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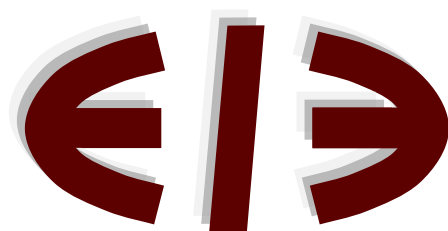
European incomes, national advantages: EU-wide inequality and its decomposition by country and region

Stefano Filauro

European incomes, national advantages: Eu-wide inequality and its decomposition by country and region [†]

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Abstract

This study analyses EU-28- and euro area-level income distribution with the latest EU-SILC data. More specifically it shows the evolution of inequality in net disposable and market incomes over the pre- and post-crisis period (2006–2013).

I find that inequality between the EU-28 and euro area (EA) has converged due to a slow decrease in EU-28 inequality, at least until 2009, coupled with a mild increase in EA inequality.

Thus, I compute how much between-country inequality, as opposed to within-country inequality, contributes to overall inequality in the EU-28 and euro area, observing that the trend of between-country inequality, albeit starting from very different levels, has been declining in the EU-28 while slightly increasing in the euro area. Similar trends are observed for between-region inequality.

Finally, I approximate the extent to which individual incomes on the European scale can be predicted by country of residence and find evidence in line with the inequality decomposition by country.

JEL codes: D3, D63, O52

Keywords: distribution; income inequality; decomposition by country; European Union; equality of opportunity.

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I. Introduction

Income inequality studies have become crucial for current policy making. In the wake of the strand of research recently popularized by Atkinson (2015) and Piketty (2014), just to name a couple, inequality issues that were not explicitly addressed in the 1990s and 2000s have spurred debate both in the economic profession and in policy circles.

Indeed, many inequality dimensions have been studied thoroughly, mostly at the country or sub-national level. A recent research strand has even focused on estimating global inequality, while continental-level inequality has only rarely been examined. However, EU-wide inequality analysis poses interesting challenges both from a policy perspective and from a theoretical viewpoint.

From a policy point of view, the importance of monitoring inequality has been stressed in the Sustainable Development Goals (SDGs) set by the UN. Indeed, the tenth SD Goal, which addresses inequalities, explicitly identifies inequality-reducing targets (10.1-4) to be achieved by 2030, including the famous "income growth of the bottom 40 per cent of the population at a rate higher than the national average" (UN 2015). In doing so, though, it mostly focuses on national-level inequality and implicitly delegates the mission of reducing between-country inequality to the eighth SD goal, devoted to "promote sustained, inclusive, and sustainable economic growth". However, the objective of reducing inequalities, especially in a highly integrated economic area such as the EU, may well be addressed at the continental level.

Especially in light of the EU objective to achieve upward convergence between countries, which is clearly spelled out in *The Five Presidents' Report: Completing Europe's Economic and Monetary Union* (Juncker *et al*. 2015) and in the outline of the European Pillar of Social Rights (European Commission 2016), monitoring inequality at the EU-level may simultaneously inform the fulfilment of the tenth SD goal and the income convergence of the EU countries.

From a theoretical viewpoint, enlarging the unit of analysis from the country level to the EU-level may be relevant for many reasons.

Firstly, monitoring how unequal the EU is and how its territorial disparities have evolved should be an issue of public relevance, as Atkinson (1995) recognised more than 20 years ago, albeit for the case of poverty.

Secondly, studying how much inequality in the EU is attributable to inequality between the different countries that constitute it may shed light on normative issues such as social cohesion and cross-country migration.

As pointed out by Milanovic (2010), when inequality between states in a federation or union of states grows, it is likely to affect social cohesion among the citizens of the area as well as popular support for the union's institutions.

Moreover if the income differentials between spatially close countries increase, they are likely to trigger migration from country to country, as standard migration models recognize.

To address these issues, in this paper I propose new contributions to the investigation of income inequality at the supranational level. In detail, I assess the relevance of between-country inequality to the overall E(M)U-wide inequality, I extend this assessment to the role played by between-region inequality and finally I quantify the effect of the country of residence in predicting incomes when considered at the E(M)U level.

