LIS
Working Paper Series

No. 760

Income Inequality Convergence Across EU Regions

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January 2019
(revised in December 2020)

Luxembourg Income Study (LIS), asbl

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November 2020

Abstract

Economic inequality has increased in many EU countries in the last decades. Yet, efforts assessing economic disparities across the EU regions mostly concentrate on convergence in average per capita incomes, offering little evidence on how regional income is distributed. Using data from Luxembourg Income Study (LIS) over the 1989-2013 period, this study contributes to fill this gap, focussing on whether there has been convergence of income inequality among EU regions, and on to what extent regional initial conditions and the Cohesion Policy funds affect the convergence process. Cross-section and panel convergence regressions, after a number of robustness checks, offer three findings. First, NUTS2 regions are converging to higher level of income inequality, so becoming equally more unequal. Second, this process is significantly faster when regions share similar structural characteristics, such as similar levels of governance quality. Finally, in regions eligible for Cohesion Policy funds the pace of inequality convergence has been significantly faster, suggesting therefore that they may be driving the convergence process

Keywords: Inequality, Income distribution, Convergence, Cohesion Policy, European Union.
JEL codes: O15, O52, D31, P48.

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1. Introduction

Economic inequality has increased in many countries around the world in the last decades (e.g., OECD 2011, Morelli et al. 2015), exacerbated by the effect of the recent recession (e.g., Heathcote et al. 2010), rising to the fore in the policy debate. In the European Union (EU), the share of the population "at risk of poverty and social exclusion" has peaked in 2014, rising by more than 5 million since the beginning of financial crisis and so exceeding 122 million, which is approximately a quarter (24.4%) of the EU 28 population.[1] Nearly the 40% of total income goes on average to people in the highest income quintile, and less than 10% to people in the first quintile (Eurostat, 2014).

Rising inequality is reason for concern because of ethical considerations, as some literature on distributive justice has long argued (e.g., Solimano 1998), and because is now part of the next development goals (Goal 10 of the United Nations Sustainable Development Goals).[2] Should this not be enough, rising inequality is also reason for concern because of its social consequences (e.g., Klasen 2008, Dabla-Norris et al. 2015, and Hirschman 1973) and its economic effects (e.g., Ostry et al. 2014, Easterly 2007, Thorbecke and Charumilind 2002),[3] implying that equity and efficiency are not separate or separable objectives and that there could be an efficiency gain from greater equality (e.g., see Klasen 2008). Regarding the causes of rising inequalities, recent contributions by Stiglitz (2012) and Piketty (2014) emphasised the role of political economy explanations (through the perpetuation of rent seeking activities) and the inherent features of capitalism (characterized by the tendency of returns on capital to exceed the rate of economic growth), as root causes of increasing inequalities. In empirical terms, according to Atkinson (2016), the change in the shape of the distribution driving the rise in inequality is the explosion of gains accruing to those at the very top of the income distribution, but the circumstances of those at the bottom have contributed too.

A crucial aspect to understand this phenomenon is its subnational dimension, especially in the case of large areas of economic integration, such as the European Union. Recent trends on income inequality in the EU confirm that, by decomposing overall inequality, 85% is explained by within countries inequality (Bonesmo Fredriksen 2012), while Barca (2009) notes how prosperous regions in EU countries show at the same time strong internal disparities. Furthermore, this aspect gained further

[1] This means that people were at least in one of the following conditions: at-risk-of-poverty after social transfers (income poverty), severely materially deprived or living in households with very low work intensity. The reduction of the number of persons at risk of poverty or social exclusion is one of the five key targets of the Europe 2020 strategy. For trends on these conditions, see: http://ec.europa.eu/eurostat/. For statistics on economic inequality in the EU, refer to: https://ec.europa.eu/eurostat/Income_inequalities; https://ec.europa.eu/eurostat/statistics ("Statistics in focus" 12/2014).

[2] The United Nations Sustainable Development Goal 10 aim at "reduce inequalities within and among countries". For further details on facts, figures, and targets see: http://www.un.org/sustainabledevelopment/inequality/.

[3] For example, increasing inequality may harm the process of economic growth by affecting human capital accumulation and by heightening social conflict. However, there is no consensus on the effects of inequality on growth; see Forbes (2000). On this point, for European regions, see Perugini and Martino (2008) among the others.

importance in the last decade with the integration process that brought part of Eastern bloc countries joining the EU (increasing, therefore, the diversity of regional inequality patterns).

Despite its relevance for social and economic outcomes, the increase of inequality in the EU regions and its importance at subnational level, the debate presents two key limitations that motivate this study. Firstly, there are very few studies investigating income inequality convergence and most of them are at cross-national level: the interest is on the country dimension, while the regional dimension has not been adequately investigated, in particular for the EU. Secondly, there has been considerable effort on studying regional convergence in income per capita levels (GDP) in the EU, almost implicitly considering such outcome as expressing both economic performance and social progress. The existing literature on the effectiveness of European regional policy seems to have conflated efficiency (economic growth convergence) and equity goals (disparities in income distribution), while the former does not necessarily imply the latter.[4] In general, less attention has been paid to the redistributive aspects of economic integration. For example, it is not well understood whether the Cohesion Policy may have contributed to reduce the inequalities between countries or regions in terms of GDP per capita disparities, while failing to reduce inequalities in terms of income distribution within countries or regions.

This study contributes to fill this gap offering a systematic investigation of income inequality convergence in European regions. We provide a set of new stylized facts, testing whether EU regions with higher inequality levels experienced larger reductions in income concentration, so to close the gap with regions with lower inequality levels, as well as assessing which structural factors may affect the pace of convergence. In particular, we try to answer the following questions. Did convergence of income distribution occur among EU regions? Do regional initial conditions matter for the convergence process? Finally, what is relationship between less developed EU regions supported by the European Regional Policy and the speed of inequality convergence? Building on Ravallion (2003), we run cross-section and panel convergence regressions, as well as a number of robustness checks, to test if regional disparities in income concentration levels within each region have reduced (or increased). Our findings reveal a process of regional convergence, where EU regions are converging to a higher level of income inequality and so becoming "equally more unequal". Sharing the same structural characteristics, such as similar levels of governance quality, significantly accelerates this process. Finally, the evidence also suggests that the pace of convergence in regions eligible for Cohesion Policy funds was significantly faster, suggesting therefore that they may be driving the convergence process. Apart

[4] On the limits of GDP as indicator of economic performance and social progress, see the report by Stiglitz, Sen and Fitoussi (2010). Although GDP per capita is still seen as a popular indicator, the European Commission has adopted a communication in which outlined a range of actions to improve and complement GDP measures ("GDP and beyond: measuring progress in a changing world" (COM (2009) 433 final)).

from adding to the debate on the process of integration and on the socio-economic disparities in the EU, this study also adds to the broader literature on convergence, traditionally interested in disparities in national incomes, but much less in other development outcomes, such as poverty and inequality.[5]

The remainder of this paper is structured as follows. The second section provides a brief review of the literature. Section 3 illustrates the data used in the analysis, providing an initial illustration of how the distribution of inequality has changed over time at regional level in the EU. Sections 4 - 5 present the results, while the last one concludes.

2. On inequality convergence

Should we expect inequality convergence? The literature indicates that convergence is a possibility, resulting from "endogenous" and "exogenous" mechanisms. Regarding "endogenous" mechanisms, inequality convergence may derive from standard growth theory. Assuming that countries or regions have the same structural characteristics, the neoclassical growth model may be consistent with convergence both in the average income level and in the entire distribution of income, where convergence of income distribution is a mechanism of falling (rising) inequality in economies of high (low) initial disparities (Bénabou 1996). "Exogenous" mechanisms may be related to the redistributive consequences of major historical events or long-term changes in the global economy. For example, Ravallion (2003) argues that the institutional changes in the transition economies resulting from the end of the Cold War may have increased income inequality in such economies so that they are closer to the levels of traditional market economies. Similarly, changes in the global division of labour and in the patterns in international trade may have resulted in falling labour shares in more advanced economies and increasing labour shares in less developed ones. In turn, these changes in the functional distribution of income may have resulted into personal income inequality convergence, where advanced economies have seen rising levels of (personal) income inequality and developing economies have experienced a decrease. However, Dao et al. (2017) found that such pattern may be subject to significant heterogeneity (changes in labour share differ across groups of countries and when skilled/unskilled labour is taken into account).

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[5] Traditionally, empirical work in this area has been concerned with convergence in national income levels (e.g., Barro and Sala-i-Martin 1991, 1992; Sala-i-Martin, 1996). But recent analysis of convergence has also extended to the evolution of other development outcomes between countries. For example, Deaton (2004) and Canning (2012) looked at the evolution of health, showing convergence in life expectancy across countries. Noorbakhsh (2007) extended the concept of convergence to human development, finding evidence of weak absolute convergence over the period 1975-2002. However, findings from a long-run perspective seem to point to a partial catching up between the OECD countries and the rest taking place in the 1913-1970 period, with an overall widening of the human development gap since 1870 (Prados de la Escosura, 2015). Qualifying earlier findings, Ortega, Casquero and Sanjuán (2016) showed that the countries' capacity for convergence in human development is subject to the level of corruption, and that convergence is more pronounced in countries with lower levels of corruption.

Ultimately, lacking a consolidated theory predicting convergence (or divergence), whether we should see convergence in income distribution is an empirical matter. But the empirical literature on inequality convergence is rather scant. The first study to discuss and test for the existence of a negative relationship between the change in inequality measure and its initial value was Bénabou (1996), who found initial evidence of unconditional inequality convergence on a panel of world countries between 1970 and 1990 using cross-national data. Ravallion (2003) provided the first systematic study. Revisiting Bénabou's findings with new data and correcting for measurement error in the initial inequality measure, it finds evidence of a rather slow convergence process across countries. Further evidence supporting the convergence hypothesis is in Bleaney and Nishiyama (2003), Alvaredo and Gasparini (2015) and Chambers and Dhongde (2016b)[6], suggesting that income distributions across countries are becoming "equally unequal" (increasingly unequal, but more similar to each other). The cross-national evidence seems relatively robust across different dimensions: income inequality measure, dataset, panel structure and composition, and method of estimation, although the rate of convergence is sensitive to dataset choice (Lustig and Teles, 2016). Another set of studies has focussed on income inequality at sub-national level, within a federal state. Panizza (2001) and Lin and Huang (2011) test for and find convergence between U.S. states. Conversely, a recent contribution by Ho (2015), re-examining this hypothesis in a long run perspective, casts doubt on inequality convergence across U.S. states.

So far we have discussed the international evidence, but what do we know about the European regions? While there has been a considerable interest in studying the convergence of income per capita levels at disaggregated level, the literature has done much less regarding income inequality convergence. The process of European Integration, through the EU Cohesion Policy, may have facilitated convergence in regional income per capita, but it is less clear whether growth in average regional incomes has resulted in higher or lower income concentration. This could be empirically important. Indeed, Förster et al. (2005), analysing the Eastern European countries at regional level with LIS data in the 1990's, find that the overall inequality is dominated by inequalities within regions, rather than between them.[7] Empirical research at regional level is very limited and it is based on the European Community Household Panel (ECHP) dataset, covering very short periods. Tselios (2009) directly tests and finds initial evidence of unconditional convergence, among European regions at NUTS 1 and NUTS 2 level, over the period 1995-2000. Ezcurra and Pascual (2005) do not directly test for income inequality convergence, but

[6] Chambers and Dhongde (2016a) test also for σ convergence on decile income shares.

[7] In general, as noted by Milanovic and Van der Weide (2014), also the literature on the relationship between growth and income inequality focuses exclusively on the effects on average incomes, suggesting that there has been little interest in the specific parts of the income distribution (the higher moments of the distribution).

provide descriptive evidence on convergence in income distribution within EU regions (based on density functions), for a panel of 65 NUTS 1 regions over 1993-1998.[8]

The empirical literature on income distribution on EU regions presents significant limitations. Partly, this has to do with the limited coverage of inequality data across countries and over time. Perhaps more significantly, limitations relate to the reliability of inequality statistics: differences in questionnaire designs and income definitions in the surveys are major sources of concern in terms of comparability across countries. Moreover, existing research has not provided a systematic assessment of inequality convergence yet. In this study, therefore, we investigate whether there is convergence in income distribution across European regions, testing the hypothesis of unconditional and conditional inequality β-convergence. We assess the importance of regional initial conditions, whether the speed of convergence has changed over time and if less developed regions eligible for Cohesion Policy funds played a role in this process. Importantly, we also overcome data comparability issues, using LIS data, and test for convergence over more than two decades, so reflecting the long term nature of inequality dynamics.

3. Data

This section introduces the dataset, describes the variables, and illustrates the procedure to generate the inequality measures at NUTS 2 level. Also, it provides descriptive evidence on income inequality trends at country and regional level.

The analysis of income distribution at regional level in the EU has been subject to limitations because of data availability and comparability. To improve on this, we opt for the Luxembourg Income Study database (LIS), since it allows studying a longer period and ensures clear comparability of inequality statistics. [9] For EU countries, Eurostat provides household income and poverty micro data with two different surveys: first, via the European Community Household Panel (EHCP) and then, via the European Union Statistics on Income and Living Conditions (EU-SILC). Although they provide a fair coverage when combined together (in which case data range from 1994 to 2016, but with some missing years in the middle), it is unclear whether and to what extent they produce comparable statistics, because the EHCP and EU-SILC datasets have different data collection methodologies.[10]

[8] Rodriguez-Pose and Tselios (2015) test and finds evidence of convergence in social welfare, using Sen's index.

[9] LIS collects social and economic data from developed and developing countries, from national statistics institutes, and then conducts an ex post harmonisation to make them comparable. The LIS dataset for EU countries runs approximately from 1970 to 2014, structured in semi decadal waves until the year 2000 and then followed by three-years waves.

[10] We have a standardised questionnaire across countries for ECHP (common survey instrument) and an ex ante standardised framework to collect data for EU-SILC (ex ante harmonised framework). Atkinson et al. (2010) recognise that the EU-SILC procedure results from a balance of considerations, because of its greater flexibility and because the "…tighter

Building on LIS effort to bring together and harmonise income microdata, we therefore construct regional measures of inequality at NUTS 2 level based on the disposable household income.[11] This is a harmonised variable including total monetary and non-monetary current income for the household, net of income taxes and social security contributions. In order to create a fully comparable income variable across countries, we first apply a common top-bottom procedure to delete extreme values in incomes and then we equivalise the variable using the LIS equivalence scale (i.e., the square root of the number of household members). Finally, given that we are interested in using an equivalised income variable, we apply the household weight multiplied by the number of household members, to weight by person (*hpopwgt*nhhmem*).[12]

Frequently, income microdata are not directly available at NUTS 2 level in the LIS database. Therefore, where the availability of territorial disaggregation of data (NUTS 1, NUTS 2, NUTS 3, or LAUs) is not regular over time, we carefully aggregated households' incomes at NUTS 3 or LAUs (lower levels) to reconstruct the NUTS 2 regions and generate regional inequality measures.[13] In this process, we take into account for each country the administrative reforms that might have affected regional boundaries, using the Eurostat NUTS 2010 classification as common reference. In case of reforms with major changes of territorial boundaries, we preferred to exclude single regions (e.g. in Finland and Sweden) or the entire country (e.g. in Czech Republic) in order to avoid wrong imputations of household's residence.[14]

For all regions we compute the following inequality measures: Gini index and quintile income shares. The analysis covers different time spans and samples of NUTS 2 regions, with the longest period spanning from 1990 to 2013 and the biggest sample including 103 observations.[15]

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requirements of standardisation (as in ECHP) may have a cost in terms of reduced accuracy in the final statistical outcomes". Furthermore, they underline that "... input harmonisation does not necessarily ensure output harmonisation" (p. 103).

[11] As for the representativeness of data when disaggregated at NUTS 2 level, LIS includes in the datasets the same weights provided by the national statistical office in charge of conduct the surveys. The samples are proportionally distributed on the regional level between urban and rural areas, in order to make them representative even for small regions.

[12] We bottom-code by setting all values less than zero to zero, and top-code by setting all values greater than ten time the median value to ten times the median value. We use inflated weights instead of normalized weights, since the analysis is restricted to EU countries, and therefore there is no huge discrepancy among the involved countries (for example, normalized weights are suggested in the case of country comparison as USA and Switzerland involved in the analysis).

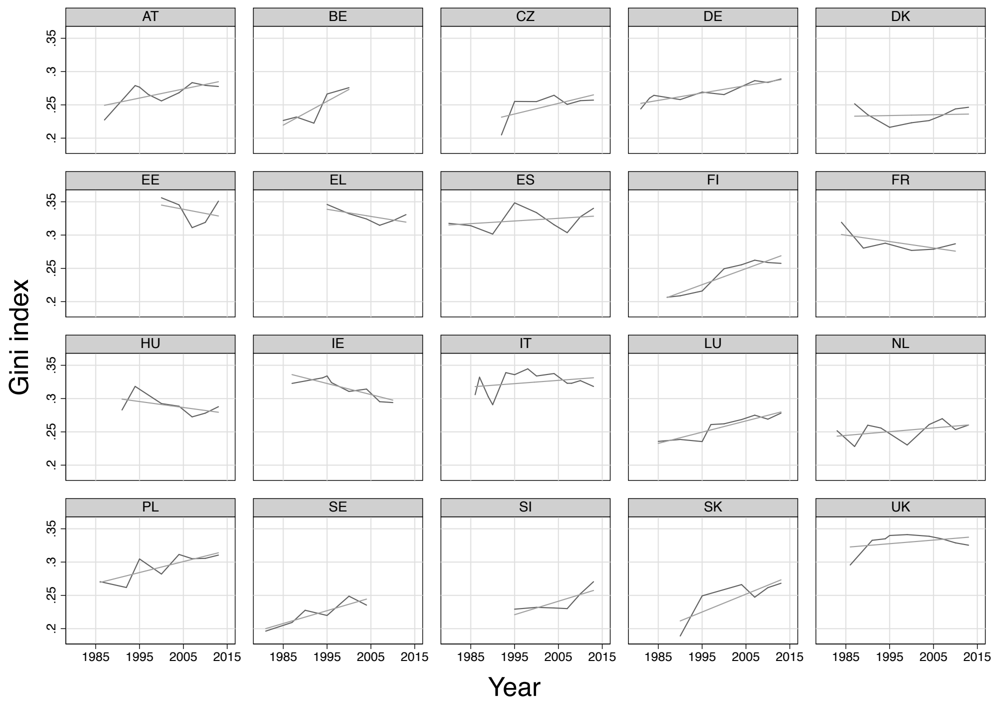
[13] Data availability in some countries is not regular across waves, as well as the regional disaggregation captured by the variable *region_c*. The first sub-national data are available during the 70's for the UK (NUTS1), and extends gradually to the majority of countries in the end of 80's with a NUTS 2 level of disaggregation (or lower level). In 1995 and 2000 waves, inequality measures are estimated using the nearest LIS wave available for Austria and Spain.

