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INCOME INEQUALITY IN THE EUROPEAN UNION, 1995-2000.

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Abstract

The main objective of this work is to analyse income inequality (measured through the Gini index) in the European Union (EU) over the period 1995-2000. We decompose income inequality in the EU as a whole, considering 14 countries, and obtain between and within countries measures of inequality. The results reveal the existence of a reduction in income inequality in Europe as a whole and also a slow convergence in within-country income inequality over the period analysed. This was due to the tendency for within-country inequality to fall in countries with initially high inequality at a greater rate than in countries with initially lower inequality. Although the data reveal the existence of beta convergence, this process may not continue indefinitely because some of the least egalitarian countries present factors that hamper the autonomous decrement.

1. Introduction

This paper analyses inequality in the income distribution in the European Union (EU) in the period 1995-2000. One should be concerned with global EU inequality for several reasons (Milanovic (2002) argues these reasons for the analysis of world inequality). The measurement of EU inequality is interesting in order to be able to say whether it is, in our view, large or not; whether current policies are contributing to it, or not; and finally, whether we need to do something about it –if we deem it too large. Research on the current state of social cohesion within EU is needed to provide a base point for developing and evaluating policy options down the line. But we can also be concerned with the convergence of the inequality within EU countries towards a common level.

Milanovic (2006) distinguish between three concepts of inequality. Inter-country inequality or inequality among countries' mean incomes (Concept 1), inequality among countries' mean incomes weighted by countries' populations (Concept 2), and inequality between EU (in our study) individuals (global inequality or Concept 3). In Concept 1 each country is one observation, and for our purpose it has little to tell us about income inequality in the EU. Concept 2 inequality weights each country by its population. It is a natural and low-cost approach since it requires the knowledge of only two variables: mean income and population size.

What Concept 2 inequality does not take into account is within national inequalities. In calculating Concept 2 inequality, we implicitly assume that each individual within a country has the same per capita income. This last assumption needs to be abandoned if we want to calculate "true" global inequality across individuals. But in order to abandon it, one must have access to national income distributions which are available only from household surveys. There is a big difference in data requirements between Concept 2 and Concept 3.

As Galbraith and Garcilazo (2005) state, research on inequality in the EU generally falls into two main lines.

One measures income inequality among European countries (Concept 2 inequality). Studies of this kind find a convergence in per capita income between EU countries during 1980-2000: member states with lower initial income levels grew faster, on average, than those with higher incomes (Sapir et al., 2003).

The other line of research measures interpersonal inequality among EU individuals (Concept 3 inequality). At the European level, Morrisson and Murtin (2003) estimate measures of income inequality for 1970, 1980, 1990, 1995, and 1998, and Beblo and Knaus (2001) estimate a single measure of European inequality for 1995.

The test to determine income convergence is a sigma convergence or beta convergence test in per capita income levels proposed by Sala-i-Martin (1996). The convergence hypothesis has received considerable attention in the recent literature. Many of the discussions have focused on the implications of different concepts of convergence that have emerged in the literature (Cuadrado-Roura, García-Greciano, and Raymond; 1999). If we understand convergence as a reduction of the differences in mean income between national economies, its significance is clear. This type of convergence is called sigma[1] convergence to differentiate it from other concepts of convergence[2]. One such concept, closely related to the catching-up hypothesis is the notion of beta convergence introduced by Barro (1991) and Barro and Sala-i-Martín (1991, 1992), which is a way of evaluating whether poorer regions tend to grow faster than richer ones. The literature, however, has emphasized that sigma and beta convergence measure different phenomena, so the conclusions obtained from each of them may also be different. We test for inequality convergence regressing the observed changes over time in a measure of inequality (Gini index) on the measure's initial values across countries, analogous to standard tests for convergence in mean incomes. There exists an extensive literature examining individual income inequalities at global level[3].

In this paper we are able to produce a consistent time series of mean income and inequality measures from 1995 to 2000 for 14 countries of the EU and the whole EU (Concept 2 and Concept 3 inequality). We use household surveys for the EU countries. Here global inequality is calculated the same way as one calculates within-country inequality, using the European Community Household Panel (ECHP). We draw on the original micro-data. The main gain of working with the ECHP is that the methodology is common to all countries analysed, making comparisons reliable, because we avoid the fact that differences in the definition of the underlying data might affect intertemporal and international comparability. On the other hand we can only get data for 8 years, and if we want to cover 14 countries we have data for only 6 years. This is a short period, but we work with homogenous database. Therefore we renounce longer period of study for homogeneity in data. This period of time is particularly interesting as the process of European integration intensified after the implementation of the Maastrich Treaty in 1993. Thus, we evaluate the trends in income disparities, and decompose inequality into two components: between-countries inequality and within-countries inequality and investigate the possible existence of convergence in income inequality levels among the European countries during this period. We also measure the