In passing, I note the effect of the welfare states in reducing the market income inequalities in the E(M)U and compare it with the inequality-reducing effect of the tax-and-transfer system in the US.

I examine these three issues using cross-sectional data from the European Union Statistics on Income and Living Conditions (EU-SILC) from 2007 to 2014.

The structure of the paper proceeds as follows. In Section II I set the theoretical stage of the study while in Section III I describe the data available to conduct it. In Sections IV and V I present the findings of the study and canvass further research possibilities opened by them and finally in Section VI I summarize the main findings and conclude.

II. Theoretical Stage and Previous Research

Inequality has been extensively dealt with at the national or sub-national level but its investigation at the supranational level may also be insightful in many respects. In a globalized world, in which transportation costs are decreasing and information about living conditions all over the world is publicly available online, it is common for people to compare their income with that of another country to make decisions about migration strategies. This may be happen even more frequently for the citizens of an economically integrated and culturally homogeneous area such as Europe.

Standard migration models assume that income differentials induce migration from poorer to richer areas (Todaro 1969)[1]. Therefore, the study of inequality within a large and integrated area may also inform about the migration flows within that area.

Moreover, by analysing inequality trends on a supranational scale, important conclusions can be drawn about social cohesion in that supranational entity. For example, Ferroni, Mateo and Payne (2007) explore how inequality is negatively associated with social cohesion in the case of Latin American countries. However, this argument may in principle be extended to a supranational case such as the EU. When inequality between the different areas composing a federation or union of states grows, decreasing popular support for the union's institutions may be expected as well as a decline in social cohesion between the different areas of the union, as Milanovic (2010) argued in the chapter "Can several countries exist in one?".

These normative issues appear to be of paramount relevance in the current phase of the European Union. For example the levels of trust of European citizens in EU institutions have been subject to a long-term decline, as witnessed by *Eurobarometer* (European Commission 2015)[2] while the intra-EU mobility has considerably increased since 2009, with EU-28 movers mostly migrating from Southern and Eastern European countries towards the core countries (Fries-Tersch *et al.* 2016).[3]

In addition to these theoretical considerations[4], the policy context is increasingly attentive to inequality-related issues that affect the EU as a whole. Indeed in core documents of the

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[1] The same research strand also investigated the reverse effect, namely whether migration occurring as a consequence of spatial inequality reduces inequality and brings about convergence (Kanbur and Rapoport 2005). Though I am aware of these studies, the investigation of this reverse effect is not the scope of this paper.

[2] Although last figures show a reverse of the trend (See Qa9 in European Commission 2015, p. 7)

[3] Over the 2009-2014 period the migration inflow was positive especially in Germany (+219%), Austria (+86%), the UK (+57%), Denmark (+54%) and Finland (+60%), with increasing immigration to Germany and Austria from both Southern and Eastern European countries (Fries-Tersch *et al.* 2016, p. 13).

[4] These considerations are also applicable to the case of the subset of EU countries constituting the euro area (EA).

European institutions, the need for social dimensions to be monitored and politically tackled is explicitly stated.

For instance in the *Five Presidents' Report: Completing Europe's Economic and Monetary Union* the entire second chapter is devoted to convergence, prosperity and social cohesion, with an explicit reference to convergence "between Member States towards the highest levels of prosperity; and convergence within European societies, to nurture our unique European model" (Juncker *et al.* 2015, 2).

In light of these considerations I lay out the framework for investigating inequality at the supranational level.

Estimates of income inequality at the EU-level have recently been produced and the first associated findings have been disseminated. For example Heidenreich (2016) estimated EU-wide inequality with EU-SILC data and decomposed the mean logarithmic deviation of disposable incomes into between-country and within-country inequality. Previously, Dauderstädt and Keltek (2014) computed the s80/s20 ratio, also by means of EU-SILC data, and found that, according to this index, the income inequality between countries had fallen in the EU-28, at least until the crisis. Brandolini (2007) also used the ancestor of EU-SILC, the European Community Household Panel (ECHP), to estimate a portfolio of inequality measures at the EU-level for the year 2000 and evidenced how the EU enlargement provoked an increase in income inequality, due to the new EE countries joining the EU, but at the same time assessed inequality as being smaller in the EU than in the US. New inequality estimates have also recently been provided by Darvas (2016), who used imputation techniques to estimate the EU-level Gini from national indices without recurring to household surveys and by Benczúr *et al.* (2016) who estimated EU-wide income inequality with EU-SILC data to show the evolution of income inequality measures for different clusters of European countries.