[14] Administrative reforms, for example, occurred in the Czech Republic in the wave III, in Sweden in the waves III and IV, and in Finland in the waves II, III and IV of LIS data.

[15] To test for inequality convergence, we compute delta variables for each inequality measure using the "first" and "last" values according to the time spans considered for cross section regressions (1990-2013, 1995-2013, 2000-2013, 2004-2013), and to the four programming periods of European Regional Policy in the case of panel regressions (1989-1993, 1994-1999, 2000-2006, 2007-2013). When data are not available exactly in the corresponding first or last year of interest, we replace the nearest value of the related LIS wave, if available.

A first look at income inequality trends in EU countries since 1985 reveals two regularities (Figure 1). First, there is a nearly generalised increase in income inequality (in 14 countries out of twenty), where countries starting with traditionally low income concentration have seen a significant increase (except for Denmark). Second, in more unequal countries income inequality level increased marginally, such as Italy and Spain, or decreased as in Greece. However, this is a picture at country level, which could hide interesting variations if disaggregated at regional level.

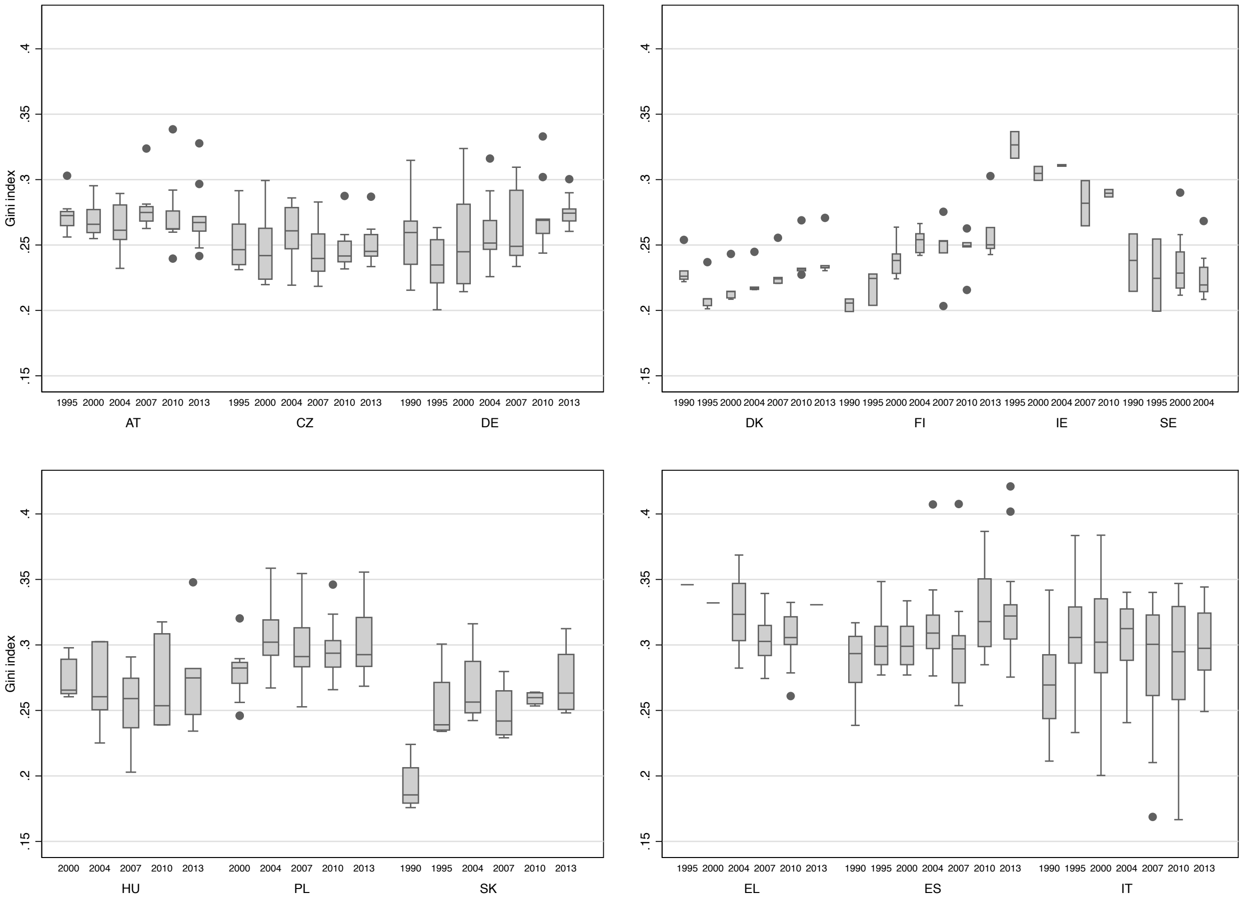
Figure 1 - Gini index in EU countries: 1985-2015



Notes: Gini index at country level calculated on equivalised disposable household income using Luxembourg Income Study (LIS) data.

Figure 2 presents the intra-country variations of income inequality at NUTS 2 level over time. We observe two facts. First, in general, national trends hide significant subnational disparities except for Northern countries reporting minor levels of variation. Second, despite highest within-country inequality characterised countries of Mediterranean area, the remarkable gap across regions decreased in the last available wave (around 2013). It is worth noting that the exceptional outside values for Spain (ES) in 2013 (with a Gini index of 0.421 and 0.401) refer respectively to the autonomous regions of Ceuta and Melilla, African enclaves in Morocco.

Figure 2 - Within country variation of income inequality: Gini index at NUTS 2 level



Notes: Gini index calculated on equivalised disposable household income at NUTS 2 level (all available years). Note that Luxembourg (LU), Estonia (EE) and Slovenia (SI) are considered as single NUTS2 regions and therefore excluded from the graph. Box plots for Germany (DE) based on nine NUTS 2 regions, and for Sweden (SE) on three regions in the waves 1990 and 1995.

Table 1 reports descriptive statistics for measures of inequality, at regional level, across four different samples, including initial and final year periods. The number of observations may range from 53 in 1990-2013 to 103 observations in 2004-2013. The main fact emerging from the figures is an overall increase in inequality, corresponding to a widening gap in the extreme parts of the entire distribution: on average, the poorest quintiles reduce their shares of total income, while the richest quintile gains.

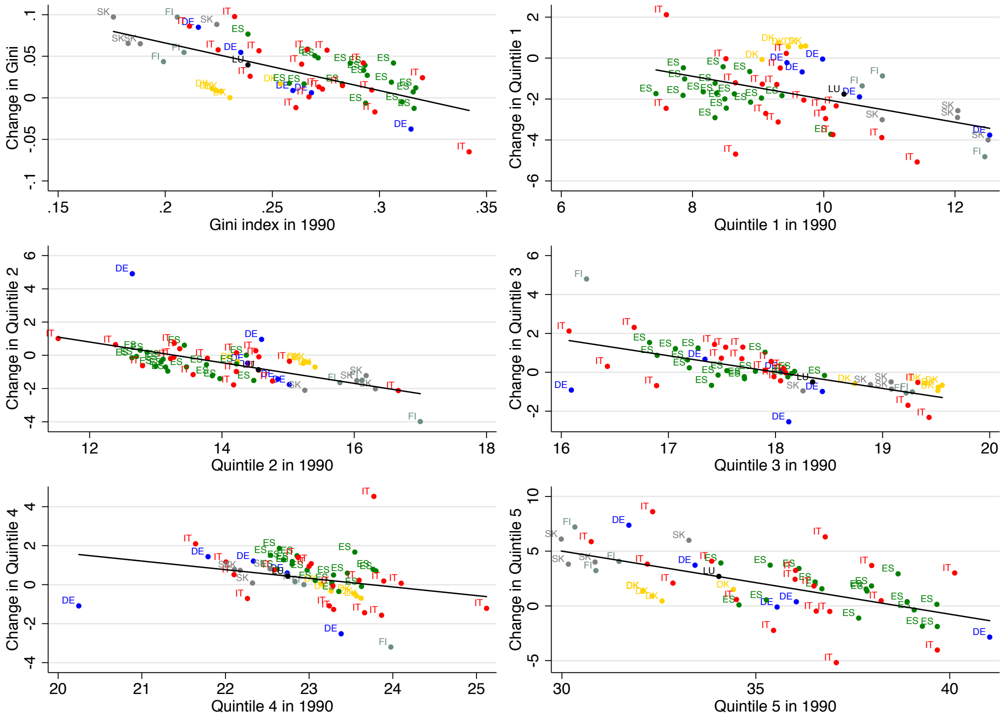
Table 1 - Income inequality across EU regions: summary statistics in four different samples

		SAMPLE 1		SAMPLE 2		SAMPLE 3		SAMPLE 4	
	Year	1990	2013	1995	2013	2000	2013	2004	2013
GINI INDEX									
	mean	0.26	0.29	0.27	0.28	0.28	0.29	0.28	0.29
	cv	0.15	0.11	0.15	0.11	0.13	0.11	0.13	0.12
	N	53	53	75	75	98	98	103	103
	sd	0.04	0.03	0.04	0.03	0.04	0.03	0.04	0.03
	max	0.34	0.35	0.38	0.35	0.38	0.36	0.41	0.42
	min	0.18	0.23	0.20	0.23	0.20	0.23	0.22	0.23
QUINTILE 1									
	mean	9.52	7.78	8.83	8.23	8.88	8.22	8.69	8.22
	cv	0.14	0.19	0.17	0.18	0.15	0.17	0.15	0.17
	N	53	53	75	75	98	98	103	103
	sd	1.30	1.48	1.51	1.48	1.32	1.42	1.34	1.42
	max	12.53	10.32	12.56	10.42	12.13	10.54	12.07	10.54
	min	7.44	3.97	5.42	3.97	4.89	3.97	4.14	3.97
QUINTILE 2									
	mean	14.19	13.63	13.96	13.82	13.84	13.67	13.76	13.67
	cv	0.08	0.08	0.08	0.07	0.07	0.07	0.08	0.07
	N	53	53	75	75	98	98	103	103
	sd	1.20	1.04	1.10	0.96	0.91	0.99	1.07	1.01
	max	17.00	17.55	16.02	17.55	15.65	17.55	18.41	17.55
	min	11.52	12.18	10.77	12.18	11.59	11.41	10.58	11.11
QUINTILE 3									
	mean	17.96	18.01	18.13	17.99	17.93	17.98	17.69	17.94
	cv	0.05	0.05	0.04	0.05	0.05	0.06	0.06	0.06
	N	53	53	75	75	98	98	103	103
	sd	0.93	0.90	0.81	0.81	0.97	1.03	0.98	1.10
	max	19.56	21.03	20.27	21.03	22.78	24.12	19.31	24.12
	min	16.07	15.18	16.19	15.18	14.46	15.18	13.91	13.55
QUINTILE 4									
	mean	23.01	23.33	23.08	23.21	22.72	23.15	22.86	23.13
	cv	0.03	0.05	0.03	0.05	0.04	0.05	0.04	0.04
	N	53	53	75	75	98	98	103	103
	sd	0.76	1.25	0.72	1.14	0.90	1.04	0.96	1.03
	max	25.12	28.30	24.73	28.30	24.99	28.30	27.02	28.30
	min	20.25	19.16	20.33	19.16	18.33	19.16	20.49	19.16
QUINTILE 5									
	mean	35.31	37.26	36.01	36.74	36.63	36.98	36.99	37.05
	cv	0.09	0.07	0.08	0.07	0.08	0.07	0.08	0.08
	N	53	53	75	75	98	98	103	103
	sd	3.00	2.59	2.99	2.51	2.87	2.66	2.85	2.84
	max	41.03	43.14	45.09	43.14	45.21	43.33	44.89	47.99
	min	29.98	31.89	30.74	31.89	30.86	30.83	30.00	30.83

Notes: The 1990–2013 panel includes 53 regions of 7 countries (DE, DK, ES, FI, IT, LU, SK), while the 1995–2013 panel includes 75 regions of 10 countries (AT, CZ, DE, DK, ES, FI, IT, LU, SI, SK). The 2000-2013 panel includes 98 regions of 12 countries (AT, CZ, DE, DK, EE, ES, FI, HU, IT, LU, PL, SI). The 2004-2013 panel includes 103 regions of 13 countries (AT, CZ, DE, DK, EE, ES, FI, HU, IT, LU, PL, SI, SK).

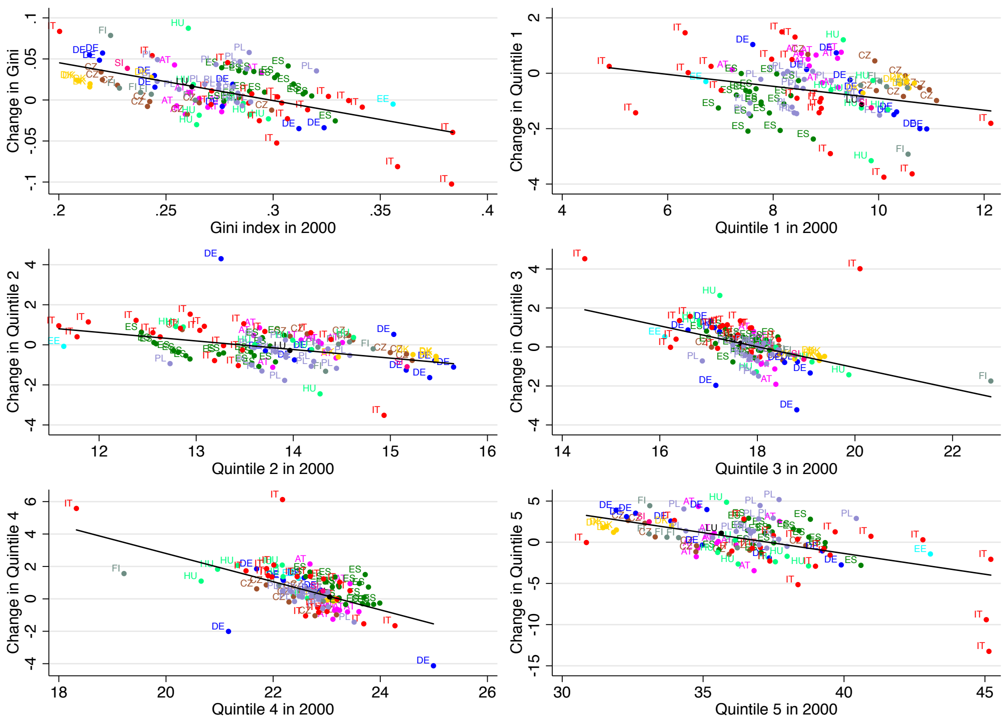
Figures 3 and 4 take a first look at convergence, reporting the scatter plots and fitting simple regression lines, for all measures of inequality for a couple of the samples analysed. Regions with higher levels of inequality seem to catch up with those having lower initial levels of inequality in 1990 and 2000, therefore providing suggestive evidence of unconditional convergence. However, these graphical illustrations do not reveal the significance and speed of the convergence process, which will be fully examined in regression estimates in the next section.

Figure 3 - Gini and quintile shares: Initial level in 1990 versus change 2013-1990



Notes: The period 1990–2013 includes 7 countries (DE, DK, ES, FI, IT, LU, SK).

Figure 4 - Gini and quintile shares: Initial level in 2000 versus change 2013-2000



Notes: The period 2000 – 2013 includes 12 countries (AT, CZ, DE, DK, EE, ES, FI, HU, IT, LU, PL, SI).

4. Inequality Convergence Tests

Following Ravallion (2003), let I_{it} denote the observed Gini index, or other measure of inequality, in a region i at time $t = 0$ and $t = T$, i.e., in the first and last year of the period considered, respectively. We regress the observed changes over time in a measure of inequality on the initial values across regions, estimating:

$$I_{iT} - I_{i0} = \alpha + \beta I_{i0} + \varepsilon_i \quad (i = 1, \dots, N) \quad (1)$$

where α and β are parameters to be estimated. A significant negative (positive) estimate of β implies that there is convergence (divergence).[16]

4.1 Unconditional convergence

Are more unequal European regions narrowing (or broadening) their gap in income concentration with less unequal regions? The top panel in Table 2 reports convergence test over the period 1990-2013, the longest available period, for Gini index and quintile shares. The coefficients of initial values are negative and statistically significant for all measures (except for the fourth quintile, but below we show that such result is not a general one, as it depends on an outlying region). Such results show that within region income inequality has been converging, since the initial year 1990, regardless of regional initial conditions, i.e., no matter of why EU regions are equal or unequal.

To give an appreciation of the speed of convergence, consider the Gini index in 1990 in Spanish region of La Rioja ES23 (scoring 0.3105) and the Finnish region of Helsinki-Uusimaa FI1B (scoring 0.2084). The two regions are positioned very close to the regression line, but nearly at its opposite extremes. According to our OLS estimates, the expected change in inequality will be 0.180 + (-0.572 · 0.3105) = 0.002, in the former case, and 0.180 + (-0.572 · 0.2084) = 0.061 in the latter. Such trends imply that, after 23 years, the two regions are predicted to reach an inequality level of 0.3105 + 0.002 = 0.313 in La Rioja, and 0.2084 + 0.061 = 0.269 in Helsinki-Uusimaa. At this pace, it would take approximately 39 years before Helsinki-Uusimaa catches up with La Rioja. This is indicative of a significant process of unconditional convergence, where inequality levels are converging, but to a higher level. Such trend implies also that EU regions are converging to an average Gini index level of |0.180/-0.572|= 0.314.