[1] The denominations of sigma and beta convergence were first introduced by Sala-i-Martin (1990).
[2] See Baumol, Nelson, and Wolff (1994) for a review of other concepts of convergence.
[3] Among others Benabou (1996), Milanovic (2002, 2006), Bourguignon and Morrison (2002), Sala-i-Martín (2002, 2006). Morrison and Murtin (2003), Ravallion (2003), Atkinson and Brandolini (2004, 2008), Bourguignon, Levin and Rosenblatt (2004, 2006), and Ezcurra and Pascual (2005).

contribution of each country to total inequality. This permits us to identify which countries have converged to the European average and which ones have diverged. To tackle this objective we apply various techniques (cross-section, σ-convergence analysis, β-convergence analysis, decomposition of the Gini index) to national inequality levels.

The article is organized as follows. Section 2 describes the decomposition of the Gini index. Section 3 presents the data. Section 4 sets out the empirical findings. We examine sigma convergence in income inequality and present the results of the estimation of a beta convergence equation with panel data. Finally, Section 4 offers some concluding remarks.

2. Decomposition of the Gini index

We make use of the decomposition of Gini index proposed by Dagum (1997). Let A be a population with n income units, divided into k<n mutually exclusive subpopulations, $A_1, A_2,..., A_k$, of n_i respective sizes, $1\le i\le k$, $\sum_{i=1}^{k} n_i = n$. Let μ denote the mean income and G the Gini index. In each A_i, F_i denotes the distribution function, μ_i the mean income and G_i the Gini index $1\le i\le k$.

Let us consider Gini's mean difference (Dagum (1980)), Δ_{ij}, between the distributions of A_i and A_j where

$$\Delta_{ij} = E(|X - Y|) = \int_0^{\infty}\int_0^{\infty} |y - x| dF_j(x) dF_i(y). \qquad [1]$$

It is obtained by aggregating all the differences, in absolute values, between income pairs $(x,y)\in A_i\times A_j$. Then the Gini index between both populations, G_{ij}, can be written as:

$$G_{ij} = \frac{\Delta_{ij}}{\mu_i + \mu_j}. \qquad [2]$$

Dagum (1997) decomposes the overall income inequality into two components, a within and a between-groups inequality. Let s_j and q_j represent the share of the j-th subpopulation in the total population and in total income respectively:

$$s_j = \frac{n_j}{n}, \qquad q_j = \frac{n_j\mu_j}{n\mu}, \qquad j = 1, 2,..., k. \quad \sum_{j=1}^{k} s_j = \sum_{j=1}^{k} q_j = 1.$$

Then

$$\mu = \sum_{j=1}^{k} s_j\mu_j \ .$$

Dagum (1997) proved that the Gini index G of the total population can be expressed as a weighted mean with

$$G = \sum_{i,j=1}^{n} s_i q_j G_{ij},$$

where $G_{ii} = G_i$ is the Gini index of the i-th subpopulation, and $G_{ij} = G_{ji}$ the Gini index between the distributions of the i-th and j-th subpopulations. The weights are the products s_iq_j, $\left(\sum_{i,j=1}^{k} s_i q_j = \left(\sum_{i=1}^{k} s_i\right)\left(\sum_{i=1}^{k} q_j\right) = 1\right)$. This could also be formulated as:

$$G = G_w + G_b, \quad G_w = \sum_i s_i q_i G_i, \quad G_b = \sum_{i\ne j} s_i q_j G_{ij}, \qquad [3]$$

where G_w and G_b quantify the within and between-groups inequality, respectively.

Note that in the previous decomposition, the inequality between subpopulations is not computed by simply taking into account the value of mean income in each subpopulation[4]. This would involve quantifying the inequality existing between these means and not the inequality between the distributions. Rather, we establish comparisons between all the pairs of incomes of both distributions, as a consequence of [1] and [2]. We think that this measure is much more informative because it is sensitive to distributional changes within countries. In this sense overall inequality can be decomposed into two terms, one measuring weighted within group inequality and other measuring weighted between group inequality (considering the entire distributions, and not only the means)

3. The Data

As we try to compare income distributions across countries choices must be made to achieve comparability among people living in households of different sizes and in different countries.

A very rich data set to investigate the distribution of income across European countries is provided by the European Community Household Panel (ECHP). To meet the demand for greater in-depth knowledge and better compatibility of data on social and economic conditions in the European Union, the ECHP was launched as a closely coordinated component of a system of household surveys aimed at generating comparable social statistics at the EU level. The ECHP is a standardized survey conducted in Member States of the European Union under the auspices of the Statistical Office of the European Communities.