In the wake of these studies, I first obtain an income distribution representative of the EU-28 and the EA and then assess the respective inequality levels. Therefore I decompose E(M)U-wide inequality indices by country to ascertain how much of the inequality in the E(M)U is attributable to inequality within countries or between the countries that compose it.

In passing, I also present evidence about the extent of total inequality in the US compared to the EU-28 and the euro area and about the redistribution of incomes achieved by the tax-and-transfer systems in the three areas considered. To shed light on the latter question I compute the reduction in inequality measures between the market incomes and the net disposable incomes for the areas considered.

Thus, I explore the issue of how much between-region inequality accounts for the total inequality, thereby complementing the between-country contribution analysis to recognise the importance of the cross-regional variation at play in the EU.

Finally I try to quantify the magnitude of the country effect in determining income at the European level, that is, how much of the income variability in the EU is explained by a model that incorporates just the country of residence as explanatory variable.

III. Methods and Data

The inequality dimension that I intend to assess for the E(M)U is income inequality. The emphasis on income over other economic dimensions is justified by the possibility of comparing it with prior research, data availability and the acknowledgment that income is the most comprehensive approximation of living standards (Atkinson and Marlier 2010).

To obtain EU-wide inequality measures I use EU-SILC data. EU-SILC is an ex-ante harmonized data collection covering most European countries. Its main item is income and the national microdata composing it are derived from a common collection framework[5]. Its structure therefore makes EU-SILC the most reliable data source to carry out cross-country income comparisons in Europe and to obtain a EU-wide income distribution.

Data quality between the countries in EU-SILC may vary as some countries collect data from surveys while others derive them from existing administrative registers[6]. It is indeed well known that register income data are usually more precise, since income data collected from surveys are based on self-declaration and tend to underdetect incomes, especially at the top of the distribution (Törmälehto and Jäntti 2013). Nevertheless I carry out the analysis with the confidence that, also in the case of EU-SILC, the comparability between different data sources will be improved further down the line.

The dataset dates back to 2004, but given that some countries joined EU-SILC only later, my analysis starts with the 2007 cross sectional file, which covers almost all the countries of the EU-28[7], and continues until the 2014 file. The income reference period usually refers to the previous year, although the fieldwork period of the surveys varies slightly from country to country[8], with the only exception of the UK, in which the survey respondents are asked about their current income. To solve this reference period mismatch I substitute the income variables for the UK in every EU-SILC cross-sectional file with those of the previous year. Consequently, our analysis carried out with EU-SILC files from 2007 to 2014 actually refers to the period 2006-2013.

The income concepts I am mostly interested in are the net disposable income and the market income. The two income concepts comprise the income components shown in Table 1. In addition, I define a slightly different net disposable income concept in which I also include imputed rents.

I follow the standard practice of using household-level incomes. I adjust the income concepts for the household size by applying the modified-OECD scale. The choice of which equivalence scale to apply may affect inequality measurements as family composition varies across the European countries, with Southern and Eastern European countries displaying a larger household size than Northern European countries (Iacovou and Skew 2011). The modified-OECD scale appreciates the incomes of numerous households more than the old OECD scale but less than the square root of the household size, so the inequality assessment may in principle be sensitive to the equivalence scale chosen (Brandolini 2007). Aware of this issue, in the future I plan to adjust the household income with different equivalence scales to carry out sensitivity checks.

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[5] The common framework "consists of common procedures, concepts and classifications, including harmonised lists of target variables to be transmitted to Eurostat" (Wolff *et al.* 2010, 40). For other data comparability issue (sampling designs, fieldwork period, etc) see also the same publication.
[6] The register countries are Sweden, Finland, Slovenia, the Netherlands. Moreover, in recent years, also France, Italy, Latvia and Ireland have also started to use income data from registers, along with Spain and Austria.
[7] The only exceptions are Malta, for which data are available from the 2008 SILC wave and Croatia, for which data are available from the 2010 wave.
[8] For further information see: "EU statistics on income and living conditions (EU-SILC) methodology – data collection" (Eurostat 2015).