[16] This corresponds to the concept of beta-convergence associated with the idea of convergence in country income levels, as developed by Barro and Sala-i-Martin (1991, 1992), where there is absolute beta-convergence if poor economies tend to grow faster than rich ones (Sala-i-Martin, 1996). Others have emphasized a different statistical notion of convergence (e.g., Quah, 1993): sigma-convergence, which looks at whether the cross-sectional dispersion across countries is decreasing, and for which beta-convergence is a necessary, but not sufficient, condition (see Sala-i-Martin, 1996). We do not pursue this approach here, because it would not allow us to focus on whether initial conditions matter for inequality convergence and on estimating its speed, while both are interesting aspects of the process of inequality dynamics we would like to document.

Instead, looking at the distribution in quintiles shares in 1990, the top quintile is converging to an average income share of 38.70 while the bottom quintile to a share of 6.41.

Finally, it is worth noting that the goodness of fit indicates that the initial level explains a sizable portion of the variation in the subsequent change of income inequality. This suggests that such estimates may be more than a descriptive result about the experience of low-inequality regions and hence indicate that some significant convergence mechanism is at work, although we cannot tell which one(s).

4.2 Robustness checks

We conduct two types of robustness checks. First, we repeat the analysis on different periods, including larger samples of regions. Second, we detect the effect of influential observations by re-estimating the regressions using Iteratively Reweighted Least Squares (IRLS). Table 2 reports unconditional convergence estimates also for the periods 1995-2013, 2000-2013 and 2004-2013. This allows to check if the speed of convergence changes during recent periods or if the tests include a larger sample of regions.[17] OLS results are constant over the four periods examined and repeating convergence simulations leads to similar conclusions. The results are generally insensitive to checks for influential observations.

[17] The estimated speed may also be biased in case the initial value of the inequality is measured with error: under (over) estimating the initial value would return to over (under) estimation of the convergence (divergence) trend. In cross-country datasets, this may be a major issue. Indeed, Ravallion (2003) corrects for measurement error instrumenting the current initial level of inequality measure with the one in the previous year. However, this should not be an issue in this case, as the LIS database ensures comparability across regions.

Table 2 - Unconditional convergence in inequality: OLS estimates

PANEL A	Change in Gini, 1990-2013	Changes in quintile shares, 1990 – 2013				
	GINI INDEX	QUINTILE 1	QUINTILE 2	QUINTILE 3	QUINTILE 4	QUINTILE 5
Initial value 1990	-0.572***	-0.561***	-0.622***	-0.841***	-0.443	-0.576***
	(0.094)	(0.131)	(0.125)	(0.191)	(0.313)	(0.100)
Constant	0.180***	3.598***	8.264***	15.154***	10.512	22.301***
	(0.025)	-1.293	-1.827	-3.517	-7.187	-3.503
F-stat	36.700***	18.230***	24.756***	19.322***	2.000	33.508***
Adj. R-Sq.	0.421	0.207	0.382	0.428	0.058	0.358
Obs.	53	53	53	53	53	53
RMSE	0.026	1.376	0.939	0.898	1.187	2.282
Converging to:	0.314	6.41	13.2	18.01	22.9	38,7
PANEL B	Change in Gini, 1995-2013	Changes in quintile shares, 1995 – 2013				
	GINI INDEX	QUINTILE 1	QUINTILE 2	QUINTILE 3	QUINTILE 4	QUINTILE 5
Initial value 1995	-0.440***	-0.411***	-0.496***	-0.959***	-0.937***	-0.501***
	(0.063)	(0.114)	(0.067)	(0.166)	(0.216)	(0.081)
Constant	0.132***	3.030***	6.789***	17.252***	21.747***	18.783***
	(0.017)	(1.039)	(0.955)	(2.984)	(4.997)	(2.835)
F-stat	49.001***	13.043***	54.622***	33.310***	18.793***	38.197***
Adj. R-Sq.	0.382	0.202	0.319	0.474	0.251	0.348
Obs.	75	75	75	75	75	75
RMSE	0.022	1.197	0.788	0.815	1.149	2.026
Converging to:	0.299	7.37	13.68	17.98	23.22	37.47
PANEL C	Change in Gini, 2000-2013	Changes in quintile shares, 2000 – 2013				
	GINI INDEX	QUINTILE 1	QUINTILE 2	QUINTILE 3	QUINTILE 4	QUINTILE 5
Initial value 2000	-0.461***	-0.216***	-0.429***	-0.536***	-0.870***	-0.505***
	(0.082)	(0.073)	(0.080)	(0.175)	(0.172)	(0.131)
Constant	0.138***	1.254*	5.765***	9.665***	20.199***	18.846***
	(0.022)	(0.648)	(1.113)	(3.117)	(3.941)	(4.697)
F-stat	31.678***	8.699***	28.920***	9.412***	25.495***	14.821***
Adj. R-Sq.	0.313	0.068	0.170	0.231	0.357	0.288
Obs.	98	98	98	98	98	98
RMSE	0.025	0.985	0.841	0.934	1.042	2.254
Converging to:	0.298	5.81	13.45	18.01	23.21	37.31
PANEL D	Change in Gini, 2004-2013	Changes in quintile shares, 2004 – 2013				
	GINI INDEX	QUINTILE 1	QUINTILE 2	QUINTILE 3	QUINTILE 4	QUINTILE 5
Initial value 2004	-0.331***	-0.196***	-0.491***	-0.787***	-0.758***	-0.418***
	(0.076)	(0.073)	(0.140)	(0.219)	(0.123)	(0.099)
Constant	0.097***	1.235*	6.664***	14.173***	17.582***	15.529***
	(0.021)	(0.643)	(1.905)	(3.913)	(2.831)	(3.583)
F-stat	19.09***	7.14***	12.22***	12.91***	38.08***	17.74***
Adj. R-Sq.	0.190	0.067	0.271	0.329	0.337	0.203
Obs.	103	103	103	103	103	103
RMSE	0.024	0.922	0.853	1.087	1.012	2.319
Converging to:	0.293	6.30	13.57	18.00	23.21	37.12

Notes: changes in each measure of inequality are regressed against the respective initial values in four periods. The panel A includes 7 countries (DE, DK, ES, FI, IT, LU, SK) while the panel B includes 10 countries (AT, CZ, DE, DK, ES, FI, IT, LU, SI, SK). The panel C includes 12 countries (AT, CZ, DE, DK, EE, ES, FI, HU, IT, LU, PL, SI). The panel D includes 13 countries (AT, CZ, DE, DK, EE, ES, FI, HU, IT, LU, PL, SI, SK). Significance levels are defined as follows: 10% (*), 5% (**) and 1% (***). Heteroskedasticity robust standard errors are in parentheses.

IRLS regressions in Table 3, down-weighting potential outliers in the sample, largely confirm previous results. They also return a significant coefficient also for the fourth quintile in 1990-2013, suggesting that the earlier result indicating lack of convergence should be misleading. Indeed, a re-examination of this regression shows that this finding is not a general one: it is driven by an outlier, that is, the German region of Bremen (see also the scatter plot of the fourth quintile in the Figure 3). Finally, when looking at convergence of the Lorenz Curve, the trends imply that the three middle quintiles are converging to shares essentially similar to year 1990.

Table 3 - Unconditional convergence in inequality: IRLS estimates

PANEL A	Change in Gini, 1990 – 2013	Changes in quintile shares, 1990 – 2013				
	GINI INDEX	QUINTILE 1	QUINTILE 2	QUINTILE 3	QUINTILE 4	QUINTILE 5
Initial value 1990	-0.566***	-0.552***	-0.499***	-0.796***	-0.816***	-0.564***
	(0.099)	(0.156)	(0.080)	(0.099)	(0.173)	(0.107)
Constant	0.179***	3.494**	6.423***	14.372***	19.171***	21.840***
	(0.026)	(1.503)	(1.142)	(1.784)	(3.996)	(3.808)
F-stat	32.415***	12.462***	38.641***	64.409***	22.206***	27.513***
Adj. R-Sq.	0.377	0.181	0.420	0.549	0.294	0.338
Obs.	53	53	53	53	52	53
RMSE	0.029	1.463	0.697	0.669	0.822	2.327
PANEL B	Change in Gini, 1995 – 2013	Changes in quintile shares, 1995 – 2013				
	GINI INDEX	QUINTILE 1	QUINTILE 2	QUINTILE 3	QUINTILE 4	QUINTILE 5
Initial value 1995	-0.426***	-0.373***	-0.476***	-0.828***	-0.898***	-0.476***
	(0.070)	(0.095)	(0.075)	(0.086)	(0.145)	(0.080)
Constant	0.128***	2.713***	6.449***	14.959***	20.863***	17.916***
	(0.019)	(0.854)	(1.054)	(1.554)	(3.345)	(2.906)
F-stat	37.596***	15.303***	39.951***	93.452***	38.424***	34.981***
Adj. R-Sq.	0.331	0.162	0.345	0.555	0.336	0.315
Obs.	75	75	75	75	75	75
RMSE	0.024	1.234	0.714	0.598	0.902	2.071
PANEL C	Change in Gini, 2000 – 2013	Changes in quintile shares, 2000 – 2013				
	GINI INDEX	QUINTILE 1	QUINTILE 2	QUINTILE 3	QUINTILE 4	QUINTILE 5
Initial value 2000	-0.391***	-0.154**	-0.354***	-0.548***	-0.919***	-0.318***
	(0.071)	(0.075)	(0.078)	(0.068)	(0.094)	(0.075)
Constant	0.118***	0.775	4.735***	9.850***	21.316***	12.130***
	(0.020)	(0.672)	(1.083)	(1.216)	(2.141)	(2.754)
F-stat	30.249***	4.247***	20.521***	65.226***	95.234***	17.883***
Adj. R-Sq.	0.232	0.032	0.168	0.401	0.493	0.150
Obs.	98	98	98	97	98	97
RMSE	0.026	0.970	0.700	0.630	0.835	2.027
PANEL D	Change in Gini, 2004 – 2013	Changes in quintile shares, 2004 – 2013				
	GINI INDEX	QUINTILE 1	QUINTILE 2	QUINTILE 3	QUINTILE 4	QUINTILE 5
Initial value 2004	-0.311***	-0.179***	-0.286***	-0.494***	-0.766***	-0.417***
	(0.067)	(0.066)	(0.071)	(0.062)	(0.081)	(0.080)
Constant	0.091***	1.211**	3.883***	8.864***	17.771***	15.512***
	(0.019)	(0.583)	(0.975)	(1.094)	(1.848)	(2.962)
F-stat	21.44***	7.31***	16.25***	64.24***	89.88***	27.25***
Adj. R-Sq.	0.167	0.058	0.131	0.385	0.466	0.205
Obs.	103	103	102	102	103	103
RMSE	0.025	0.898	0.693	0.560	0.784	2.301

Notes: The panel A includes 53 regions except in the 4th quintile where the German region of Bremen (DE50) is an outlier, and therefore dropped. The panel C includes 98 regions except in the 3rd and 5th quintile where the regions Valle d'Aosta (ITC2) and Abruzzo (ITF1) are outliers and dropped. The panel D includes 103 regions except in the 2nd and 3rd quintiles where Aland (FI20) is dropped. Significance levels are defined as follows: 10% (*), 5% (**) and 1% (***). Heteroskedasticity robust standard errors are in parentheses.

5. Conditional convergence

The first set of regressions revealed that inequality convergence at regional level occurred regardless their initial conditions, although at a relatively slow pace, and to a higher level of inequality. To what extent structural characteristics of the regions matter in this process? Is the speed of the convergence significantly faster if they share the same initial conditions? To this aim, we introduce in the baseline specification a set of variables to account for potential drivers of income inequality and so test for conditional convergence. We estimate:

$$I_{iT} - I_{i0} = \alpha + \beta I_{i0} + \gamma \mathbf{X}_{i0} + \varepsilon_i \qquad (i = 1, \dots, N) \qquad (2)$$

The set of initial conditions, the vector $\mathbf{X}_{i0}$ includes country dummies and the following variables: (i) the level of economic development (GDP per capita), as the different initial regional economic performance might have different effect on inequality following the Kuznets hypothesis of an inverted U-shaped relationship (Kuznets, 1955); (ii) the labour income share (captured by the compensation of employees/GDP per capita) and (iii) a measure of the capital share (reflected by the Gross Fixed Capital Formation, or GFCF), as global division of labour and international trade patterns may have resulted in falling labour shares in more advanced economies and increasing labour shares in less developed ones changing the functional distribution of income (Dao et al., 2017). In some specifications, only for the 2000-2013 period, we could also control for socio-economic variables including: (iv) measures of human capital and technological innovation, as there is growing evidence supporting the hypothesis that technological innovation lead to higher level of inequality through the job polarisation mechanism, with high demand for both high-skilled (well-paid) and low-skilled (low-paid) jobs to the detriment of middle-income jobs (Acemoglu, 2002; Autor and Dorn, 2013; and Goos et al., 2014 for evidence on Europe); (v) population density, to account for population dynamics and change in households structure, as a trend toward smaller households (e.g. for OECD countries) is likely to increase income inequality because they are less able to benefit from saving coming from pooling resources and sharing expenditures (OECD, 2011; Furceri and Ostry, 2019); (vi) finally, a composite indicator expressing the quality of institutions at regional level, as low levels of corruption and better institutions are supposed to provide economic opportunities to a broad cross-section of the population (Acemoglu, 2008).[18]

OLS results from conditional convergence regressions confirm that inequality has been converging in all our periods of investigation, with the coefficients of initial values negative and statistically significant for all measures of inequality. One should also note that the estimated coefficients for the initial values are larger than the coefficients estimated in the unconditional regression, in absolute terms. In this case, therefore, this suggests that if regions share the same level of economic development, the same functional distribution of income, this process is faster. How much faster is the convergence process? Comparing unconditional and conditional OLS estimates in 1990-2013, the magnitude of coefficients is substantially larger, both for Gini index and for quintile shares, with the exception of the fourth quintile (Table 4). We check the robustness of the results repeating the analysis on different periods, including different samples of regions. In 1995-2013, the coefficients remain essentially unvaried in terms of sign and significance, while the speed of the convergence process reduced or remained stable for Gini index

[18] We use data from European Commission (Eurostat database, 2016), Cambridge Econometrics (European Regional Database-ERD, 2016) and Quality of Government Institute (European Quality of Government Index EQI, 2013).

and quintiles, except for the fourth quintile (Table A4 in the Appendix). This can be explained by the inclusion of more egalitarian regions of Czech Republic and Austria in such estimates.

Looking at control variables entering OLS regressions, regional initial conditions seems to contribute significantly in explaining the variation of inequality and quintiles shares of income. For the period 1990-2013, we find some evidence that economic development benefits only the bottom part of income distribution and no evidence supporting the Kuznets hypothesis. With respect to the functional distribution of income, a variation of capital share is significantly associated with an increase in income inequality and a widening gap between the top and bottom of the distribution of income; while there is no clear evidence on the role of labour share. Re-estimating the regressions by dropping influential observations (Panel B) and for the period 1995-2013 confirms the results. See Table A3 in the Appendix.

Table 4 - Conditional convergence in inequality: OLS 1990 - 2013

PANEL A	Change in Gini, 1990-2013	Changes in quintile shares, 1990-2013				
	GINI INDEX	QUINTILE 1	QUINTILE 2	QUINTILE 3	QUINTILE 4	QUINTILE 5
Initial value 1990	-0.858***	-1.258***	-0.694***	-1.068***	-0.697**	-0.794***
	(0.136)	(0.221)	(0.126)	(0.194)	(0.274)	(0.172)
GDP per capita (ln)	-0.137	7.721*	6.326*	5.385	-1.819	-14.913
	(0.100)	(4.109)	(3.601)	(4.020)	(4.791)	(9.938)
GDP per capita squared (ln)	-0.016	0.821*	0.716*	0.560	-0.211	-1.578
	(0.011)	(0.425)	(0.378)	(0.424)	(0.518)	(1.081)
GFCF	0.001**	-0.053**	-0.035**	-0.022	-0.014	0.121***
	(0.000)	(0.025)	(0.015)	(0.015)	(0.025)	(0.044)
Labour Income Share	0.018	-2.780	6.981*	-4.778*	-2.047	0.949
	(0.098)	(3.120)	(3.938)	(2.686)	(4.832)	(9.986)
Constant	-0.045	28.941***	19.013**	32.867***	13.632	-2.617
	(0.211)	(9.534)	(7.398)	(9.129)	(12.999)	(21.356)
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
F-stat	13.12***	14.20***	9.87***	12.20***	10.15***	8.15***
Adj. R-Sq.	0.601	0.571	0.600	0.612	0.108	0.434
Obs.	52	52	52	52	52	52
RMSE	0.022	1.021	0.758	0.741	1.166	2.155
PANEL B	Change in Gini, 1990-2013	Changes in quintile shares, 1990-2013				
	GINI INDEX	QUINTILE 1	QUINTILE 2	QUINTILE 3	QUINTILE 4	QUINTILE 5
Initial value 1990	-0.824***	-1.065***	-0.640***	-0.859***	-0.459*	-0.733***
	(0.129)	(0.260)	(0.096)	(0.167)	(0.264)	(0.150)
GDP per capita (ln)	-0.228***	9.726**	9.180**	4.080	2.345	-23.256***
	(0.082)	(4.068)	(3.479)	(2.954)	(3.437)	(7.482)
GDP per capita squared (ln)	-0.025***	1.009**	1.003***	0.419	0.215	-2.407***
	(0.009)	(0.412)	(0.363)	(0.308)	(0.356)	(0.784)
GFCF	0.001***	-0.055**	-0.041***	-0.015	-0.016	0.127***
	(0.000)	(0.023)	(0.015)	(0.015)	(0.024)	(0.039)
Labour Income Share	0.221**	-8.303**	3.001	-8.066*	-9.506*	23.408**
	(0.084)	(3.858)	(4.330)	(4.410)	(5.071)	(9.171)
Constant	-0.346*	34.005***	26.267***	27.802***	20.627*	-33.319**
	(0.179)	(10.044)	(7.166)	(6.546)	(10.346)	(16.296)
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
F-stat	54.66***	24.22***	22.14***	10.69***	4.73***	12.65***
Adj. R-Sq.	0.710	0.602	0.654	0.574	0.042	0.569
Obs.	50	50	50	50	50	50
RMSE	0.018	0.945	0.649	0.651	1.051	1.774

Notes: The panel 1990-2013 includes regions of 7 countries (DE, DK, ES, FI, IT, LU, SK). Berlin region (DE30) is excluded from the sample as control variables are unavailable in year 1990. Control variables are expressed in billions of euro and deflated to 2005 constant price euros using sectoral price deflators obtained from AMECO. Significance levels are defined as follows: 10% (*), 5% (**) and 1% (***). Heteroskedasticity robust standard errors are in parentheses.