The key feature of the ECHP is harmonization of its methodology, specifically through the creation of a centralized questionnaire that serves as the point of departure for all national surveys

The analysis undertaken is based on data supplied by the ECHP. The ECHP is a panel survey that contains data on individuals and households for 15 European countries. This source has provided data allowing income distribution in 15 countries to be compared for the period 1993 to 2000. The information is homogeneous, as the questionnaire is similar and the elaboration process of the survey is coordinated by EUROSTAT. Hence this database has the advantage that the methodology is common to all countries analysed, making comparisons reliable. To avoid that measured trends reflect changes in country coverage, we concentrate on the sample composed of 14 countries (EU-15 except Sweden) with 6 observations (1995-2000).

We analyse the distribution of disposable money income. That is, we take total annual household income after taxes and transfer payments as our chosen indicator for differences in the access to economic resources. Since we are particularly interested in comparing real income levels across EU countries we first transform all incomes into a comparable base using the purchasing power parities provided by Eurostat. .

We measure income as household equivalent income. The unit of analysis is the individual to whom we assign an equivalent household income according to the modified OECD scale[5]. We assume that within each family an equal share of income is

[4] This is the case of generalized entropy indexes. In these indexes the total inequality component attributed to the between-groups inequality coincides with the value of the corresponding index applied to the vector of mean incomes of each subpopulation.

[5] This scale assigns a weight of 1.0 to the first household member aged 14 or over, 0.5 to each additional member aged 14 or more and 0.3 to each member aged less than 14 years old.

allocated to each member. Thus we do not take into account the possibility of unequal sharing within the household

The Gini index is calculated for the 14 countries as a whole, for each of them considered individually and for each pair of countries taking the PPP-adjusted household equivalent disposable income as the reference variable.

4. Empirical results

We estimate each country's annual income distribution using a non parametric kernel density function. This procedure does not impose specific functional forms on individual country distributions[6]. Figure 1 shows the evolution of the European distribution of income. The results reveal differences in the external shape of the densities over the six years contemplated, showing that the initial situation did not remain stable over time. During the period examined there was a perceptible shift of the density to the right.

Figure 1. Distribution of income in Europe.

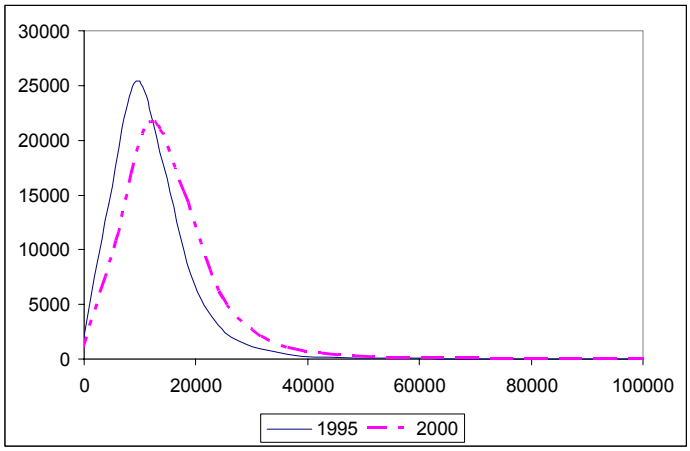
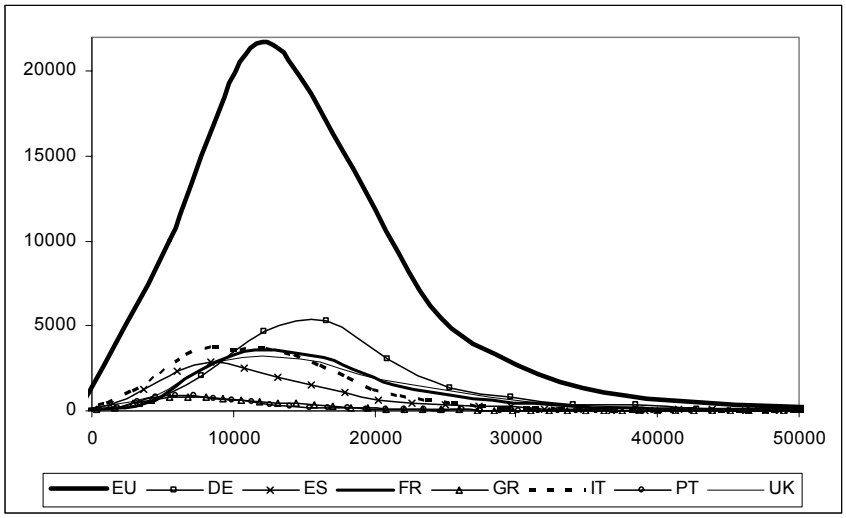


Figure 2 displays the income density function for EU and some countries in 2000. Table 1 illustrates the countries' population shares within the EU income distribution.