Table 1. Income Concepts

	Net disposable income		Market income
+	gross employee cash or near cash income	+	gross employee cash or near cash income
+	company car	+	company car
+	gross cash benefits or losses from self-employment	+	gross cash benefits or losses from self-employment
+	pensions received from individual private plans	+	pensions received from individual private plans
+	income from rental of a property or land	+	income from rental of a property or land
+	regular inter-household cash transfers received	+	regular inter-household cash transfers received
+	interests, dividends, profit from capital investments	+	interests, dividends, profit from capital investments
+	income received by people aged under 16	+	income received by people aged under 16
+	family/children related allowances		
+	social exclusion not elsewhere classified		
+	housing allowances		
+	unemployment benefits		
+	old-age benefits		
+	survivor' benefits		
+	sickness benefits		
+	disability benefits		
+	education-related allowances		
-	regular taxes on wealth		
-	regular inter-household cash transfer paid		
-	tax on income and social insurance contributions		

Subsequently, to make the income concepts comparable across all countries, I correct the income variables for national price-level indices. We download price-level indices normalized to EU-28=1 from Eurostat (prc_ppp_ind), selecting them for different levels of aggregation (GDP or household final consumption expenditure (HFCE)). In the following analyses I present the results for the income distributions corrected for the GDP-based price-level indices but the results for the HFCE-corrected income distribution are available on request. The ppp correction is gauged on the year of reference (e.g. 2014 EU-SILC data are corrected with 2013 ppps except for the UK, which is corrected with 2014 ppps).

The country concept that I use in the analysis reported below refers to the country of residence at the time of data collection. The same applies to the region concept that I will use in Section IV.4. This choice mostly depends on the data available, as these are the country and region variables of EU-SILC. The use of the country of residence instead of the country of origin poses some interesting questions especially for the interpretation of the results in Section IV.2, in which this aspect is discussed.

Finally a remarkable advantage of the EU-SILC data is the sample-weighting procedure. In each wave a variable of individual weights is recorded to account for both the different probabilities of selection and survey non-response at the individual level. Moreover the weighting variable is constructed in such a way that it makes the merged sample of all EU countries representative of the EU population when it is applied to EU-wide statistics.

IV. Inequality Analysis

IV.1. A First Anatomy of Inequality Levels at the E(M)U-Level

Having obtained the equivalized ppp-adjusted income distributions for both the net disposable and the market income concept, I compute the income inequality for the EU-28 and the euro area. It must be noted that the Member States (MSs) of the EU and the EA have

changed over the time span considered. For the sake of simplicity, for the whole period under scrutiny I consider the EU-28 and the EA-19 as they were composed at the time of writing[9].

Here inequality is mostly shown as it is measured through the Gini coefficient or the shares measures. The Gini coefficient was chosen as it is the most widespread inequality index allowing us to make comparisons with previous inequality studies for the US, while the shares measures, recently popularized by Piketty (2014), were employed to integrate the inequality measurement provided by the Gini coefficient. This is because the Gini coefficient is particularly sensitive to income differences around the centre of the distribution so it is less informative about distributional changes at the top and the bottom. The caveats about the underdetection of top incomes in surveys described in Section III apply here, so the share measures must be interpreted cautiously. However, given that EU-wide inequality analysis is a nascent field, I deem it to be valuable information anyway, maybe to be corrected in the future when register data become available for all EU countries.

Other inequality measures, such as the generalized entropy family of indices, the Atkinson indices and some quantile ratios, were also computed and are available on request.

The Gini index for the net disposable income in the EU-28 and the EA is illustrated in Figure 1.