We repeat the analysis also for 2000-2013 with a larger sample of regions and different specifications of the model. In this case, we can also add further variables to control for level of tertiary education (expressed as the percentage of the population 25/64 years old), technology (given by the number of patent applications to the European Patent Office per million inhabitants), population density (expressed as the population average per square kilometre), and the quality of regional institutions (given by the European Quality of Government Index - EQI).[19] OLS estimates for 2000-2013 generally confirm previous results. However, in this case, the effect of GDP is to exacerbate the level of economic inequality and to widen the gap at the extremes of the distribution of income (See Tables A4 and A5 in the Appendix). More interestingly, these estimates add evidence on the role of institutional structural factors in this process. The EQI coefficient in the first panel of Table A5, negative and significant, indicates that improving the quality of regional institutions will result in a decrease of economic inequality. In addition, when looking at the quantile distribution of income at its extremes, the inverse sign of the coefficients for the lowest and the highest quintile confirms the potential "redistributive" effect of better regional governance. These results are generally confirmed also in the second panel, where further controls allow sharing the same level of regional education and technology, and the same population density.

5.1 Fixed Effects results

We also include Fixed Effects (FE) estimates, since they allow to control for time-invariant regional characteristics, eliminating therefore a potential source of omitted variable bias. FE estimates support the hypothesis of inequality convergence in all periods analysed, with the magnitude of Gini and quintile coefficients being larger, as all time-invariant regional initial conditions are held constant with this estimator. For 1990-2013, the evidence in Table 5 confirms the significant effect of GDP in widening income inequality in both stage of economic development, and a corresponding significant effect in decreasing lowest quintiles share of income and increasing the highest. Capital share variation is not associated with a significant change in inequality, while there is evidence on middle quintiles for labour share. Results are confirmed when dropping influential observations (Panel B) and for the period 1995-2013 (see Table A6 in the Appendix).

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[19] EQI is a composite indicator from Quality of Government Institute (Charron et al. 2013) capturing EU citizens' perceptions and experiences with corruption (corruption pillar), and the extent to which they rate their public services as impartial (impartial pillar) and of good quality (quality pillar) across EU countries. Given the long term nature of institutional changes, we use data of first round collected in 2010 as a proxy for the initial values.

Table 5 - Conditional convergence in inequality: Fixed Effects (FE) 1990-2013

PANEL A	Change in Gini, 1990-2013	Changes in quintile shares, 1990-2013				
	GINI INDEX	QUINTILE 1	QUINTILE 2	QUINTILE 3	QUINTILE 4	QUINTILE 5
Initial value	-1.156***	-1.035***	-1.057***	-1.039***	-1.204***	-1.235***
	(0.080)	(0.075)	(0.129)	(0.156)	(0.107)	(0.109)
GDP per capita (ln)	0.378***	-7.029	-8.161***	-7.133**	-9.891	32.915***
	(0.096)	(4.610)	(2.875)	(3.492)	(6.856)	(7.578)
GDP per capita squared (ln)	0.042***	-0.720	-0.848**	-0.842*	-1.398	3.916***
	(0.013)	(0.591)	(0.357)	(0.477)	(0.908)	(1.071)
GFCF	0.001	-0.011	-0.003	-0.015	-0.023	0.057
	(0.001)	(0.017)	(0.014)	(0.015)	(0.022)	(0.042)
Labour Income Share	0.048	-3.664	-5.940**	7.255**	-0.687	2.279
	(0.051)	(2.319)	(2.667)	(2.822)	(5.057)	(5.530)
Constant	1.137***	-5.938	-1.932	0.492	11.151	112.494***
	(0.187)	(9.155)	(5.572)	(6.566)	(11.848)	(14.570)
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes
F-stat	36.92***	41.85***	15.26***	7.75***	29.69***	22.90***
Adj. R-Sq.	0.650	0.618	0.509	0.493	0.560	0.653
Obs.	196	196	196	196	196	196
Regions	52	52	52	52	52	52
RMSE	0.018	0.710	0.624	0.684	0.867	1.557
PANEL B	Change in Gini, 1990-2013	Changes in quintile shares, 1990-2013				
	GINI INDEX	QUINTILE 1	QUINTILE 2	QUINTILE 3	QUINTILE 4	QUINTILE 5
Initial value	-1.178***	-1.022***	-1.021***	-1.107***	-1.230***	-1.272***
	(0.079)	(0.067)	(0.133)	(0.184)	(0.120)	(0.105)
GDP per capita (ln)	0.284***	-3.131	-7.484***	-7.533*	-6.907	25.092***
	(0.075)	(4.563)	(2.775)	(4.010)	(6.156)	(4.700)
GDP per capita squared (ln)	0.030***	-0.320	-0.798**	-0.835	-0.875	2.764***
	(0.010)	(0.624)	(0.344)	(0.539)	(0.803)	(0.670)
GFCF	0.001	-0.018	-0.006	-0.012	-0.016	0.055
	(0.000)	(0.015)	(0.015)	(0.016)	(0.021)	(0.040)
Labour Income Share	0.023	-4.690*	-6.643**	8.991***	3.465	-3.094
	(0.063)	(2.660)	(3.088)	(3.292)	(4.726)	(5.614)
Constant	0.975***	3.436	-0.256	-0.859	13.377	103.829***
	(0.144)	(8.318)	(5.570)	(7.199)	(11.215)	(12.517)
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes
F-stat	42.54***	43.45***	14.87***	8.17***	21.29***	24.50***
Adj. R-Sq.	0.667	0.635	0.494	0.503	0.566	0.673
Obs.	188	188	188	188	188	188
Regions	50	50	50	50	50	50
RMSE	0.018	0.666	0.618	0.652	0.844	1.504

Notes: The panel includes regions of 7 countries (DE, DK, ES, FI, IT, LU, SK). Berlin region (DE30) is excluded from the sample as control variables are unavailable in year 1990. Control variables are expressed in billions of euro and deflated to 2005 constant price euros using sectoral price deflators obtained from AMECO. Significance levels are defined as follows: 10% (*), 5% (**) and 1% (***). Clustered standard errors at regional level are in parentheses.

For 2000-2013, with an extended sample, the role of the economic development in widening the level of inequality is not confirmed and estimates indicate a significant effect of a mechanism operating in the direction of reduce inequality, although for some quintiles of income distribution (Table A7 in the Appendix). This is not surprising as the empirical evidence on the inequality-growth relationship seems to depend on identification strategy, data and countries involved.

With respect to the functional distribution of income, a variation of capital share is involved with an increase in income inequality and a widening gap of top-bottom quintiles (in the first specification). On the other side, the labour share has a significantly compensating role operating on the overall level of inequality and at the extremes of the quintile distribution (in both specifications). It is worth noting that with FE the technology and the population dynamics have a significant effect in shaping, respectively, part of the quintile distribution and the overall level of inequality. No effect of human capital is detected with this specification. In this setting, we cannot re-estimate the effect of the quality of regional institutions (EQI) as available data do not allow to perform FE regressions. Finally, also in this case, we estimate results for different samples and specifications, or dropping potential influential observations. This does not significantly change the results.[20]

6. EU Cohesion Policy and the convergence process

Did the EU Cohesion Policy affect the speed of convergence? The purpose of this section is to provide initial evidence on the role played by the European Regional Development Policy, focussing on two aspects: (i) whether the process of convergence changed over time as a result of the transition from one programming period to the next over 1989-2013; and (ii) whether the speed of convergence is different in less developed regions eligible for Cohesion Policy funds (CP, hereafter).[21] We begin by estimating:

$$I_{iT} - I_{i0} = \alpha + \beta_1 I_{it0} + \sum_{t=2}^{4} \beta_t \cdot \gamma_t I_{it0} + \gamma_t + \varepsilon_i \qquad (i = 1, \ldots, N) \qquad (3)$$

where our dependent variable captures the variation of the inequality measure for each region in each programming period γ_t (capturing the common shocks related to a specific programming period), β_1 is the coefficient of the initial value of inequality in the first programming period (which we use as benchmark), while β_t represent the four coefficients of the interaction terms between the time dummies and the initial value of income inequality.

Instead, to investigate the role played by regions receiving CP funds in the convergence process, we estimate the following extension of equation (3):

$$I_{iT} - I_{i0} = \alpha + \beta_1 I_{it0} + \sum_{Treat=1}^{4} \beta_t \cdot Treat_t \, I_{it0} + Treat_t + \gamma_t + \varepsilon_i \qquad (i = 1, \ldots, N) \qquad (4)$$

where β_t represent the four coefficients of the interaction terms between the dummies indicating the CP "treatment" and the initial value of inequality. $Treat_t$ represent the dummy "treatment" for each of the four episodes over the period 1989-2013: it identifies whether a specific region has received CP funds in a specific programming period. Finally, γ_t captures common shocks related to a specific programming period (like a time effect dummy).

Table 6 presents pooled OLS and FE estimates for Gini coefficient in the four programming periods of the European Regional Policy, with different samples of NUTS 2 regions and model specifications. Here, following equation (3), we look at how the speed of convergence depends also on the

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[20] Full regression outputs are all available on request.

[21] Following the 1988 reform of European Regional Policy, the four programming periods are: 1989-1993, 1994-1999, 2000-2006, 2007-2013. See at http://ec.europa.eu/regional_policy/en/policy/what/history/. Regions supported by Cohesion Policy funds have been identified according to the EU official documents of each programming period.

programming period. In the first set of regressions (Panel A) suggests that it does: the speed of convergence accelerated in the programming periods following the first one in 1989-1993.

The coefficients of the pooled OLS specification with interaction terms, due to high collinearity with the initial value of Gini, appear to be statistically insignificant (the Variance Inflation Factor is above 150). However, they turn significant both when testing the nonlinear restrictions that each programming period has no effect on the speed of convergence and when running Fixed Effects (FE) regressions.[22] Hence, pooled OLS and FE estimates confirm evidence of convergence in income inequality, suggesting that it may be faster in more recent programming periods.

The second set of regressions (Panel B) confirms this, by estimating the speed of convergence for each programming period in cross-section regressions. Results for the first period seems to reveal that no convergence occurred during 1989-1993, given that the coefficient is not statistically significant. A possible explanation for such result is to impute to the limited number of observations. However, estimates for the remaining three programming periods show that there has been a significant increase in the speed of convergence, with the convergence parameter reaching 0.33 in the most recent programming period.

The appendix reports further regressions, for each of the five quintiles (Tables A8 - A12). The results show the same pattern for each quintile, suggesting that moving from one programming period to the next has affected the speed of convergence in all parts of the distribution.

[22] Performing linear restriction tests, we assess magnitude and significance of the speed of convergence for each programming period, that is: $\beta_1 + \beta_2 = 0$, $\beta_1 + \beta_3 = 0$, and $\beta_1 + \beta_4 = 0$. The results reveal that the coefficients turn significant and in line with the other estimates. The second linear restriction tests that the three interaction terms in the programming periods PP2, PP3, PP4 are identical. In Pooled OLS the test fails to reject the null hypothesis $H_0 = \beta_2 = \beta_3 = \beta_4$, suggesting that the speed of convergence is different across periods, while rejecting the null hypothesis in FE estimates, thus proving inconclusive evidence on whether the change in convergence speed is the same across programming periods.

Table 6 - Speed of convergence in different Programming Periods: Gini index, 1989-2013

	PANEL A: Change in Gini over all programming periods (PPs), 1989-2013						PANEL B: Change in Gini in each programming period (PP)			
							PP1 1989-1993	PP2 1994-1999	PP3 2000-2006	PP4 2007-2013
Estimator:	Pooled OLS	FE	Pooled OLS	FE	Pooled OLS	FE	Pooled OLS	Pooled OLS	Pooled OLS	Pooled OLS
Gini initial value	-0.299***	-1.124***	-0.292***	-1.129***	-0.234	-0.910***	-0.234	-0.267***	-0.295***	-0.333***
	(0.054)	(0.076)	(0.050)	(0.072)	(0.173)	(0.152)	(0.174)	(0.065)	(0.056)	(0.093)
Dummy pp2			-0.017***	0.001	-0.008	0.033				
			(0.006)	(0.004)	(0.044)	(0.034)				
Dummy pp3			-0.018***	-0.001	-0.002	0.072**				
			(0.005)	(0.004)	(0.048)	(0.036)				
Dummy pp4			-0.005	0.008*	0.022	0.127***				
			(0.006)	(0.004)	(0.051)	(0.037)				
Gini 1994*dummy pp2					-0.033	-0.121				
					(0.159)	(0.124)				
Gini 2000*dummy pp3					-0.062	-0.269**				
					(0.174)	(0.128)				
Gini 2007*dummy pp4					-0.099	-0.437***				
					(0.185)	(0.132)				
Constant	0.089***	0.315***	0.098***	0.314***	0.083*	0.255***	0.083*	0.075***	0.081***	0.105***
	(0.015)	(0.021)	(0.015)	(0.020)	(0.048)	(0.042)	(0.048)	(0.017)	(0.015)	(0.026)
F-stat	30.39***	221.53	12.96***	66.24***	9.02***	57.38***	1.80	17.06***	28.21***	12.89***
Adj. R-Sq.	0.148	0.598	0.205	0.615	0.200	0.643	0.023	0.187	0.182	0.173
Obs.	336	336	336	336	336	336	49	75	108	104
Regions	114	114	114	114	114	114	49	75	108	104
RMSE	0.027	0.017	0.026	0.016	0.026	0.016	0.034	0.024	0.023	0.026
$\beta_1 + \beta_2 = 0$					-0.267***	-1.031***				
$\beta_1 + \beta_3 = 0$					-0.295***	-1.179***				
$\beta_1 + \beta_4 = 0$					-0.333***	-1.347***				
$\beta_2 = \beta_3 = \beta_4$ (p-value)					0.828	0.001				

Notes: The Panel A includes 15 countries (AT, CZ, DE, DK, EE, ES, FI, HU, IE, IT, LU, PL, SE, SI, SK). The Panel B includes 6 countries in 1989-1993 (DE, DK, ES, FI, IT, LU), 10 countries in 1994-1999 (AT, CZ, DE, DK, ES, FI, IE, IT, LU, SE), 14 countries in 2000-2006 (AT, CZ, DE, DK, EE, ES, FI, HU, IE, IT, LU, PL, SE, SI), and 13 countries in 2007-2013 (AT, CZ, DE, DK, EE, ES, FI, HU, IT, LU, PL, SI, SK). Programming period 1 (PP1) is used as benchmark and therefore is excluded in the regressions. Significance levels are defined as follows: 10% (*), 5% (**) and 1% (***). Clustered standard errors at regional level are in parentheses.

In Table 7, we test if less developed regions eligible for CP funds, defined as "Objective 1" (and later as "Convergence Objective"), have converged at different speed. To this aim, following equation (4), we identify such regions with a dummy in each programming cycle of the Policy (1 if "treated" and 0 otherwise), using as reference category all regions not financed by CP funds. Then, we interact them with the initial level of inequality, assuming therefore that the effect of initial level of inequality on its subsequent change (in each programming period) depends also on having received the CP funds.

Referring to the full sample spanning the period 1989-2013, we find evidence of faster speed of convergence for Objective 1 regions for all programming periods. Indeed, the estimated difference in speed of convergence between regions receiving CP funds and regions not financed seems substantial in all the programming periods (except for 1994-1999). This suggests that less developed EU regions may be driving therefore the convergence process.

Table 7 - Speed of convergence in EU regions receiving Cohesion Policy funds: Gini index, 1989 - 2013

	(1) Four PPs	(2) Four PPs	(3) Four PPs	(4) Four PPs
Estimator:	Pooled OLS	FE	Pooled OLS	FE
Gini initial value	-0.316***	-1.107***	-0.314***	-1.015***
	(0.049)	(0.074)	(0.075)	(0.087)
dummy_t1	0.036***	0.017*	0.214**	0.145**
	(0.010)	(0.009)	(0.084)	(0.065)
dummy_t2	0.002	0.002	0.003	0.002
	(0.006)	(0.006)	(0.036)	(0.038)
dummy_t3	0.002	-0.004	-0.004	0.093***
	(0.005)	(0.006)	(0.027)	(0.028)
dummy_t4	0.000	0.004	-0.028	0.137***
	(0.005)	(0.006)	(0.026)	(0.034)
dummy_t1 * Gini 1989			-0.627**	-0.482**
			(0.289)	(0.215)
dummy_t2 * Gini 1994			-0.005	-0.028
			(0.124)	(0.124)
dummy_t3 * Gini 2000			0.023	-0.360***
			(0.100)	(0.100)
dummy_t4 * Gini 2007			0.105	-0.487***
			(0.093)	(0.119)
Constant	0.092***	0.303***	0.092***	0.280***
	(0.014)	(0.021)	(0.020)	(0.025)
Time dummies	Yes	Yes	Yes	Yes
F-stat	8.56***	52.61***	8.95***	50.61***
Adj. R-Sq.	0.248	0.624	0.261	0.655
Obs.	336	336	336	336
Regions	114	114	114	114
RMSE	0.025	0.016	0.025	0.015
$\beta_1 + \beta_2 = 0$			-0.940***	-1.497***
$\beta_1 + \beta_3 = 0$			-0.319***	-1.043***
$\beta_1 + \beta_4 = 0$			-0.291***	-1.375***
$\beta_1 + \beta_5 = 0$			-0.209***	-1.502***
$\beta_2 = \beta_3 = \beta_4 = \beta_5$ (p-value)			0.065	0.002

Notes: The sample 1989-2013 includes 15 countries (AT, CZ, DE, DK, EE, ES, FI, HU, IE, IT, LU, PL, SE, SI, SK). Significance levels are defined as follows: 10% (*), 5% (**) and 1% (***). Clustered standard errors at regional level are in parentheses.