[6] We used the Epanechnikov kernel and optimal Silverman (1986) bandwidth.

Figure 2. EU and individual country distribution in 2000.



DE: Germany, ES: Spain, FR: France, GR: Greece, IT: Italy,, PT: Portugal, UK: United Kingdom.

The information contained in Figure 2 is also contained in Table 1.

Table 1. Distribution of EU deciles by country 2000.

	AT	BE	DE	DK	ES	FI	FR	GR	IE	IT	LU	NL	PT	UK
Decile 1	3.88	2.97	3.04	2.18	19.21	6.45	5.75	30.67	14.26	16.70	0.25	5.53	35.24	7.32
Decile 2	4.76	6.90	5.10	4.97	15.98	12.50	9.67	16.96	10.61	14.27	0.66	7.55	17.93	8.62
Decile 3	7.58	9.83	7.48	4.73	13.15	12.49	9.44	12.37	9.91	11.09	2.59	11.99	12.16	10.22
Decile 4	9.45	9.83	8.62	8.69	10.80	14.21	10.80	9.22	9.56	11.09	3.16	13.50	8.89	8.86
Decile 5	14.24	10.11	10.67	9.38	8.24	11.98	10.28	7.51	9.55	10.67	4.10	11.84	6.22	9.27
Decile 6	8.99	11.68	14.02	11.10	6.79	11.88	10.01	6.09	10.75	8.99	5.55	10.60	3.47	8.76
Decile 7	12.26	11.28	12.47	13.65	7.68	10.45	10.81	5.50	10.05	8.92	7.78	9.16	3.93	9.52
Decile 8	14.17	12.63	12.45	17.25	5.19	8.70	11.30	4.94	10.51	7.72	12.82	11.43	3.47	10.73
Decile 9	13.74	11.75	12.92	17.22	6.26	7.47	10.98	3.77	7.39	6.21	19.41	10.29	3.09	12.22
Decile 10	10.93	13.01	13.23	10.83	6.70	3.86	10.97	2.97	7.41	4.33	43.69	8.11	5.59	14.48
	100	100	100	100	100	100	100	100	100	100	100	100	100	100

AT: Austria, BE: Belgium, DE: Germany, DK: Denmark, ES: Spain, FI: Finland, FR: France, GR: Greece, IE: Ireland, IT: Italy, LU: Luxembourg, NL: The Netherlands, PT: Portugal, UK: United Kingdom.

The results in Table 1reveal that the central or continental EU countries (Austria, Belgium, Germany, Denmark, France and Luxembourg) as well as the United Kingdom are over proportionally represented in the higher income classes. Luxembourg is an extreme case with a population share lower than 5% in the lower half of the income distribution and a substantial over-proportional fraction in the highest income group (43%). An exception to this central European pattern is the Netherlands which, after an over-representation in the six central income classes, experiences a decrease in the highest income group.

Finland has a pattern similar to the one of the Netherlands. It is over represented in the second to seventh income class and is under represented in the three highest incomes groups.

Southern European countries (Spain, Greece, Italy and Portugal) as well as Ireland have larger shares in the lower income groups. Greece and Portugal have a share greater than 30% in the first decile. In this set of countries, the share of the first decile

increased from 1995 to 2000 for Greece, Italy Ireland and Portugal, and only Spain reduced it. Ireland is a peculiar country in this set. It is over represented in the first two deciles, presents a sharp drop thereafter and improves its representation rate throughout the deciles 6th to 8th. Then its representation declines again.

These results coincide with those of Beblo and Knaus (2001) for 1995 and with those of Morrison and Murtin (2004).

This information about national structures of income distribution is complemented with the evolution of income dispersion through the period 1995-2000.

Figure 3 shows the time path of the coefficient of variation of countries' mean logarithm of income during the period 1995-2000. This coefficient reduces in 4.2%. These features are indicative of the existence of process of non-stationary convergence in the EU.

Figure 3. σ convergence in the European countries, 1995-2000.