Figure 1. Inequality Comparison: The EU-28 and the Euro Area. Gini Index
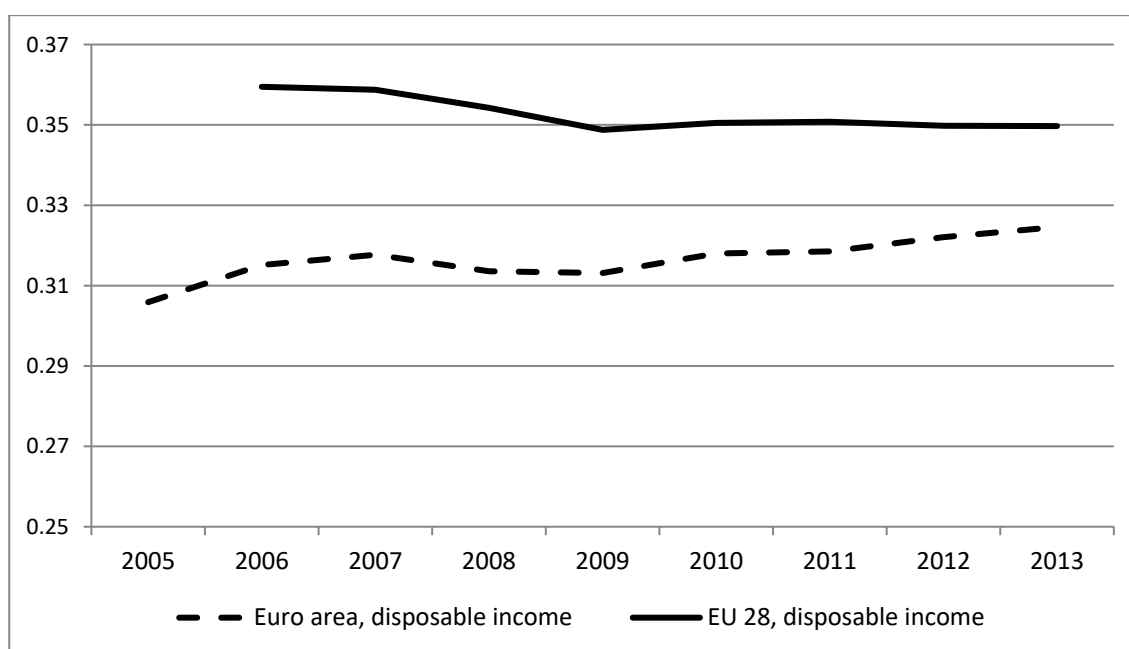
As may be noted, the Gini coefficient displays different trends for the EU-28 and the EA. For the former the trend seems to decrease, at least until the 2009, then stabilizes at around 0.35, while the Gini coefficient in the EA, though smaller than that in the EU-28, has slowly increased, especially after the crisis, to the peak of 0.32 in 2013.

This difference in inequality trends between the EA and the EU-28 seems to indicate potential income convergence of the countries outside the euro area (mostly the Eastern European (EE) countries). This hypothesis will be tested in the Section IV. 2.

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[9] The EU-28 and EA-19 are considered in its present-day composition even though some countries joined the EU-28 or adopted the euro over the course of the period under examination, 2006-2013 (e.g. LV, CY, etc).

The E(M)U-wide inequality appears to be slightly smaller when imputed rents are taken into account, as the figures show an average reduction in the Gini index of respectively 4% and 3.5% for the EU-28 and the EA (Annex). This is probably due to the greater shares of home ownership in South-Eastern countries (Törmälehto and Sauli 2010), which are likely to appreciate the incomes in these countries and, as a result, decrease E(M)U-wide inequality levels. However, the rationale for using income distributions corrected for imputed rents in supranational analysis and the lack of data for Germany prevented us from using these distributions in the following analysis[10].

To gain a visual idea of how unequal the EU-28 is in relation to the Member States that compose it, in Figure 2 I plot the MSs that display Gini coefficients more (dis)similar to the EU-28 Gini[11], which are BG, PT and LV.