7. Conclusions

While convergence in income per capita in the EU has traditionally received much scrutiny, convergence in other equally important development outcomes is not well understood. This paper contributes to fill this gap by asking whether EU regions are becoming more (or less) similar with respect to their income distribution. We test for unconditional and conditional income inequality convergence, providing new stylised facts.

Both cross section and panel estimates support the idea of inequality convergence among EU regions. In particular, our findings indicate that inequality among NUTS 2 regions is converging, but to a higher level, so that they have tended to become *equally more unequal*. This process is significantly faster when regions share the same structural features, such as the same level of economic development and the same functional distribution of income and the same level of education and technology. In addition, our results suggest that sharing the same level of the quality of regional institutions may also accelerate the convergence process.

Furthermore, we investigate if the pace of the convergence process changed over time and if less developed regions eligible for Cohesion Policy funds played a significant role in this process. Panel estimates find that the allocation of EU funds related to second, third and fourth programming periods are driving the convergence effect, where the transition from one programming period to another suggest that the Cohesion Policy accelerated the process of (unconditional) convergence. Finally, the evidence also suggests that regions eligible for Cohesion Policy funds significantly accelerated the pace of inequality convergence, driving therefore the catch-up process. For the first programming period, the estimates find no effect, perhaps because of the sample composition and the limited number of observations.

Our findings have two types of implications. The first one is that, as NUTS2 regions seem to be converging to higher levels of income inequality, planning future EU policies ought not to ignore distributive consequences and perhaps put increasing effort into pursuing growth with equity. The second one relates to future research. Our findings call for more analysis, looking at the effects of specific interventions and specific channels through which the allocation of EU funds may affect the inequality convergence process we documented in this paper. This means shifting the focus from the macro level to sectoral and micro level analysis.

References

Acemoglu, D. (2002). Technical change, inequality, and the labor market. *Journal of economic literature*, *40*(1), 7-72.

Acemoglu, D. (2008). Oligarchic versus democratic societies. *Journal of the European Economic Association*, 6(1), 1-44.

Alvaredo, F., & Gasparini, L. (2015). Recent trends in inequality and poverty in developing countries. In *Handbook of income distribution* (Vol. 2, pp. 697-805). Elsevier.

Atkinson, A.B. (2016). How to spread the wealth: practical policies for reducing inequality. *Foreign Affairs*, 95(1), 29-33.

Atkinson, A.B., Marlier, E., Montaigne, F., & Reinstadler, A. (2010). Income poverty and income inequality, in: Atkinson A.B. and Marlier E., (2010), *Income and Living Conditions in Europe*, Eurostat Statistical Books, Publication Office of European Union, Luxembourg.

Barca, F. (2009). An agenda for a reformed cohesion policy: A place-based approach to meeting European Union challenges and expectations. Independent Report prepared at the request of Danuta Hübner, Commissioner for Regional Policy, EU Commission, Brussels.

Barro, R.J. & Sala-I-Martin, X. (1991). Convergence Across States and Regions. *Brookings Papers on Economic Activity*, no. 1, 107-158.

Barro, R.J. & Sala-I-Martin, X. (1992). Convergence. *Journal of Political Economy*, 100(2), 223-251.

Bénabou, R. (1996). Inequality and growth. In: Bernanke, B.S., Rotemberg, J.J. (eds.) *NBER Macroeconomics Annual*, 11–74. MIT, Cambridge.

Bleaney, M. & Nishiyama, A. (2003). Convergence in income inequality: differences between advanced and developing countries. *Economics Bulletin*, 4(22), 1-10.

Bonesmo Fredriksen, K. (2012). Income Inequality in the European Union. *OECD Economics Department Working Papers*, n. 952, OECD Publishing, Paris.

Cambridge Econometrics, European Regional Database (ERD) https://www.camecon.com/european-regional-data/.

Canning, D. (2012). Progress in health around the world. *Journal of Development Studies*, 48(12), 1784–1798.

Chambers, D. & Dhongde, S. (2016a). Are countries becoming equally unequal? *Empirical Economics*, 53(4), 1323-1348.

Chambers, D. & Dhongde, S. (2016b). Convergence in income distributions: Evidence from a panel of countries. *Economic Modelling*, 59, 262-270.

Charron, N., Dijkstra L., & Lapuente V. (2014). Regional Governance Matters: Quality of Government within European Union Member States. *Regional Studies*, 48(1), 68-90.

Dabla-Norris, E., Kochhar, K., Suphaphiphat, N., Ricka, F., & Tsounta E. (2015). Causes and consequences of income inequality: A global perspective. *IMF Staff discussion note* No. 15/13. Washington, DC: International Monetary Fund.

Dao, M.C., Das, M.M., Koczan, Z., & Lian, W. (2017). Why is labour receiving a smaller share of global income? Theory and empirical evidence. International Monetary Fund.

David, H., & Dorn, D. (2013). The growth of low-skill service jobs and the polarization of the US labor market. *American Economic Review*, 103(5), 1553-97.

Deaton, A. (2004). Health in an age of globalization. In *Brookings Trade Forum 2004* (pp. 83–130). Washington, DC: Brookings Institution Press.

European Commission, Eurostat database available at: https://ec.europa.eu/eurostat/data/database .

European Commission (2009). GDP and beyond: measuring progress in a changing world. COM (2009) 433 final.

Easterly, W. (2007). Inequality does cause underdevelopment: Evidence from a new instrument. *Journal of Development Economics*, 84, 755-776.

Eurostat (2014). Statistics in focus 12/2014. https://ec.europa.eu/eurostat/statistics-explained/ .

Ezcurra, R. & Pascual, P. (2005). Is there convergence in income inequality levels among the European regions? *Applied Economics Letters*, 12(12), 763-767.

Forbes, K.J. (2000). A Reassessment of the Relationship between Inequality and Growth. *American Economic Review*, 90(4), 869-887.

Förster, M., Jesuit, D. & Smeeding T., (2005), Regional Poverty and Income Inequality in Central and Eastern Europe: Evidence from the Luxembourg Income Study. In Kanbur, R. & Venables, A.J. (eds.), *Spatial Inequality and Development*, Oxford University Press.

Furceri, D., & Ostry, J. D. (2019). Robust determinants of income inequality. *Oxford Review of Economic Policy*, 35(3), 490-517.

Geppert, K., & Stephan A. (2008). Regional disparities in the European Union: Convergence and agglomeration. *Papers in Regional Science,* 87(2), 193-217.

Goos, M., Manning, A., & Salomons, A. (2014). Explaining job polarization: Routine-biased technological change and offshoring. *American economic review*, 104(8), 2509-26.

Heathcote, J., Perri, F., & Violante, G. (2010). Unequal We Stand: An Empirical Analysis of Economic Inequality in the US, 1967-2006. *Review of Economic Dynamics*, 13(1), 15–51.

Hirschman, A.O. (1973). The Changing Tolerance for Income Inequality in the Course of Economic Development. *The Quarterly Journal of Economics*, 87(4), 544-566.

Ho, T.W. (2015). Income inequality may not converge after all: Testing panel unit roots in the presence of cross-section cointegration. *The Quarterly Review of Economics and Finance*, 56, 68–79.

Klasen, S. (2008). The Efficiency of Equity. *Review of Political Economy*, 20(2), 257–274.

Kuznets, S. (1955). Economic Growth and Income Inequality. *American Economic Review*, 45(1), 1–28.

Lin, P.C. & Huang, H.C. (2011). Inequality convergence in a panel of states. *The Journal of Economic Inequality*, 9(2), 195-206.

Luxembourg Income Study (LIS) Database. http://www.lisdatacenter.org (multiple countries; May 2017- July 2017). Luxembourg: LIS.

Lustig, N. & Teles, D., (2016). Inequality convergence: How sensitive are results to the choice of data? ECINEQ working paper, No. 412.

Milanovic, B. & Van der Weide, R. (2014). Inequality is bad for growth of the poor (but not for that of the rich). *World Bank Policy Research Working Paper*, 6963.

Morelli, S., Smeeding, T. & Thompson, J.P. (2015). Post 1970 trends in within-country inequality and poverty. In A.B. Atkinson & F. Bourguignon (eds), *Handbook of Income Distribution* (Vol. 2, pp. 593-696). Elsevier.

Noorbakhsh, F. (2007). International convergence or higher inequality in human development? Evidence for 1975–2002. In Mavrotas G. & Shorrocks A. F. (Eds.), *Advancing development: Core themes in global economics* (pp. 149–167). Basingstoke, UK. Palgrave Macmillan.

OECD (2011). Divided We Stand: Why Inequality Keeps Rising. *OECD Publishing*. http://dx.doi.org/10.1787/9789264119536-en.

Ortega, B., Casquero, A., & Sanjuán, J. (2016). Corruption and convergence in human development: Evidence from 69 countries during 1990–2012. *Social Indicators Research*, 127(2), 691-719.

Ostry, J.D., Berg, A., & Tsangarides C.G. (2014). Redistribution, Inequality and Growth. *IMF Staff Discussion Note,* No. 14/02. International Monetary Fund.

Panizza, U. (2001). Convergence in income inequality. *Journal of Income Distribution*, 10, 5-12.

Perugini, C., & Martino, G. (2008). Income inequality within European regions: determinants and effects on growth. *Review of Income and Wealth*, 54(3), 373-406.

Piketty, T. (2014). Capital in the twenty-first century. Harvard University Press.

Prados de la Escosura, L. (2015). World human development: 1870–2007. *Review of Income and Wealth*, 61, 220-247.

Quah, D. (I993). Galton's fallacy and tests of the convergence hypothesis. *Scandinavian Journal of Economics*, 95(4), 427-43.

Ravallion, M. (2003). Inequality convergence. *Economics Letters*, 80, 351-356.

Rodríguez-Pose, A., & Tselios, V. (2015). Toward inclusive growth: Is there regional convergence in social welfare? *International Regional Science Review*, 38(1), 30-60.

Sala-I-Martin, X. (1996). Regional cohesion: evidence and theories of regional growth and convergence. *European Economic Review*, 40(6), 1325-1352.

Solimano, A. (1998). Alternative Theories of Distributive Justice and Social Inequality: Liberal, Socialist and Libertarian Perspectives. In *Social Inequality: Values, Growth, and the State*, edited by Andrés Solimano (pp. 15-27). The University Michigan Press.

Stiglitz, J.E., Sen, A. & Fitoussi, J.P. (2010). Report by the Commission on the Measurement of Economic Performance and Social Progress (Paris: INSEE).

Stiglitz, J.E. (2012). The price of inequality. Penguin, UK.

Thorbecke, E. & Charumilind, C. (2002). Economic Inequality and Its Socioeconomic Impact. *World Development*, 30(9), 1477-95.

Tselios, V. (2009). Growth and convergence in income per capita and income inequality in the regions of the EU. *Spatial Economic Analysis*, 4(3), 343-370.

Appendix

Table A1 displays the number of observations (NUTS 2 regions) across countries for each wave of LIS database.

Table A1 - Number of observations for each country

		Wave III	Wave IV	Wave V	Wave VI	Wave VII	Wave VIII	Wave IX
		1990	1995	2000	2004	2007	2010	2013
Austria	AT		9	9	9	9	9	9
Czech Republic	CZ		8	8	8	8	8	8
Germany	DE	5	9	9	9	9	9	9
Denmark	DK	5	5	5	5	5	5	5
Estonia	EE			1	1	1	1	1
Greece	EL				13	13	13	
Spain	ES	17	17	17	18	19	19	19
Finland	FI	3	3	5	5	5	5	5
Hungary	HU			7	7	7	7	7
Ireland	IE		2	2	2	2	2	
Italy	IT	18	18	19	19	19	19	19
Luxembourg	LU	1	1	1	1	1	1	1
Poland	PL			16	16	16	16	16
Sweden	SE	3	3	8	8			
Slovenia	SI		1	1	1	1	1	1
Slovak Republic	SK	4	4		4	4	4	4

Notes: Slovenia (SI) is treated as a single NUTS2 region in the framework of EU Cohesion Policy and therefore aggregated in the analysis. Data for inequality measures have been interpolated in wave IV in Austria (AT) and in waves IV and V in Spain (ES).

Table A2 - Number of households for each wave in LIS

				1990			**1995**			**2000**			**2004**			**2007**			**2010**			**2013**
NUTS CODE		**not rural**	**rural**	**total**	**not rural**	**rural**	**total**	**not rural**	**rural**	**total**	**not rural**	**rural**	**total**	**not rural**	**rural**	**total**	**not rural**	**rural**	**total**	**not rural**	**rural**	**total**
	AUSTRIA																					
AT11	Burgenland			-	973	1032	**2005**			-	54	175	**229**	57	148	**205**	72	135	**207**	0	200	**200**
AT12	Niederoesterreich			-	2131	841	**2972**			-	501	493	**994**	574	537	**1111**	603	546	**1149**	438	738	**1176**
AT13	Wien			-	3065	0	**3065**			-	875	0	**875**	1068	0	**1068**	1315	0	**1315**	1280	0	**1280**
AT21	Kaernten			-	1583	236	**1819**			-	150	222	**372**	166	271	**437**	182	235	**417**	206	173	**379**
AT22	Steiermark			-	1865	937	**2802**			-	350	491	**841**	309	444	**753**	349	479	**828**	403	406	**809**
AT31	Oberoesterreich			-	2521	725	**3246**			-	579	337	**916**	673	401	**1074**	678	400	**1078**	376	627	**1003**
AT32	Salzburg			-	1900	176	**2076**			-	174	115	**289**	226	150	**376**	273	152	**425**	251	104	**355**
AT33	Tirol			-	1779	673	**2452**			-	169	237	**406**	218	230	**448**	235	282	**517**	187	286	**473**
AT34	Vorarlberg			-	1929	297	**2226**			-	190	36	**226**	200	35	**235**	208	43	**251**	172	62	**234**
					17746	4917	**22663**				3042	2106	**5148**	3491	2216	**5707**	3915	2272	**6187**	3313	2596	**5909**
	CZECH REPUBLIC																					
CZ01	Praha			-			**2048**	1587	0	**1587**	469	0	**469**	951	0	**951**	871	0	**871**	932	0	**932**
CZ02	Stredni Cechy			-			**3144**	351	335	**686**	254	205	**459**	616	656	**1172**	530	473	**1003**	426	493	**919**
CZ03	Jihozapad			-			**3475**	554	308	**862**	323	201	**524**	819	564	**1383**	609	497	**1106**	525	527	**1052**
CZ04	Severozapad			-			**3465**	632	355	**987**	335	145	**480**	890	419	**1309**	647	287	**934**	563	226	**789**
CZ05	Severovychod			-			**4203**	654	355	**1009**	372	238	**610**	1000	636	**1636**	754	473	**1227**	704	436	**1140**
CZ06	Jihovychod			-			**4696**	712	393	**1105**	373	285	**658**	981	793	**1774**	811	630	**1441**	731	550	**1281**
CZ07	Stredni Morava			-			**3482**	477	382	**859**	291	258	**549**	780	677	**1457**	543	529	**1072**	545	428	**973**
CZ08	Moravskoslezsko			-			**3635**	730	148	**878**	440	162	**602**	1152	460	**1612**	886	326	**1212**	668	299	**967**
							28148	5697	2276	**7973**	2857	1494	**4351**	7189	4205	**11294**	5651	3215	**8866**	5094	2959	**8053**
	DENMARK																					
DK01	Hovedstaden			**4252**			**25932**			**26335**			**26477**			**26657**			**27055**			**27659**
DK02	Sjaelland			**1818**			**11407**			**11757**			**12004**			**12310**			**12300**			**12569**
DK03	Syddanmark			**2720**			**13813**			**14177**			**14442**			**18278**			**18355**			**18704**
DK04	Midtjylland			**2901**			**16630**			**17071**			**17480**			**18570**			**18938**			**19371**
DK05	Nordjylland			**1204**			**7240**			**7453**			**7577**			**8854**			**8997**			**9214**
				12895			**75022**			**76793**			**77980**			**84669**			**85645**			**87517**
	ESTONIA																					
EE00	Estonia			-			-	3771	2297	**6068**	2406	1763	**4169**	2748	1996	**4744**	2795	2198	**4993**	3396	2474	**5870**
	FINLAND																					
FI19	Länsi-Suomi			**3411**			**2672**			**2850**			**3005**			**2863**			**2550**			**2905**
FI1B	Helsinki-Uusimaa			**2706**			**2190**			**2512**			**2651**			**2600**			**2291**			**2284**
FI1C	Etelä-Suomi			**2435**			**1985**			**2271**			**2371**			**2264**			**2087**			**2878**
FI1D	Pohjois- ja Itä-Suomi			**3137**			**2385**			**2730**			**3099**			**2678**			**2315**			**2760**
FI20	Åland			**60**			**30**			**60**			**103**			**67**			**108**			**141**
				11749			**9262**			**10423**			**11229**			**10472**			**9351**			**10968**
	GERMANY																					
DE30	Berlin	183	0	**183**	325	0	**325**	487	0	**487**	463	0	**463**	452	0	**452**	674	0	**674**	661	0	**661**
DE40	Brandenburg			-	12	276	**288**	37	466	**503**	43	433	**476**	43	431	**474**	60	626	**686**	55	571	**626**
DE50	Bremen	59	0	**59**	57	0	**57**	100	0	**100**	88	0	**88**	84	0	**84**	123	0	**123**	127	0	**127**
DE60	Hamburg	108	0	**108**	83	0	**83**	182	0	**182**	180	0	**180**	188	0	**188**	270	0	**270**	272	0	**272**
DE80	Mecklenburg-Vorpommern			-	25	178	**203**	40	249	**289**	40	238	**278**	40	240	**280**	48	365	**413**	44	313	**357**
DEC0	Saarland (Rheinland-Pfalz)*	269	48	**317**	291	60	**351**	552	170	**722**	522	156	**678**	128	0	**128**	167	0	**167**	145	0	**145**
DEE0	Sachsen-Anhalt			-	96	244	**340**	139	369	**508**	134	340	**474**	125	317	**442**	202	457	**659**	197	389	**586**
DEF0	Schleswig-Holstein	76	74	**150**	72	81	**153**	158	209	**367**	155	210	**365**	130	204	**334**	176	432	**608**	171	401	**572**
DEG0	Thüringen			-	94	228	**322**	145	353	**498**	141	325	**466**	147	333	**480**	227	427	**654**	203	397	**600**
		695	122	**817**	1055	1067	**2122**	1840	1816	**3656**	1766	1702	**3468**	1337	1525	**2862**	1947	2307	**4254**	1875	2071	**3946**
	GREECE																					
EL30	Attiki			-			-			-	1383	132	**1515**	1827	226	**2053**	1225	217	**1442**			-
EL41	Voreio Aigaio			-			-			-	0	128	**128**	0	152	**152**	0	158	**158**			-
EL42	Notio Aigaio			-			-			-	52	118	**170**	45	146	**191**	46	124	**170**			-
EL43	Kriti			-			-			-	175	177	**352**	171	202	**373**	162	216	**378**			-
EL51	Anatoliki Makedonia Thraki			-			-			-	79	295	**374**	98	334	**432**	73	386	**459**			-
EL52	Kentriki Makedonia			-			-			-	540	549	**1089**	576	621	**1197**	479	630	**1109**			-
EL53	Dytiki Makedonia			-			-			-	0	188	**188**	0	205	**205**	0	217	**217**			-
EL54	Ipeiros			-			-			-	62	132	**194**	40	157	**197**	63	156	**219**			-
EL61	Thessalia			-			-			-	200	257	**457**	196	254	**450**	206	297	**503**			-
EL62	Ionia Nisia			-			-			-	0	102	**102**	0	105	**105**	0	92	**92**			-
EL63	Dytiki Ellada			-			-			-	89	288	**377**	155	282	**437**	184	352	**536**			-
EL64	Sterea Ellada			-			-			-	68	226	**294**	79	250	**329**	60	285	**345**			-
EL65	Peloponnisos			-			-			-	30	298	**328**	31	352	**383**	53	348	**401**			-
											2678	2890	**5568**	3218	3286	**6504**	2551	3478	**6029**			
	HUNGARY																					
HU10	Közép-Magyarország			-			-			**463**			**552**			**580**			**607**			**611**
HU21	Közép-Dunántúl			-			-			**232**			**197**			**202**			**226**			**218**
HU22	Nyugat-Dunántúl			-			-			**191**			**204**			**207**			**194**			**197**
HU23	Dél-Dunántúl			-			-			**209**			**215**			**188**			**193**			**196**
HU31	Észak-Magyarország			-			-			**274**			**259**			**258**			**246**			**253**
HU32	Észak-Alföld			-			-			**285**			**350**			**315**			**296**			**306**
HU33	Dél-Alföld			-			-			**359**			**281**			**274**			**286**			**280**
										2013			**2058**			**2024**			**2048**			**2061**
	IRELAND																					
IE01	Border Midland and Western			-			**886**			**929**			**1592**			**1311**			**1175**			-
IE02	Southern and Eastern			-			**1983**			**1935**			**4493**			**3936**			**3158**			-
							2869			**2864**			**6085**			**5247**			**4333**			