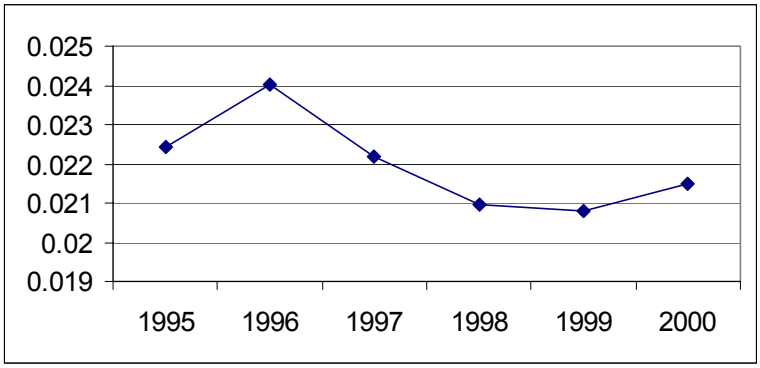
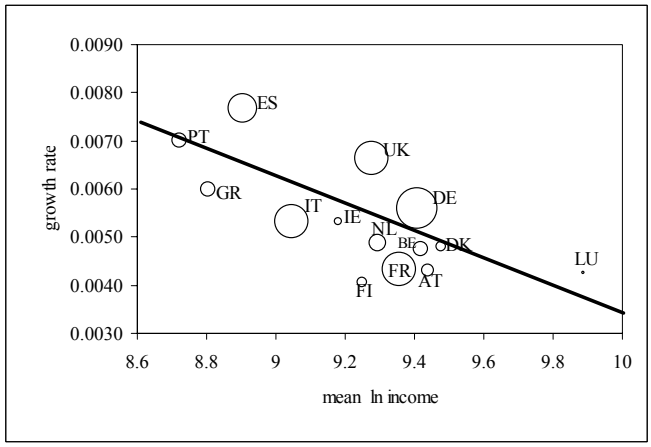


Figure 4 displays the scatter plot of the average growth rate of income during the whole sample period versus the mean of the logarithm of income in 1995 with the size of each dot proportional to that country's population.

Figure 4. Growth versus initial income. B convergence in the European countries' means income 1995-2000.



Note: Estimated equation $\Delta lny_{it}=0.032-0.0029lny_{i0}+e_i$

There exists a negative relation between growth and the initial level of income. We get that the beta coefficient is significantly different from zero. The negative slope of the fitted regression line indicates that, on average, growth has been faster in the initially poorer countries. Nevertheless the rate of convergence (i.e. the slope of the regression line) suggests that the process of convergence is very slow.

This conclusion is not sufficient to provide accurate estimates of income inequality. By now we have implicitly assumed that all citizens have the same level of income corresponding to the country's mean income but we miss within-country dispersion. We are interested in knowing if there are signs of inequality convergence in the EU.

In order to analyse inequality convergence we have computed the Gini index for the whole EU during the period 1995-2000. We use the Gini index as it is an income inequality index commonly used in the measurement of inequality, and it can be decomposed into two components: within-country Gini index and between-country Gini index and both add up to a global Gini index as Dagum (1997) shows.

In the decomposition of the Gini index, the component of between-country inequality instead of measuring inequality considering each country's mean income as one data point weighted by the population of the country, measures inequality among individuals of different countries, comparing all the pairs of incomes of both distributions, in order to capture distributional differences between countries.

Table 2. Inequality in the EU: Gini index.

	1995	1996	1997	1998	1999	2000
Within-country	0.0434	0.0420	0.0417	0.0418	0.0413	0.0411
Across country	0.2684	0.2621	0.2608	0.2611	0.2550	0.2547
Inequality	0.3118	0.3041	0.3025	0.3029	0.2963	0.2958

Table 2 reports the evolution of the overall Gini index[7]. According to this index EU income inequality has followed a soft downward trend over the second half of the nineties, as reported for pay inequality by Galbraith and Garcilazo (2005). The Gini index declined by 5 percent during this period. The overall Gini index for EU in every year is higher than inequality in all but four countries: Portugal, Greece ,Spain and the United Kingdom[8] (see Table 3). Thus, if EU was a country, it would be one of the most unequal countries in EU.

We decompose global income inequality into two components. Table 2 reports that over 86% of income inequality among individuals in EU is accounted for differences among countries and only 14% is accounted for by within-country differences. Logically, the share of between countries inequality is higher than the corresponding values of other inequality measures (as Theil) because in this paper we measure inequality between countries distribution, and not inequality between mean incomes. Dispersion over mean incomes is sensitively less than dispersion over the distributions considered. Table 2 also shows that between-country and within-country inequality has a similar trend to the one corresponding to the overall inequality. Both reduce during the second half of the nineties.

We found interesting to know more about inequality within each country and between each pair of countries. In this sense Table 3 analyse the evolution of inequality in each country.

[7] The evolution of the Gini index is similar to the Atkinson (ε=1) and Log Deviation Measure. Data is available upon request from the authors.

[8] It is greater than the Gini coefficient for Ireland in the first five years, but not in the last. And it is greater than the Gini coefficient for Italy in the three first years.