Figure 2. Inequality Comparison. The EU-28 and Some MSs. Gini Index, Net Disposable income
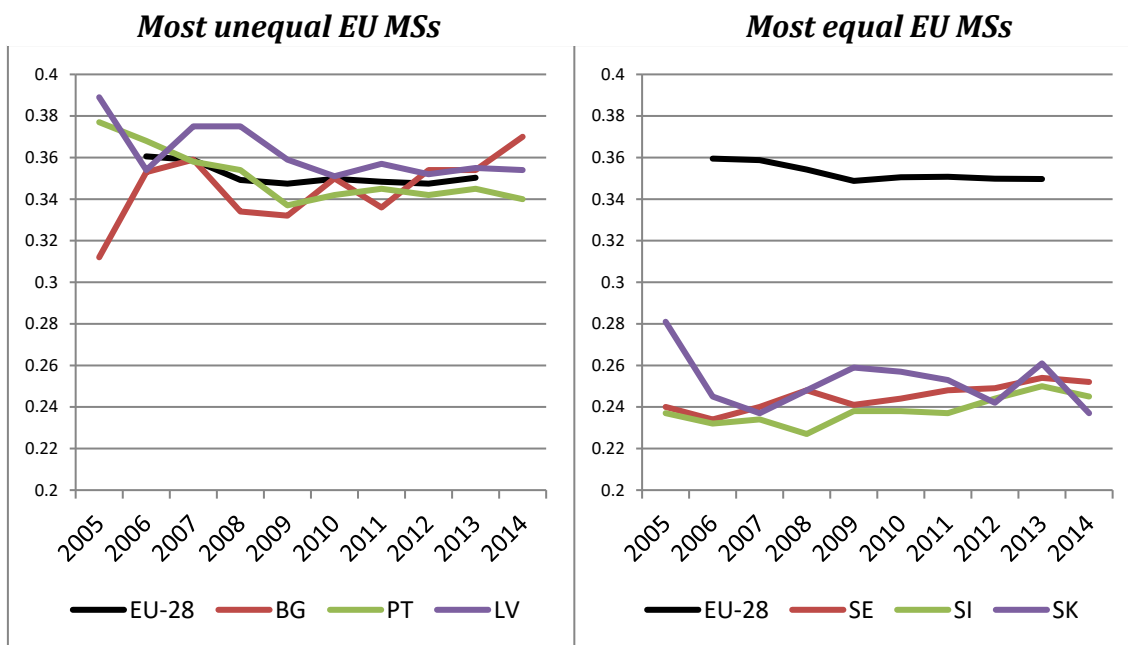
This shows that the EU-28 as a whole is as unequal as the most unequal among its MSs. Conversely, the most distant Member States inequality-wise are the most equal ones, specifically SE, SI, and SK.

If I enlarge the comparison across the Atlantic and plot the US Gini coefficient[12], as shown in Figure 3, the inequality ranking looks clear-cut with the US topping the list, followed by the EU-28 and the EA. Considering the trends, the US Gini is also growing similarly to the EA one but from much higher levels until it reached the disturbing peak of 0.40 in 2013.

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[10] Whether the inclusion of imputed rents in the income distribution affect EU-wide inequality more through a within-country lever or a between-country lever will be object of further research.

[11] Similarity is expressed in terms of the time average of squared deviations from the EU-28 Gini.

[12] The US Gini coefficient is derived from OECD data in which the household income is equivalized with the square root of the household size.