Table A2 - Number of households for each wave in LIS (cont.)

				1990			1995			2000			2004			2007			2010			2013
	ITALY																					
ITC1	Piemonte	572	50	**622**	574	88	**662**	628	104	**732**	565	160	**725**	652	137	**789**	640	71	**711**	633	92	**725**
ITC2	Valle d'Aosta	-	-	**-**	-	-	**-**	25	0	**25**	22	22	**44**	22	23	**45**	22	24	**46**	21	22	**43**
ITC3	Liguria	449	24	**473**	366	20	**386**	291	25	**316**	348	23	**371**	291	24	**315**	290	21	**311**	305	42	**347**
ITC4	Lombardia	755	25	**780**	761	63	**824**	781	79	**860**	733	110	**843**	722	122	**844**	733	70	**803**	855	89	**944**
ITF1	Abruzzo	240	99	**339**	212	99	**311**	188	40	**228**	176	44	**220**	178	23	**201**	202	0	**202**	203	1	**204**
ITF2	Molise	44	0	**44**	85	0	**85**	83	0	**83**	78	21	**99**	113	25	**138**	94	22	**116**	89	22	**111**
ITF3	Campania	683	50	**733**	645	64	**709**	726	89	**815**	527	99	**626**	545	82	**627**	662	90	**752**	628	88	**716**
ITF4	Puglia	658	0	**658**	520	0	**520**	471	0	**471**	428	22	**450**	429	22	**451**	434	20	**454**	430	23	**453**
ITF5	Basilicata	63	40	**103**	93	34	**127**	67	28	**95**	81	45	**126**	83	45	**128**	83	43	**126**	83	45	**128**
ITF6	Calabria	207	25	**232**	233	29	**262**	173	37	**210**	146	47	**193**	145	45	**190**	151	45	**196**	195	22	**217**
ITG1	Sicilia	748	0	**748**	559	0	**559**	630	0	**630**	569	21	**590**	494	22	**516**	565	22	**587**	596	22	**618**
ITG2	Sardegna	193	75	**268**	204	91	**295**	205	103	**308**	181	149	**330**	211	133	**344**	211	131	**342**	210	133	**343**
ITH3	Veneto	421	0	**421**	474	2	**476**	403	36	**439**	510	68	**578**	537	64	**601**	485	27	**512**	477	22	**499**
ITH4	Friuli-Venezia Giulia	217	26	**243**	250	63	**313**	219	36	**255**	206	44	**250**	231	22	**253**	214	0	**214**	214	0	**214**
ITH5	Emilia-Romagna	644	47	**691**	661	64	**725**	701	50	**751**	610	68	**678**	660	60	**720**	641	67	**708**	607	70	**677**
ITI1	Toscana	643	0	**643**	589	0	**589**	598	0	**598**	618	23	**641**	596	11	**607**	614	1	**615**	605	0	**605**
ITI2	Umbria	150	97	**247**	200	88	**288**	198	73	**271**	217	66	**283**	200	67	**267**	211	66	**277**	213	64	**277**
ITI3	Marche	325	46	**371**	315	58	**373**	258	70	**328**	322	67	**389**	302	52	**354**	311	44	**355**	301	44	**345**
ITI4	Lazio	378	23	**401**	338	73	**411**	351	74	**425**	342	83	**425**	350	63	**413**	389	63	**452**	409	43	**452**
		7537	651	**8188**	7268	867	**8135**	7133	868	**8001**	6783	1229	**8012**	6868	1109	**7977**	7064	887	**7951**	7225	931	**8156**
	LUXEMBOURG																					
LU00	Luxembourg			**1957**			**1813**			**2433**			**3622**	3031	748	**3779**	4230	1234	**5464**	2015	1847	**3862**
	SPAIN																					
ES11	Galicia			**1739**			**-**			**-**	608	303	**911**	602	325	**927**	589	290	**879**	445	366	**811**
ES12	Asturias			**443**			**-**			**-**	453	140	**593**	481	142	**623**	432	134	**566**	328	170	**498**
ES13	Cantabria			**362**			**-**			**-**	241	103	**344**	273	116	**389**	293	123	**416**	221	74	**295**
ES21	Basque Community			**1360**			**-**			**-**	649	82	**731**	623	91	**714**	662	85	**747**	641	55	**696**
ES22	Navarre			**367**			**-**			**-**	250	179	**429**	260	189	**449**	253	181	**434**	259	167	**426**
ES23	La Rioja			**357**			**-**			**-**	287	124	**411**	271	126	**397**	305	142	**447**	269	116	**385**
ES24	Aragon			**1105**			**-**			**-**	331	251	**582**	315	**254**	**569**	341	271	**612**	342	199	**541**
ES30	Madrid			**764**			**-**			**-**	772	29	**801**	945	44	**989**	1176	62	**1238**	1078	56	**1134**
ES41	Castile-Leon			**3162**			**-**			**-**	447	466	**913**	445	442	**887**	432	449	**881**	500	345	**845**
ES42	Castile-La Mancha			**1694**			**-**			**-**	191	489	**680**	194	442	**636**	207	501	**708**	220	344	**564**
ES43	Extremadura			**830**			**-**			**-**	0	554	**554**	0	534	**534**	0	496	**496**	144	362	**506**
ES51	Catalonia			**1644**			**-**			**-**	1182	194	**1376**	1200	226	**1426**	1253	212	**1465**	1095	169	**1264**
ES52	Valencian Community			**1704**			**-**			**-**	932	157	**1089**	876	155	**1031**	878	147	**1025**	697	194	**891**
ES53	Balearic Islands			**429**			**-**			**-**	322	186	**508**	304	160	**464**	244	143	**387**	238	135	**373**
ES61	Andalusia			**3674**			**-**			**-**	1003	607	**1610**	998	569	**1567**	906	565	**1471**	888	590	**1478**
ES62	Region of Murcia			**526**			**-**			**-**	359	198	**557**	339	189	**528**	321	167	**488**	346	153	**499**
ES63	Ceuta			**-**			**-**			**-**			**-**	127	0	**127**	113	0	**113**	139	0	**139**
ES64	Melilla			**-**			**-**			**-**			**-**	124	0	**124**	112	0	**112**	119	0	**119**
ES70	Canary Islands			**772**			**-**			**-**	543	99	**642**	535	98	**633**	535	89	**624**	430	71	**501**
											8835	4161	**12996**	8912	4102	**13014**	9052	4057	**13109**	8399	3566	**11965**
	SLOVAK REPUBLIC																					
SK01	Bratislava	1264	23	**1288**			**1487**			**-**	620	21	**641**			**541**			**464**			**632**
SK02	West Slovakia	2777	2614	**5391**			**6140**			**-**	1319	516	**1835**			**1969**			**1890**			**1910**
SK03	Central Slovakia	2763	2187	**4950**			**4300**			**-**	996	312	**1308**			**1413**			**1368**			**1455**
SK04	East Slovakia	2433	1928	**4361**			**4409**			**-**	958	405	**1363**			**1527**			**1478**			**1493**
		9237	6752	**15990**			**16336**				3893	1254	**5147**			**5450**			**5200**			**5490**
	SLOVENIA																					
SI00	Eastern+Western Slovenia			**-**			**2577**			**3859**			**3725**			**3697**			**3924**			**3663**
	SWEDEN																					
SE11	Stockholm			**2210**			**3709**			**2934**			**3539**			**-**			**-**			**-**
SE12	Östra Mellansverige (East Middle)			**-**			**-**			**2436**			**2752**			**-**			**-**			**-**
SE21	Småland med öarna (Småland and the Islands)			**-**			**-**			**1328**			**1417**			**-**			**-**			**-**
SE22	Sydsverige (South)			**2680**			**3551**			**2054**			**2376**			**-**			**-**			**-**
SE23	Västsverige (West)			**1072**			**1960**			**2833**			**3130**			**-**			**-**			**-**
SE31	Norra Mellansverige (North Middle)			**-**			**-**			**1419**			**1432**			**-**			**-**			**-**
SE32	Mellersta Norrland (Middle Norrland)			**-**			**-**			**645**			**675**			**-**			**-**			**-**
SE33	Övre Norrland (Upper Norrland)			**-**			**-**			**842**			**947**			**-**			**-**			**-**
				6688			**5669**			**14491**			**16268**									

Notes: * LIS data for Saarland region (DEC0) includes data for Rheinland-Pfalz until 2004. Slovenia (SI) is treated as a single NUTS2 region in the framework of EU Cohesion Policy and therefore aggregated in the analysis.

Tables A3-A5 report further OLS conditional convergence estimates for the periods 1995-2013 and 2000-2013 (See results presented in the section 5).

Table A3 - Conditional Convergence: OLS 1995-2013

PANEL A	Change in Gini, 1995-2013	Changes in quintile shares, 1995-2013				
	GINI INDEX	QUINTILE 1	QUINTILE 2	QUINTILE 3	QUINTILE 4	QUINTILE 5
Initial value 1995	-0.521***	-0.742***	-0.689***	-1.051***	-1.254***	-0.491***
	(0.124)	(0.170)	(0.151)	(0.213)	(0.235)	(0.149)
GDP per capita (ln)	0.034	1.141	2.223	2.586	-3.153	2.001
	(0.064)	(2.757)	(3.746)	(2.886)	(3.555)	(6.006)
GDP per capita squared (ln)	0.003	0.124	0.273	0.326	-0.316	0.145
	(0.007)	(0.304)	(0.404)	(0.307)	(0.382)	(0.684)
GFCF	0.001	-0.038*	-0.034	-0.011	-0.007	0.068
	(0.000)	(0.022)	(0.021)	(0.017)	(0.025)	(0.044)
Labour Income Share	0.021	-1.105	0.166	0.804	0.551	0.177
	(0.020)	(0.801)	(1.246)	(0.971)	(1.262)	(1.757)
Constant	0.234*	8.831	13.452	23.298***	22.018**	23.926*
	(0.125)	(5.939)	(9.098)	(7.550)	(9.418)	(12.339)
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
F-stat	33.48***	33.12***	35.46***	14.90***	8.16***	15.75***
Adj. R-Sq.	0.582	0.543	0.423	0.510	0.343	0.402
Obs.	75	75	75	75	75	75
RMSE	0.018	0.906	0.726	0.786	1.075	1.940
PANEL B dropping infl. obs.						
	GINI INDEX	QUINTILE 1	QUINTILE 2	QUINTILE 3	QUINTILE 4	QUINTILE 5
Initial value 1995	-0.537***	-0.631***	-0.760***	-0.956***	-1.480***	-0.515***
	(0.125)	(0.192)	(0.159)	(0.226)	(0.212)	(0.150)
GDP per capita (ln)	-0.017	3.648	4.974	0.247	-0.214	-2.509
	(0.071)	(2.710)	(4.567)	(3.374)	(4.643)	(7.387)
GDP per capita squared (ln)	-0.003	0.390	0.580	0.073	0.004	-0.358
	(0.008)	(0.288)	(0.494)	(0.363)	(0.491)	(0.815)
GFCF	0.001*	-0.045**	-0.041*	-0.001	-0.015	0.078*
	(0.000)	(0.022)	(0.021)	(0.018)	(0.027)	(0.046)
Labour Income Share	0.030	-1.737**	-0.388	0.968	0.180	1.242
	(0.019)	(0.744)	(0.875)	(0.833)	(1.150)	(1.868)
Constant	0.130	13.184**	20.316*	16.650*	33.376***	15.089
	(0.139)	(5.737)	(11.039)	(9.060)	(10.492)	(14.668)
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
F-stat	32.67***	36.66***	32.96***	15.11***	11.03***	14.37***
Adj. R-Sq.	0.571	0.519	0.466	0.557	0.376	0.377
Obs.	73	73	73	73	73	73
RMSE	0.018	0.849	0.698	0.732	1.034	1.931

Notes: The panels include 10 countries (AT, CZ, DE, DK, ES, FI, IT, LU, SI, SK). Control variables are expressed in billions of euro and deflated to 2005 constant price euros using sectoral price deflators obtained from AMECO. Significance: 10% (*), 5% (**) and 1% (***). Heteroskedasticity robust standard errors are in parentheses.

Table A4 - Conditional convergence in inequality: OLS 2000 - 2013

	Change in Gini, 2000-2013	Changes in quintile shares, 2000-2013				
	GINI INDEX	QUINTILE 1	QUINTILE 2	QUINTILE 3	QUINTILE 4	QUINTILE 5
Initial value 2000	-0.691***	-0.532***	-0.701***	-0.478**	-1.001***	-0.606***
	(0.094)	(0.112)	(0.253)	(0.223)	(0.152)	(0.154)
GDP per capita (ln)	0.180**	-4.447	-2.788	-0.847	-4.975	12.327*
	(0.090)	(2.748)	(4.104)	(2.923)	(3.406)	(7.076)
GDP per capita squared (ln)	0.022*	-0.589*	-0.353	-0.136	-0.517	1.535*
	(0.011)	(0.322)	(0.463)	(0.333)	(0.374)	(0.860)
GFCF	0.000	-0.024*	-0.017	-0.016	-0.001	0.067**
	(0.000)	(0.014)	(0.017)	(0.016)	(0.014)	(0.033)
Labour Income Share	0.093**	-4.005***	-1.076	-2.267	-0.735	6.462
	(0.046)	(1.415)	(1.977)	(1.555)	(1.956)	(4.508)
Constant	0.491***	-1.910	5.019	8.436	13.583*	42.044***
	(0.164)	(5.178)	(9.350)	(6.265)	(8.111)	(14.634)
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
F-stat	209.89***	63.71***	165.49***	342.77***	41.61***	11.51***
Adj. R-Sq.	0.512	0.354	0.271	0.317	0.439	0.419
Obs.	98	98	98	98	98	98
RMSE	0.021	0.820	0.788	0.879	0.973	2.035

Notes: The panel includes 12 countries (AT, CZ, DE, DK, EE, ES, FI, HU, IT, LU, PL, SI). Control variables are expressed in billions of euro and deflated to 2005 constant price euros using sectoral price deflators obtained from AMECO. Significance: 10% (*), 5% (**) and 1% (***). Heteroskedasticity robust standard errors are in parentheses.