Table 3. Evolution of inequality in each country. 1995-2000

	1995	1996	1997	1998	1999	2000
AT	0.260	0.250	0.245	0.260	0.243	0.243
BE	0.284	0.274	0.272	0.292	0.295	0.280
DE	0.268	0.253	0.249	0.249	0.249	0.253
DK	0.220	0.205	0.215	0.216	0.215	0.216
ES	0.342	0.351	0.338	0.331	0.324	0.327
FI	0.222	0.222	0.224	0.239	0.236	0.244
FR	0.285	0.288	0.278	0.292	0.281	0.270
GR	0.345	0.353	0.351	0.344	0.330	0.328
IE	0.334	0.327	0.336	0.319	0.298	0.288
IT	0.321	0.308	0.305	0.301	0.294	0.294
LU	0.249	0.255	0.259	0.271	0.262	0.265
NL	0.294	0.258	0.254	0.260	0.248	0.261
PT	0.361	0.364	0.368	0.363	0.357	0.369
UK	0.316	0.302	0.317	0.317	0.318	0.306

AT: Austria, BE: Belgium, DE: Germany, DK: Denmark, ES: Spain, FI: Finland, FR: France, GR: Greece, IE: Ireland, IT: Italy, LU: Luxembourg, NL: The Netherlands, PT: Portugal, UK: United Kingdom.

We can see that the evolution of the Gini index in each country is not the same. In Finland, Luxembourg and Portugal inequality has non monotonically increased during this period. Austria, Germany, Spain, Greece, Ireland and Italy present a non monotonically decrement in income inequality. The rest of countries show an ambiguous change in inequality.

Independently of the trend of the inequality measure we observe that the country rankings are very stable along the period analysed. We can detect six substantial groups of EU countries. These groups are similar to the ones obtained by Alvarez-García et al. (2004) for EU countries in 1996.

Sorted in ascending order with respect to the Gini index, Denmark is the first group in the ranking, the one with the smallest degree of inequality. A second group would be formed by Finland, Austria, Luxembourg and Germany. France, the Netherlands, Belgium, Ireland, Italy and United Kingdom constitute the third group with greater inequality than the two previous sets of countries. In this group, the Netherlands and France always dominate Italy, the United Kingdom and Ireland. Spain, Greece and Portugal are the fourth, fifth and sixth groups, since they remain the most inequitable countries. Comparing with the sets obtained by Alvarez-García et al. (2004), we can observe that in the second half of the nineties the ranking did not changed much compared to the one in the first half. The Netherlands and Spain are the only countries that change groups, because they present a worse rank in the second half of the nineties. Galbraith and Garcilazo (2005) also found that northern European countries have the lowest values of pay income inequality and southern European countries have the highest during the period 1995-2000.

Interestingly, income inequality does not show great variation across countries. It is instead the weights of the countries ($s_i q_i$ in [3]) that differ remarkably. The differences in the countries weights are due to the countries' mean income levels as well as their population sizes. As a result Germany in 2000 comes in fourth highest in terms of relative contribution to inequality although its index is the fourth lowest of all countries' Gini index. Germany is responsible for a share of 10.35% of overall inequality, since it constitutes almost 22.4% of the EU population considered. In contrast to this, Greece in 2000 has the seventh position in relative contribution to

within-countries inequality despite its relatively high within country Gini index (second higher). This is due to its average population share under 2.9% of all EU residents considered.

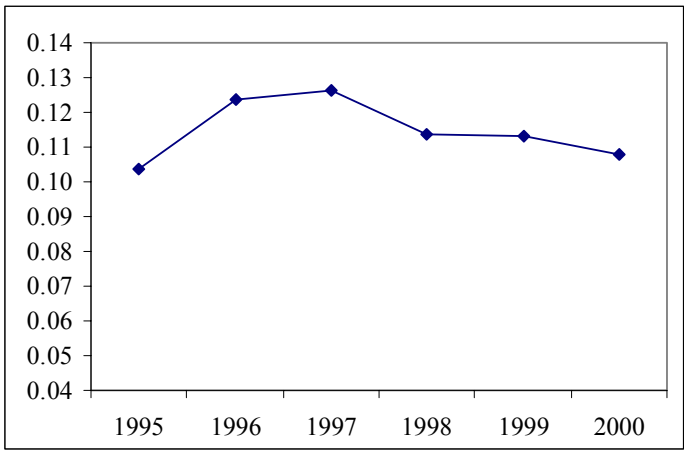
Looking to the between-countries component in depth, the individual elements of this component reveal inequality between each pair of countries. The biggest inequalities are between Portugal and Luxembourg. They present the greatest inter-country Gini index for all the years of study (between 0.49 and 0.51). On the other hand, the pairs of countries: Denmark-Austria and Denmark-Germany, present the smallest values of between-country Gini index (between 0.23 and 0.24). We also observe that the countries that have the largest relative contributions to the inequality between-countries are those of the United Kingdom and Germany, while the lower relative contributions belong to Austria and Luxembourg. This is due again to the country weights that consider population and mean income. The United Kingdom and Germany are the most populated countries in the EU-15 and Luxembourg the least populated one. Table 4 shows the between-country Gini index for all the pairs of countries for 2000 as an illustration.