Table A5 - Conditional convergence in inequality: OLS 2000 - 2013 (with further controls)

PANEL A with EQI	Change in Gini, 2000-2013	Changes in quintile shares, 2000-2013				
	GINI INDEX	QUINTILE 1	QUINTILE 2	QUINTILE 3	QUINTILE 4	QUINTILE 5
Initial value 2000	-0.785***	-0.696***	-0.657***	-0.473**	-1.042***	-0.768***
	(0.104)	(0.130)	(0.238)	(0.233)	(0.133)	(0.163)
GDP per capita (ln)	0.192*	-5.885*	-0.984	-2.887	-9.590**	17.403**
	(0.101)	(3.141)	(4.761)	(3.116)	(3.931)	(8.488)
GDP per capita squared (ln)	0.021*	-0.712*	-0.133	-0.345	-1.053**	2.004*
	(0.012)	(0.367)	(0.545)	(0.366)	(0.442)	(1.071)
GFCF	0.000	-0.014	-0.020	-0.007	0.007	0.040
	(0.000)	(0.014)	(0.017)	(0.013)	(0.016)	(0.030)
Labour Income Share	0.085**	-3.881***	-0.645	-2.305	-1.798	6.710*
	(0.040)	(1.386)	(2.022)	(1.616)	(1.896)	(3.762)
EQI	-0.015***	0.782**	-0.157	0.597*	0.497	-2.130***
	(0.006)	(0.316)	(0.275)	(0.322)	(0.317)	(0.669)
Constant	0.570***	-4.414	7.749	3.527	5.617	60.891***
	(0.186)	(5.788)	(10.717)	(7.971)	(8.791)	(17.377)
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
F-stat	296.75***	97.42***	143.68***	289.60***	46.51***	7.95***
Adj. R-Sq.	0.579	0.435	0.262	0.356	0.465	0.503
Obs.	90	90	90	90	90	90
RMSE	0.019	0.756	0.787	0.831	0.954	1.885

PANEL B with EQI-Eurostat						
	GINI INDEX	QUINTILE 1	QUINTILE 2	QUINTILE 3	QUINTILE 4	QUINTILE 5
Initial value 2000	-0.855***	-0.689***	-0.697***	-0.449	-1.136***	-0.850***
	(0.126)	(0.165)	(0.262)	(0.273)	(0.120)	(0.193)
GDP per capita (ln)	0.146	-6.032	0.522	-3.054	-10.390**	13.453
	(0.126)	(3.921)	(5.840)	(4.299)	(4.224)	(10.986)
GDP per capita squared (ln)	0.016	-0.705	0.001	-0.339	-1.115**	1.567
	(0.015)	(0.441)	(0.643)	(0.492)	(0.466)	(1.358)
GFCF	0.000	-0.018	-0.019	-0.011	0.005	0.047
	(0.000)	(0.014)	(0.014)	(0.012)	(0.015)	(0.029)
Labour Income Share	0.089**	-3.968**	-0.048	-2.735	-3.509	7.858**
	(0.042)	(1.641)	(2.295)	(1.819)	(2.182)	(3.830)
Tech. innovation	-0.000	0.002	0.001	0.002	-0.000	-0.001
	(0.000)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)
Tertiary education	-0.001	0.025	-0.030	0.041	0.076*	-0.098
	(0.001)	(0.031)	(0.042)	(0.035)	(0.041)	(0.073)
Population density	0.000*	-0.000	-0.000	-0.000	-0.000	0.001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
EQI	-0.014**	0.751**	-0.268	0.565	0.533	-2.096***
	(0.006)	(0.328)	(0.295)	(0.363)	(0.322)	(0.692)
Constant	0.518**	-5.643	11.838	1.825	5.431	57.388***
	(0.222)	(8.124)	(13.966)	(11.526)	(8.520)	(19.444)
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
F-stat	1.3e+10***	5.5e+09***	4.7e+10***	4505.76***	1.6e+09***	7.8e+10***
Adj. R-Sq.	0.581	0.423	0.256	0.337	0.484	0.501
Obs.	85	85	85	85	85	85
RMSE	0.020	0.786	0.808	0.860	0.962	1.931

Notes: The first panel includes 11 countries (AT, CZ, DE, DK, EE, ES, FI, IT, LU, PL, SI), while in the second panel Denmark (DK) is excluded due to missing initial values for Eurostat controls. Control variables are expressed in billions of euro and deflated to 2005 constant price euros using sectoral price deflators obtained from AMECO. Significance: 10% (*), 5% (**) and 1% (***). Heteroskedasticity robust standard errors are in parentheses.

Tables A6 - A7 report further Fixed Effects (FE) conditional convergence estimates for the periods 1995-2013 and 2000-2013 (See results presented in the sub-section 5.1).

Table A6 - Conditional Convergence: Fixed Effects (FE) 1995-2013

PANEL A	Change in Gini, 1995-2013	Changes in quintile shares, 1995-2013				
	GINI INDEX	QUINTILE 1	QUINTILE 2	QUINTILE 3	QUINTILE 4	QUINTILE 5
Initial value	-1.106***	-1.041***	-1.118***	-0.960***	-1.058***	-1.126***
	(0.127)	(0.099)	(0.141)	(0.186)	(0.104)	(0.156)
GDP per capita (ln)	0.180*	0.316	-3.077	-7.853**	-5.607	17.547**
	(0.092)	(3.314)	(2.716)	(3.489)	(4.057)	(7.183)
GDP per capita squared (ln)	0.015	0.012	-0.223	-0.657*	-0.473	1.510*
	(0.010)	(0.321)	(0.310)	(0.375)	(0.410)	(0.777)
GFCF	0.000	-0.022	0.006	0.017	0.000	-0.000
	(0.001)	(0.018)	(0.018)	(0.018)	(0.018)	(0.055)
Labour Income Share	-0.051*	1.406	0.512	1.143	-1.035	-2.518
	(0.030)	(0.934)	(1.374)	(1.234)	(1.424)	(2.561)
Constant	0.807***	9.729	6.529	-4.298	9.939	88.069***
	(0.237)	(8.370)	(5.840)	(8.469)	(9.817)	(18.997)
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes
F-stat	13.25***	18.53***	15.12***	6.31***	23.82***	10.44***
Adj. R-Sq.	0.514	0.537	0.458	0.468	0.501	0.508
Obs.	216	216	216	216	216	216
Regions	75	75	75	75	75	75
RMSE	0.016	0.610	0.581	0.582	0.741	1.398
PANEL B dropping infl. obs.						
	GINI INDEX	QUINTILE 1	QUINTILE 2	QUINTILE 3	QUINTILE 4	QUINTILE 5
Initial value	-1.076***	-1.035***	-1.078***	-0.909***	-1.056***	-1.102***
	(0.125)	(0.102)	(0.141)	(0.210)	(0.106)	(0.159)
GDP per capita (ln)	0.125	2.466	-2.224	-6.390*	-7.045*	15.069**
	(0.078)	(2.892)	(2.792)	(3.425)	(4.163)	(7.136)
GDP per capita squared (ln)	0.009	0.231	-0.136	-0.499	-0.616	1.248
	(0.008)	(0.277)	(0.320)	(0.375)	(0.422)	(0.776)
GFCF	0.000	-0.029	0.004	0.013	0.004	0.006
	(0.001)	(0.017)	(0.019)	(0.018)	(0.018)	(0.056)
Labour Income Share	-0.054*	1.595*	0.651	1.098	-1.137	-2.706
	(0.030)	(0.919)	(1.355)	(1.280)	(1.423)	(2.568)
Constant	0.672***	14.681*	7.903	-1.951	6.524	81.642***
	(0.205)	(7.545)	(5.894)	(7.808)	(9.999)	(19.268)
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes
F-stat	13.13***	17.02***	15.34***	4.92***	23.58***	9.51***
Adj. R-Sq.	0.513	0.544	0.437	0.405	0.503	0.497
Obs.	212	212	212	212	212	212
Regions	73	73	73	73	73	73
RMSE	0.016	0.593	0.572	0.583	0.742	1.379

Notes: The panels include 10 countries (AT, CZ, DE, DK, ES, FI, IT, LU, SI, SK). Control variables are expressed in billions of euro and deflated to 2005 constant price euros using sectoral price deflators obtained from AMECO. Significance: 10% (*), 5% (**) and 1% (***). Clustered standard errors at regional are in parentheses.

Table A7 - Conditional convergence: Fixed Effects (FE) 2000-2013 (with further controls)

PANEL A	Change in Gini, 2000-2013	Changes in quintile shares, 2000-2013				
	GINI INDEX	QUINTILE 1	QUINTILE 2	QUINTILE 3	QUINTILE 4	QUINTILE 5
Initial value	-1.269***	-1.455***	-1.453***	-1.349***	-1.265***	-1.219***
	(0.138)	(0.136)	(0.128)	(0.260)	(0.116)	(0.161)
GDP per capita (ln)	0.065	7.927*	2.194	-10.513**	-11.787***	13.060
	(0.139)	(4.664)	(3.579)	(4.895)	(3.905)	(11.515)
GDP per capita squared (ln)	0.001	0.705	0.377	-0.722*	-0.914**	0.717
	(0.013)	(0.439)	(0.347)	(0.426)	(0.349)	(1.064)
GFCF	0.001*	-0.037*	-0.028**	-0.017	-0.041*	0.109**
	(0.001)	(0.021)	(0.014)	(0.025)	(0.022)	(0.048)
Labour Income Share	-0.070*	2.158**	1.848	2.581	0.553	-5.888*
	(0.038)	(1.068)	(1.963)	(2.216)	(1.776)	(3.355)
Constant	0.631*	32.738***	22.018**	-7.861	-3.909	87.950***
	(0.348)	(11.555)	(8.865)	(15.696)	(11.138)	(28.531)
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes
F-stat	20.34***	31.79***	28.11***	9.54***	26.78***	19.48***
Adj. R-Sq.	0.637	0.691	0.758	0.569	0.731	0.600
Obs.	196	196	196	196	196	196
Regions	98	98	98	98	98	98
RMSE	0.013	0.470	0.403	0.536	0.538	1.251
PANEL B with EUROSTAT						
	GINI INDEX	QUINTILE 1	QUINTILE 2	QUINTILE 3	QUINTILE 4	QUINTILE 5
Initial value	-1.295***	-1.433***	-1.469***	-1.355***	-1.313***	-1.251***
	(0.142)	(0.141)	(0.133)	(0.254)	(0.102)	(0.159)
GDP per capita (ln)	0.040	8.367**	3.229	-9.856*	-12.045***	11.312
	(0.132)	(3.981)	(3.444)	(5.304)	(3.898)	(11.624)
GDP per capita squared (ln)	-0.002	0.664*	0.517	-0.561	-0.832**	0.410
	(0.013)	(0.384)	(0.345)	(0.457)	(0.349)	(1.094)
GFCF	0.001	-0.024	-0.028*	-0.031	-0.049*	0.117**
	(0.001)	(0.022)	(0.016)	(0.028)	(0.025)	(0.055)
Labour Income Share	-0.101**	3.440***	2.741	2.251	-0.296	-7.186**
	(0.040)	(1.154)	(1.801)	(2.150)	(1.781)	(3.392)
Tech. innovation	-0.000	0.012***	0.006	-0.004	-0.008**	-0.007
	(0.000)	(0.004)	(0.004)	(0.005)	(0.004)	(0.013)
Tertiary education	-0.000	-0.027	0.021	0.053	0.035	-0.069
	(0.001)	(0.031)	(0.031)	(0.033)	(0.031)	(0.073)
Population density	0.000**	-0.001	-0.004***	-0.002	-0.004**	0.010*
	(0.000)	(0.001)	(0.002)	(0.002)	(0.002)	(0.005)
Constant	0.590*	34.447***	24.144***	-7.909	-4.071	87.021***
	(0.322)	(10.089)	(8.580)	(16.784)	(10.878)	(28.318)
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes
F-stat	14.24***	20.94***	20.79***	9.05***	23.07***	13.82***
Adj. R-Sq.	0.652	0.729	0.772	0.593	0.750	0.606
Obs.	191	191	191	191	191	191
Regions	98	98	98	98	98	98
RMSE	0.013	0.445	0.397	0.527	0.525	1.258

Notes: The panel includes regions of 12 countries (AT, CZ, DE, DK, EE, ES, FI, HU, IT, LU, PL, SI). Control variables are expressed in billions of euro and deflated to 2005 constant price euros using sectoral price deflators obtained from AMECO. Significance levels are defined as follows: 10% (*), 5% (**) and 1% (***). Clustered standard errors at regional level are in parentheses.

Tables A8 - A12 report pooled OLS and FE estimates for each of the five quintiles in the four programming periods of the European Regional Policy (as presented in the section 6).

Table A8 - Speed of convergence in different Programming Periods: Quintile 1 share of income, 1989 - 2013

	PANEL A: Change in Gini over all programming periods (PPs), 1989-2013						PANEL B: Change in Gini in each programming period (PP)			
							PP1 1989/1993	PP2 1994/1999	PP3 2000/2006	PP4 2007/2013
	Pooled OLS	FE	Pooled OLS	FE	Pooled OLS	FE	Pooled OLS	Pooled OLS	Pooled OLS	Pooled OLS
Q1 initial value	-0.258***	-0.983***	-0.245***	-1.022***	-0.307	-0.768***	-0.307	-0.226***	-0.283***	-0.202**
	(0.045)	(0.079)	(0.040)	(0.070)	(0.233)	(0.198)	(0.235)	(0.077)	(0.056)	(0.088)
dummy_pp2			0.714***	-0.094	-0.032	1.588				
			(0.200)	(0.145)	(2.315)	(1.834)				
dummy_pp3			0.827***	0.027	0.586	4.144**				
			(0.207)	(0.158)	(2.070)	(1.657)				
dummy_pp4			0.121	-0.620***	-0.837	2.919				
			(0.197)	(0.185)	(2.260)	(1.824)				
Q1 94 * dummy pp2					0.081	-0.179				
					(0.264)	(0.205)				
Q1 00 * dummy pp3					0.024	-0.455**				
					(0.231)	(0.185)				
Q1 07 * dummy pp4					0.105	-0.390*				
					(0.256)	(0.206)				
Constant	1.971***	8.446***	1.386***	8.997***	1.970	6.659***	1.970	1.939***	2.557***	1.133
	(0.399)	(0.705)	(0.400)	(0.682)	(2.081)	(1.801)	(2.093)	(0.680)	(0.513)	(0.779)
F-stat	32.80***	155.28	19.77***	62.24***	16.76***	94.51***	1.71	8.66***	25.78***	5.28**
Adj. R-Sq.	0.103	0.506	0.208	0.584	0.203	0.615	0.041	0.161	0.191	0.050
Obs.	336	336	336	336	336	336	49	75	108	104
Regions	114	114	114	114	114	114	49	75	108	104
RMSE	1.001	0.661	0.941	0.607	0.944	0.584	1.298	0.783	0.746	1.036

Notes: The Panel A includes 15 countries (AT, CZ, DE, DK, EE, ES, FI, HU, IE, IT, LU, PL, SE, SI, SK). The Panel B includes 6 countries in 1989-1993 (DE, DK, ES, FI, IT, LU), 10 countries in 1994-1999 (AT, CZ, DE, DK, ES, FI, IE, IT, LU, SE), 14 countries in 2000-2006 (AT, CZ, DE, DK, EE, ES, FI, HU, IE, IT, LU, PL, SE, SI), and 13 countries in 2007-2013 (AT, CZ, DE, DK, EE, ES, FI, HU, IT, LU, PL, SI, SK). Programming period 1 (PP1) is used as benchmark and therefore is excluded in the regressions. Significance levels are defined as follows: 10% (*), 5% (**) and 1% (***). Clustered standard errors at regional level are in parentheses.

Speed of convergence in EU regions receiving Cohesion Policy funds: Quintile 1 share of income, 1989 - 2013

	(1) Pooled OLS	(2) FE	(3) Pooled OLS	(4) FE
Q1 initial value	-0.271***	-1.025***	-0.311***	-0.993***
	(0.039)	(0.069)	(0.053)	(0.079)
dummy_t1	-1.231***	0.065	2.933	1.569
	(0.373)	(0.329)	(3.119)	(2.760)
dummy_t2	-0.527***	0.007	-2.337**	-0.804
	(0.200)	(0.214)	(0.972)	(1.103)
dummy_t3	-0.214	0.165	-0.070	3.503***
	(0.144)	(0.242)	(0.849)	(1.085)
dummy_t4	-0.038	0.055	-2.752***	2.626**
	(0.198)	(0.238)	(0.842)	(1.056)
dummy_t1 * Q1			-0.460	-0.135
			(0.361)	(0.327)
dummy_t2 * Q1			0.218*	0.134
			(0.117)	(0.123)
dummy_t3 * Q1			-0.018	-0.369***
			(0.089)	(0.108)
dummy_t4 * Q1			0.306***	-0.285**
			(0.088)	(0.111)
Constant	2.055***	8.984***	2.437***	8.632***
	(0.442)	(0.666)	(0.572)	(0.771)
Time dummies	Yes	Yes	Yes	Yes
F-stat	12.24***	33.77***	12.66***	50.74***
Adj. R-Sq.	0.259	0.580	0.289	0.612
Obs.	336	336	336	336
Regions	114	114	114	114
RMSE	0.910	0.610	0.891	0.586

Notes: The sample 1989-2013 includes 15 countries (AT, CZ, DE, DK, EE, ES, FI, HU, IE, IT, LU, PL, SE, SI, SK). Significance levels are defined as follows: 10% (*), 5% (**) and 1% (***). Clustered standard errors at regional level are in parentheses.

Table A9 - Speed of convergence in different Programming Periods: Quintile 2 share of income, 1989 - 2013

	PANEL A: Change in Gini over all programming periods (PPs), 1989-2013						PANEL B: Change in Gini in each programming period (PP)			
							PP1 1989/1993	PP2 1994/1999	PP3 2000/2006	PP4 2007/2013
	Pooled OLS	FE	Pooled OLS	FE	Pooled OLS	FE	Pooled OLS	Pooled OLS	Pooled OLS	Pooled OLS
Q2 initial value	-0.445***	-1.132***	-0.439***	-1.095***	-0.348**	-0.771***	-0.348**	-0.384***	-0.396***	-0.546***
	(0.082)	(0.110)	(0.078)	(0.113)	(0.170)	(0.190)	(0.171)	(0.096)	(0.096)	(0.157)
dummy_pp2			0.403***	0.101	0.905	3.934*				
			(0.152)	(0.137)	(2.289)	(2.234)				
dummy_pp3			0.511***	0.256*	1.171	6.743***				
			(0.142)	(0.150)	(2.756)	(2.158)				
dummy_pp4			0.103	-0.002	2.863	6.547***				
			(0.142)	(0.149)	(3.107)	(2.127)				
Q2 94 * dummy pp2					-0.036	-0.277*				
					(0.168)	(0.158)				
Q2 00 * dummy pp3					-0.047	-0.469***				
					(0.200)	(0.154)				
Q2 07 * dummy pp4					-0.198	-0.471***				
					(0.227)	(0.154)				
Constant	6.072***	15.646***	5.712***	15.017***	4.445*	10.533***	4.445*	5.351***	5.617***	7.309***
	(1.124)	(1.533)	(1.064)	(1.614)	(2.308)	(2.665)	(2.322)	(1.386)	(1.348)	(2.154)
F-stat	29.77***	105.74	10.77***	33.48***	7.04***	31.10***	4.16**	15.94***	17.05***	12.12***
Adj. R-Sq.	0.230	0.532	0.266	0.544	0.267	0.572	0.137	0.223	0.161	0.337
Obs.	336	336	336	336	336	336	49	75	108	104
Regions	114	114	114	114	114	114	49	75	108	104
RMSE	0.869	0.572	0.848	0.565	0.848	0.548	0.841	0.822	0.846	0.871

Notes: The Panel A includes 15 countries (AT, CZ, DE, DK, EE, ES, FI, HU, IE, IT, LU, PL, SE, SI, SK). The Panel B includes 6 countries in 1989-1993 (DE, DK, ES, FI, IT, LU), 10 countries in 1994-1999 (AT, CZ, DE, DK, ES, FI, IE, IT, LU, SE), 14 countries in 2000-2006 (AT, CZ, DE, DK, EE, ES, FI, HU, IE, IT, LU, PL, SE, SI), and 13 countries in 2007-2013 (AT, CZ, DE, DK, EE, ES, FI, HU, IT, LU, PL, SI, SK). Programming period 1 (PP1) is used as benchmark and therefore is excluded in the regressions. Significance levels are defined as follows: 10% (*), 5% (**) and 1% (***). Clustered standard errors at regional level are in parentheses.

Speed of convergence in EU regions receiving Cohesion Policy funds: Quintile 2 share of income, 1989 - 2013

	(1) Pooled OLS	(2) FE	(3) Pooled OLS	(4) FE
Q2 initial value	-0.461***	-1.089***	-0.493***	-0.972***
	(0.080)	(0.111)	(0.132)	(0.145)
dummy_t1	-0.838***	-0.467	4.049	0.760
	(0.256)	(0.311)	(3.114)	(4.972)
dummy_t2	-0.017	0.062	-1.254	1.929
	(0.231)	(0.286)	(2.522)	(2.788)
dummy_t3	-0.041	0.170	-2.586	5.453**
	(0.163)	(0.231)	(2.671)	(2.648)
dummy_t4	-0.119	-0.147	-1.022	7.634***
	(0.169)	(0.227)	(2.285)	(2.369)
dummy_t1 * Q2			-0.368	-0.073
			(0.232)	(0.371)
dummy_t2 * Q2			0.091	-0.127
			(0.178)	(0.196)
dummy_t3 * Q2			0.184	-0.381**
			(0.193)	(0.188)
dummy_t4 * Q2			0.065	-0.556***
			(0.169)	(0.168)
Constant	6.304***	15.099***	6.766***	13.416***
	(1.131)	(1.615)	(1.865)	(2.092)
Time dummies	Yes	Yes	Yes	Yes
F-stat	7.60***	20.52***	7.86***	27.61***
Adj. R-Sq.	0.282	0.553	0.286	0.579
Obs.	336	336	336	336
Regions	114	114	114	114
RMSE	0.839	0.560	0.837	0.543

Notes: The sample 1989-2013 includes 15 countries (AT, CZ, DE, DK, EE, ES, FI, HU, IE, IT, LU, PL, SE, SI, SK). Significance levels are defined as follows: 10% (*), 5% (**) and 1% (***). Clustered standard errors at regional level are in parentheses.

Table A10 - Speed of convergence in different Programming Periods: Quintile 3 share of income, 1989 - 2013

	PANEL A: Change in Gini over all programming periods (PPs), 1989-2013						PANEL B: Change in Gini in each programming period (PP)			
							PP1 1989/1993	PP2 1994/1999	PP3 2000/2006	PP4 2007/2013
	Pooled OLS	FE	Pooled OLS	FE	Pooled OLS	FE	Pooled OLS	Pooled OLS	Pooled OLS	Pooled OLS
Q3 initial value	-0.493***	-1.057***	-0.492***	-1.056***	-0.568***	-1.052***	-0.568**	-0.456***	-0.280***	-0.668***
	(0.092)	(0.132)	(0.092)	(0.130)	(0.215)	(0.154)	(0.217)	(0.126)	(0.077)	(0.154)
dummy_pp2			0.005	-0.050	-2.020	-2.130				
			(0.170)	(0.143)	(4.423)	(4.188)				
dummy_pp3			0.013	-0.098	-5.177	-2.384				
			(0.146)	(0.161)	(3.965)	(4.643)				
dummy_pp4			0.025	0.018	1.820	3.264				
			(0.186)	(0.162)	(4.646)	(4.663)				
Q3 94 * dummy pp2					0.112	0.116				
					(0.246)	(0.231)				
Q3 00 * dummy pp3					0.288	0.128				
					(0.220)	(0.255)				
Q3 07 * dummy pp4					-0.100	-0.181				
					(0.259)	(0.257)				
Constant	8.798***	18.940***	8.779***	18.965***	10.141***	18.892***	10.141**	8.121***	4.964***	11.961***
	(1.647)	(2.378)	(1.631)	(2.324)	(3.857)	(2.797)	(3.880)	(2.258)	(1.413)	(2.760)
F-stat	28.49***	63.83	7.62***	18.15***	6.08***	37.07***	6.88**	13.04***	13.29***	18.79***
Adj. R-Sq.	0.212	0.495	0.205	0.493	0.221	0.506	0.271	0.190	0.097	0.284
Obs.	336	336	336	336	336	336	49	75	108	104
Regions	114	114	114	114	114	114	49	75	108	104
RMSE	0.924	0.636	0.928	0.637	0.919	0.629	0.928	0.834	0.786	1.086

Notes: The Panel A includes 15 countries (AT, CZ, DE, DK, EE, ES, FI, HU, IE, IT, LU, PL, SE, SI, SK). The Panel B includes 6 countries in 1989-1993 (DE, DK, ES, FI, IT, LU), 10 countries in 1994-1999 (AT, CZ, DE, DK, ES, FI, IE, IT, LU, SE), 14 countries in 2000-2006 (AT, CZ, DE, DK, EE, ES, FI, HU, IE, IT, LU, PL, SE, SI), and 13 countries in 2007-2013 (AT, CZ, DE, DK, EE, ES, FI, HU, IT, LU, PL, SI, SK). Programming period 1 (PP1) is used as benchmark and therefore is excluded in the regressions. Significance levels are defined as follows: 10% (*), 5% (**) and 1% (***). Clustered standard errors at regional level are in parentheses.

Speed of convergence in EU regions receiving Cohesion Policy funds: Quintile 3 share of income, 1989 - 2013

	(1) Pooled OLS	(2) FE	(3) Pooled OLS	(4) FE
Q3 initial value	-0.525***	-1.051***	-0.441***	-0.918***
	(0.093)	(0.124)	(0.116)	(0.182)
dummy_t1	-0.880***	-0.499	5.363	2.918
	(0.287)	(0.329)	(3.298)	(3.770)
dummy_t2	-0.186	-0.118	5.380	5.283
	(0.195)	(0.237)	(3.436)	(4.305)
dummy_t3	-0.131	0.262	0.246	6.745*
	(0.166)	(0.257)	(3.407)	(3.708)
dummy_t4	-0.138	-0.032	3.304	12.439***
	(0.200)	(0.200)	(2.969)	(4.091)
dummy_t1 * Q3			-0.351*	-0.185
			(0.181)	(0.203)
dummy_t2 * Q3			-0.314	-0.299
			(0.197)	(0.244)
dummy_t3 * Q3			-0.019	-0.363*
			(0.188)	(0.202)
dummy_t4 * Q3			-0.192	-0.704***
			(0.164)	(0.224)
Constant	9.678***	19.038***	8.152***	16.620***
	(1.699)	(2.278)	(2.115)	(3.325)
Time dummies	Yes	Yes	Yes	Yes
F-stat	4.62***	13.44***	7.17***	124.99***
Adj. R-Sq.	0.223	0.502	0.228	0.520
Obs.	336	336	336	336
Regions	114	114	114	114
RMSE	0.918	0.632	0.915	0.620

Notes: The sample 1989-2013 includes 15 countries (AT, CZ, DE, DK, EE, ES, FI, HU, IE, IT, LU, PL, SE, SI, SK). Significance levels are defined as follows: 10% (*), 5% (**) and 1% (***). Clustered standard errors at regional level are in parentheses.

Table A11 - Speed of convergence in different Programming Periods: Quintile 4 share of income, 1989 - 2013

	PANEL A: Change in Gini over all programming periods (PPs), 1989-2013						PANEL B: Change in Gini in each programming period (PP)			
							PP1 1989/1993	PP2 1994/1999	PP3 2000/2006	PP4 2007/2013
	Pooled OLS	FE	Pooled OLS	FE	Pooled OLS	FE	Pooled OLS	Pooled OLS	Pooled OLS	Pooled OLS
Q4 initial value	-0.795***	-1.109***	-0.803***	-1.125***	-1.092***	-1.429***	-1.092***	-0.464**	-0.983***	-0.733***
	(0.123)	(0.103)	(0.126)	(0.104)	(0.277)	(0.423)	(0.279)	(0.190)	(0.267)	(0.093)
dummy_pp2			-0.077	0.010	-14.539*	-14.912				
			(0.143)	(0.131)	(8.613)	(11.516)				
dummy_pp3			-0.121	-0.030	-2.667	-0.682				
			(0.161)	(0.174)	(8.656)	(10.570)				
dummy_pp4			0.136	0.317	-8.118	-10.523				
			(0.183)	(0.209)	(6.410)	(9.820)				
Q4 94 * dummy pp2					0.629*	0.649				
					(0.373)	(0.499)				
Q4 00 * dummy pp3					0.109	0.026				
					(0.377)	(0.458)				
Q4 07 * dummy pp4					0.359	0.473				
					(0.279)	(0.426)				
Constant	18.297***	25.486***	18.478***	25.747***	25.133***	32.732***	25.133***	10.595**	22.466***	17.015***
	(2.833)	(2.357)	(2.884)	(2.361)	(6.372)	(9.753)	(6.410)	(4.419)	(6.102)	(2.157)
F-stat	41.81***	116.19	13.40***	30.75***	10.24***	32.23***	15.36***	5.94**	13.60***	62.66***
Adj. R-Sq.	0.364	0.539	0.366	0.553	0.388	0.587	0.484	0.192	0.485	0.310
Obs.	336	336	336	336	336	336	49	75	108	104
Regions	114	114	114	114	114	114	49	75	108	104
RMSE	0.925	0.730	0.923	0.718	0.907	0.691	0.934	0.782	0.870	1.010

Notes: The Panel A includes 15 countries (AT, CZ, DE, DK, EE, ES, FI, HU, IE, IT, LU, PL, SE, SI, SK). The Panel B includes 6 countries in 1989-1993 (DE, DK, ES, FI, IT, LU), 10 countries in 1994-1999 (AT, CZ, DE, DK, ES, FI, IE, IT, LU, SE), 14 countries in 2000-2006 (AT, CZ, DE, DK, EE, ES, FI, HU, IE, IT, LU, PL, SE, SI), and 13 countries in 2007-2013 (AT, CZ, DE, DK, EE, ES, FI, HU, IT, LU, PL, SI, SK). Programming period 1 (PP1) is used as benchmark and therefore is excluded in the regressions. Significance levels are defined as follows: 10% (*), 5% (**) and 1% (***). Clustered standard errors at regional level are in parentheses.

Speed of convergence in EU regions receiving Cohesion Policy funds: Quintile 4 share of income, 1989 - 2013

	(1) Pooled OLS	(2) FE	(3) Pooled OLS	(4) FE
Q4 initial value	-0.812***	-1.150***	-0.846***	-1.188***
	(0.130)	(0.102)	(0.177)	(0.113)
dummy_t1	-0.071	-1.058*	2.279	1.842
	(0.337)	(0.540)	(11.580)	(16.361)
dummy_t2	0.437**	-0.422	-4.563	-11.143
	(0.193)	(0.383)	(7.280)	(7.133)
dummy_t3	-0.012	-0.445	-0.795	1.536
	(0.175)	(0.355)	(5.847)	(5.247)
dummy_t4	-0.253	-0.630*	-5.228	-2.481
	(0.208)	(0.358)	(5.615)	(7.647)
dummy_t1 * Q4			-0.103	-0.126
			(0.502)	(0.709)
dummy_t2 * Q4			0.218	0.467
			(0.313)	(0.305)
dummy_t3 * Q4			0.034	-0.084
			(0.255)	(0.229)
dummy_t4 * Q4			0.219	0.085
			(0.244)	(0.332)
Constant	18.723***	26.752***	19.488***	27.626***
	(3.051)	(2.420)	(4.132)	(2.695)
Time dummies	Yes	Yes	Yes	Yes
F-stat	12.93***	22.45***	18.64***	23.47***
Adj. R-Sq.	0.370	0.569	0.366	0.577
Obs.	336	336	336	336
Regions	114	114	114	114
RMSE	0.920	0.705	0.923	0.699

Notes: The sample 1989-2013 includes 15 countries (AT, CZ, DE, DK, EE, ES, FI, HU, IE, IT, LU, PL, SE, SI, SK). Significance levels are defined as follows: 10% (*), 5% (**) and 1% (***). Clustered standard errors at regional level are in parentheses.

Table A12 - Speed of convergence in different Programming Periods: Quintile 5 share of income, 1989 - 2013

	PANEL A: Change in Gini over all programming periods (PPs), 1989-2013						PANEL B: Change in Gini in each programming period (PP)			
							PP1 1989/1993	PP2 1994/1999	PP3 2000/2006	PP4 2007/2013
	Pooled OLS	FE	Pooled OLS	FE	Pooled OLS	FE	Pooled OLS	Pooled OLS	Pooled OLS	Pooled OLS
Q5 initial value	-0.363***	-1.170***	-0.354***	-1.174***	-0.426**	-1.086***	-0.426**	-0.303***	-0.393***	-0.330***
	(0.073)	(0.096)	(0.068)	(0.094)	(0.182)	(0.158)	(0.183)	(0.083)	(0.098)	(0.080)
dummy_pp2			-0.971**	0.187	-5.409	-0.872				
			(0.485)	(0.314)	(5.347)	(4.262)				
dummy_pp3			-1.295***	0.017	-2.486	5.402				
			(0.421)	(0.306)	(6.149)	(5.817)				
dummy_pp4			-0.355	0.437	-3.834	7.539				
			(0.459)	(0.355)	(6.457)	(5.562)				
Q5 94 * dummy pp2					0.123	0.028				
					(0.149)	(0.115)				
Q5 00 * dummy pp3					0.034	-0.149				
					(0.172)	(0.157)				
Q5 07 * dummy pp4					0.097	-0.197				
					(0.180)	(0.151)				
Constant	13.593***	42.880***	14.008***	42.812***	16.609**	39.658***	16.609**	11.200***	14.123***	12.775***
	(2.605)	(3.470)	(2.543)	(3.380)	(6.562)	(5.754)	(6.600)	(2.945)	(3.480)	(2.874)
F-stat	25.01***	149.65	8.65***	41.00***	6.52***	26.83***	5.41**	13.47***	16.17***	16.78***
Adj. R-Sq.	0.183	0.609	0.215	0.611	0.211	0.619	0.124	0.180	0.214	0.172
Obs.	336	336	336	336	336	336	49	75	108	104
Regions	114	114	114	114	114	114	49	75	108	104
RMSE	2.235	1.414	2.191	1.409	2.197	1.394	2.753	1.964	2.154	2.109

Notes: The Panel A includes 15 countries (AT, CZ, DE, DK, EE, ES, FI, HU, IE, IT, LU, PL, SE, SI, SK). The Panel B includes 6 countries in 1989-1993 (DE, DK, ES, FI, IT, LU), 10 countries in 1994-1999 (AT, CZ, DE, DK, ES, FI, IE, IT, LU, SE), 14 countries in 2000-2006 (AT, CZ, DE, DK, EE, ES, FI, HU, IE, IT, LU, PL, SE, SI), and 13 countries in 2007-2013 (AT, CZ, DE, DK, EE, ES, FI, HU, IT, LU, PL, SI, SK). Programming period 1 (PP1) is used as benchmark and therefore is excluded in the regressions. Significance levels are defined as follows: 10% (*), 5% (**) and 1% (***). Clustered standard errors at regional level are in parentheses.

Speed of convergence in EU regions receiving Cohesion Policy funds: Quintile 5 share of income, 1989 - 2013

	(1) Pooled OLS	(2) FE	(3) Pooled OLS	(4) FE
Q5 initial value	-0.382***	-1.162***	-0.402***	-1.025***
	(0.067)	(0.095)	(0.092)	(0.126)
dummy_t1	2.867***	1.704**	23.636***	26.634***
	(0.815)	(0.774)	(8.439)	(8.994)
dummy_t2	0.185	0.459	-0.261	3.330
	(0.469)	(0.466)	(5.650)	(5.482)
dummy_t3	0.325	-0.228	-3.033	13.726***
	(0.440)	(0.515)	(4.225)	(4.706)
dummy_t4	0.302	0.745	-5.708	17.021***
	(0.404)	(0.552)	(4.100)	(5.266)
dummy_t1 * Q5			-0.560**	-0.691***
			(0.233)	(0.237)
dummy_t2 * Q5			0.013	-0.093
			(0.149)	(0.143)
dummy_t3 * Q5			0.092	-0.386***
			(0.120)	(0.131)
dummy_t4 * Q5			0.164	-0.450***
			(0.114)	(0.144)
Constant	14.037***	41.762***	14.732***	37.052***
	(2.354)	(3.456)	(3.234)	(4.512)
Time dummies	Yes	Yes	Yes	Yes
F-stat	6.35***	31.23***	8.04***	38.80***
Adj. R-Sq.	0.253	0.626	0.267	0.652
Obs.	336	336	336	336
Regions	114	114	114	114
RMSE	2.138	1.383	2.117	1.333

Notes: The sample 1989-2013 includes 15 countries (AT, CZ, DE, DK, EE, ES, FI, HU, IE, IT, LU, PL, SE, SI, SK). Significance levels are defined as follows: 10% (*), 5% (**) and 1% (***). Clustered standard errors at regional level are in parentheses.