Table 4. Between-country Gini index. 2000

	AT	BE	DE	DK	ES	FI	FR	GR	IE	IT	LU	NL	PT	UK
AT		0.26	0.25	0.23	0.31	0.26	0.26	0.34	0.27	0.29	0.31	0.26	0.37	0.28
BE	0.26		0.27	0.25	0.33	0.28	0.28	0.36	0.29	0.31	0.33	0.27	0.39	0.29
DE	0.25	0.27		0.24	0.32	0.27	0.26	0.35	0.28	0.30	0.31	0.26	0.38	0.28
DK	0.23	0.25	0.24		0.31	0.25	0.25	0.34	0.27	0.29	0.29	0.25	0.37	0.27
ES	0.31	0.33	0.32	0.31		0.29	0.31	0.33	0.31	0.31	0.42	0.31	0.36	0.34
FI	0.26	0.28	0.27	0.25	0.29		0.26	0.31	0.27	0.27	0.37	0.26	0.34	0.29
FR	0.26	0.28	0.26	0.25	0.31	0.26		0.34	0.28	0.30	0.34	0.27	0.37	0.29
GR	0.34	0.36	0.35	0.34	0.33	0.31	0.34		0.33	0.32	0.48	0.33	0.35	0.37
IE	0.27	0.29	0.28	0.27	0.31	0.27	0.28	0.33		0.29	0.37	0.28	0.36	0.30
IT	0.29	0.31	0.30	0.29	0.31	0.27	0.30	0.32	0.29		0.41	0.29	0.35	0.32
LU	0.31	0.33	0.31	0.29	0.42	0.37	0.34	0.48	0.37	0.41		0.35	0.49	0.34
NL	0.26	0.27	0.26	0.25	0.31	0.26	0.27	0.33	0.28	0.29	0.35		0.36	0.29
PT	0.37	0.39	0.38	0.37	0.36	0.34	0.37	0.35	0.36	0.35	0.49	0.36		0.39
UK	0.28	0.29	0.28	0.27	0.34	0.29	0.29	0.37	0.30	0.32	0.34	0.29	0.39	

We are now interested in identifying if countries are converging to the same level of inequality. In this sense we evaluate sigma and beta convergence in within-country income inequality. Figure 5 shows the dispersion (measured through the coefficient of variation) of the within-country Gini index for the 14 countries studied.

Figure 5. σ convergence in income inequality. Gini index. 1995-2000



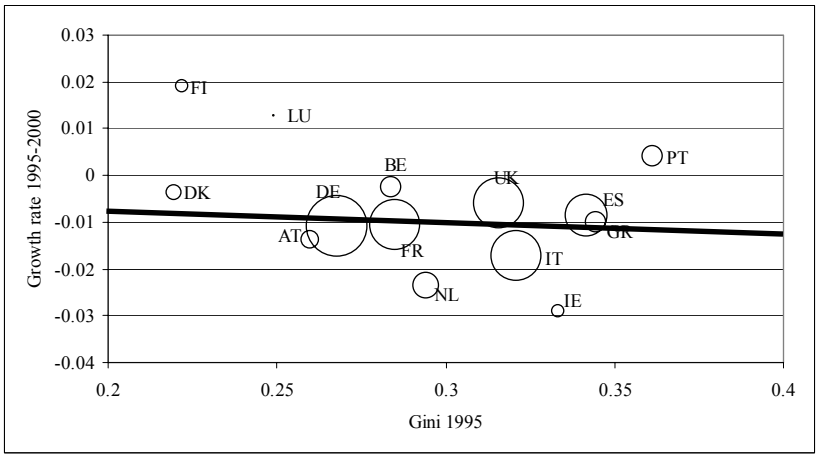
We can observe that the situation does not improve until 1998, where the dispersion in the Gini index starts to decrease. The coefficient of variation in 2000 is greater than in 1995 but less than in 1996. From 1996 to 2000 this coefficient falls by 12.7%. In any case this coefficient is not high during the period (there is not much dispersion between Gini indexes).

We compute different regressions to test the convergence in inequality. The basic regression of the average yearly rate of change in the Gini index of each country between 1995 and 2000 on a constant and the initial value of the Gini index:

$G_{i,2000} - G_{i,1995} = \alpha + \beta G_{i,1995} + \varepsilon_i$

is presented at the bottom of Figure 6. Figure 6 displays the scatter plot of the change of the Gini index during the whole sample period versus the Gini index in 1995 with the size of each dot proportional to that country's population.

Figure 6. Gini index change versus initial Gini index. B convergence in the European countries 1995-2000.



$G_{i,2000} - G_{i,1995} = 0.0022 - 0.0584 G_{i,1995} + e_i$

The negative slope of the fitted regression line shown in Figure 6 indicates that, on average, the inequality decrement has been faster in the initially less egalitarian countries. The convergence parameter β is negative and significantly different from zero, therefore there is inequality convergence. Nevertheless the rate of convergence (i.e. the slope of the regression line) suggests that the process of convergence is slow, as it was the case for income convergence.

We make a cross-section analysis and regress the yearly rate of change in the Gini index of each country on a constant and previous year's income inequality:

$$G_{i,t} - G_{i,t-1} = \alpha + \beta G_{i,t-1} + \varepsilon_{it}$$

where $G_{i,t-1}$ is the previous year's income inequality Gini index. Results shown in Table 4 (standard equation) illustrate that the beta index is significantly different from zero. It shows that the convergence relationship holds.

Table 4. Beta convergence equation in inequality for the European countries: 1995-2000

$G_t - G_{t-1}$	Standard equation		Fixed-effects model	
	Coefficient	Standard errors	Coefficient	Standard errors
G_{t-1}	-0.041	0.00019	-0.753	0.00060
AT	_	_	0.186	0.00015
BE	_	_	0.213	0.00017
DE	_	_	0.188	0.00015
DK	_	_	0.161	0.00013
ES	_	_	0.251	0.00020
FI	_	_	0.177	0.00014
FR	_	_	0.211	0.00017
GR	_	_	0.256	0.00021
IE	_	_	0.234	0.00020
IT	_	_	0.225	0.00018
LU	_	_	0.198	0.00021
NL	_	_	0.191	0.00016
PT	_	_	0.275	0.00022
UK	_	_	0.234	0.00019
Adj-R square	0.0245		0.546	
Prob > F	0.0000		0.0000	

We complete the analysis testing for beta convergence in inequality with panel data using a fixed-effects model. This approach allows us to exploit both the cross-section and the time series dimensions of the data, thereby providing a more complete version of inequality growth than the traditional cross-section estimates. The beta convergence equation is:

$$G_{i,t} - G_{i,t-1} = \alpha_i + \beta G_{i,t-1} + \varepsilon_{it}$$

where α_i is the specific individual effect, and ε_{it} is the random disturbance term that captures the influence of any omitted variable. When a panel data regression of convergence is performed the concept of convergence is somewhat different to the classical approach of convergence in cross-section regressions in the sense that it is now regarded as convergence towards the country's own steady state inequality. Consequently, as a country is closer to its own steady state than to the average steady state of a total group, the convergence coefficient is higher than in the cross-section analysis.

Table 4 shows the results of the estimation of the beta convergence equation using a panel consisting on the 14 countries of the EU in the period 1995-2000. The beta index is significantly different from zero and the specific individual effects are globally significant. Our results suggest that, although having high inequality level seems to be an advantage from the point of view of inequality rate of decrement, we must also consider other factors that may tend to offset this catch-up effect. By way of example, the greatest positive constant terms correspond to the least egalitarian countries (Spain, Greece and Portugal), and these suggest that these countries present specific features that hamper the autonomous inequality reduction. On the other hand,

Denmark and Finland, the countries with the lowest positive constant terms are countries with low level of inequality, and they may possess factors that may allow them to decrease inequality at higher rates than those that would be expected on the basis of their level of inequality. This implies that countries converge to different steady state levels of inequality.

5. Conclusions.

We find a pattern of declining inequality across the EU as a whole for the period 1995-2000. Between-country and within-country inequality component has a similar trend to the one corresponding to the overall inequality. It reduces during the second half of the nineties in the EU.

At the country level, northern European countries have the lowest within-country Gini index and southern countries have the highest values. Spain, Greece and Portugal are the most inequitable countries in ascending order. Looking to the between-country component of inequality, Luxembourg and Portugal present the highest value of inequality between countries (comparing all pairs of incomes in both countries, not only mean income) while Denmark and Austria, and Denmark and Germany present the lowest values of the between-country Gini index. .

In the analysis of convergence in the Gini index among countries, we conclude that it is not until 1998 when we can observe σ-convergence in inequality. Our analysis of beta convergence in inequality through a beta convergence equation that takes into account both the spatial and temporal aspects of the data allows us to suggest that countries steady states inequalities drifted apart. When countries are bound to different steady state positions, convergence to a common inequality level is therefore impossible. The figures obtained for the convergence rates are higher than in the typical cross-section regressions, since the specifications of the model implies convergence to each country's own particular steady state level of inequality. Poor economies, like Spain, Greece and Portugal converge to a higher steady state of inequality while rich economies as Denmark and Finland converge to a lower steady state level of inequality.

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