Figure 3. Inequality Comparison. The US, the EU-28 and the Euro Area. Gini Index
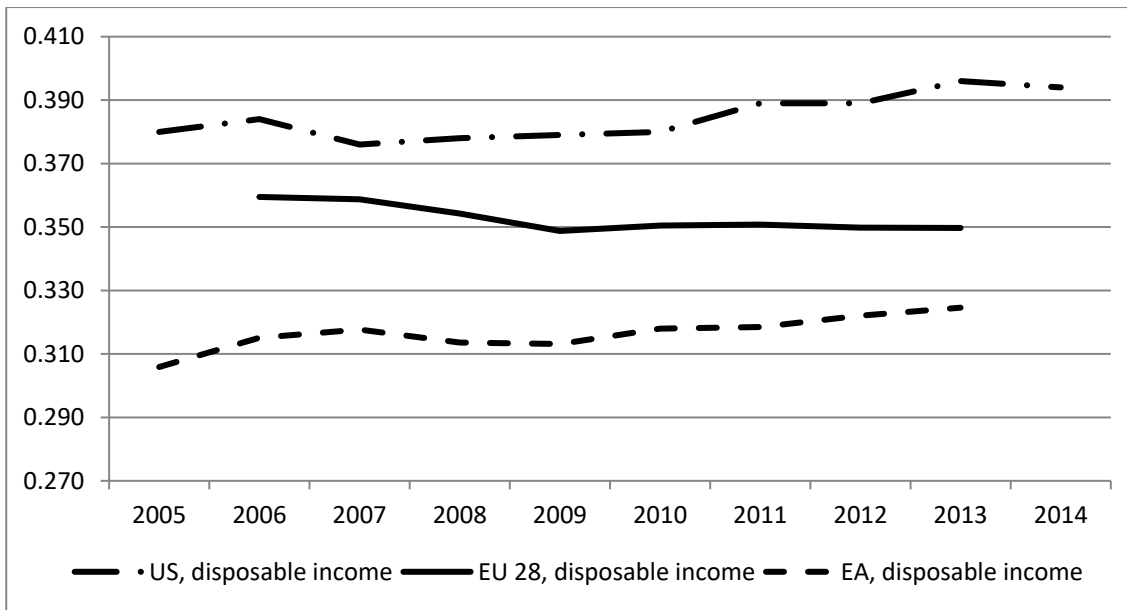
We also compute the share measures for the EU-28 to integrate the inequality assessment provided by the Gini coefficient, as shown in Figure 4.

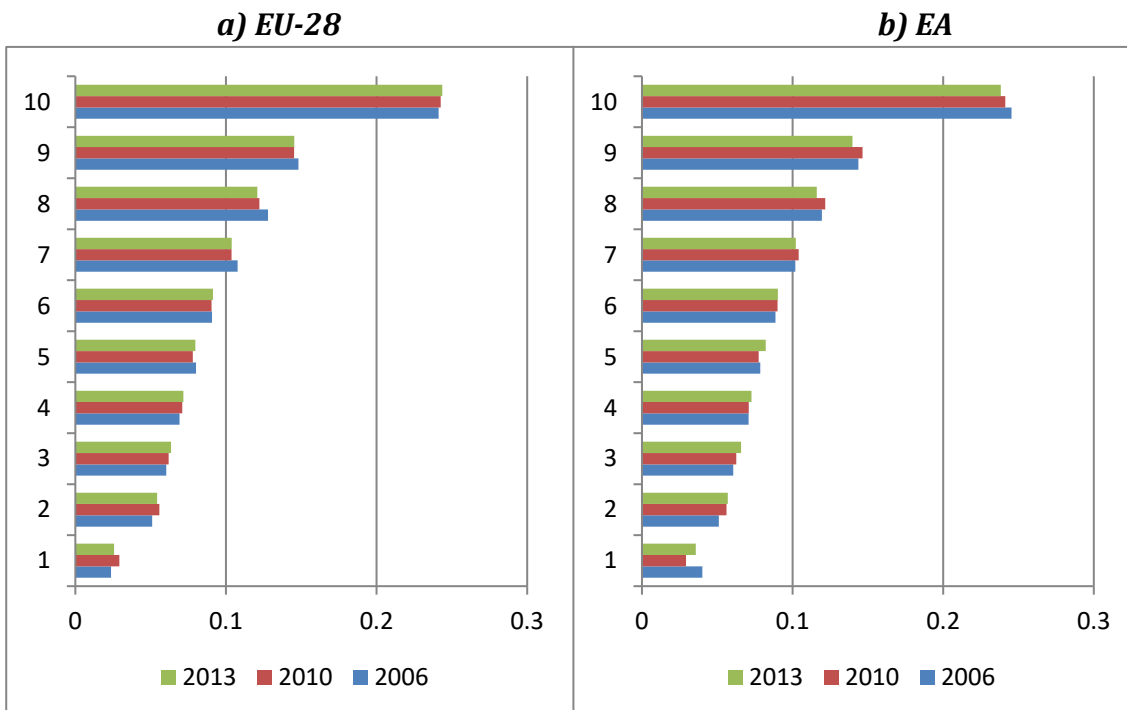**Figure 4. Share of Disposable Income Possessed by Different Deciles**

Figure 4 shows how much of the total net disposable income for the E(M)U-wide distribution is appropriated by the different population deciles for 2006, 2010 and 2013, loosely corresponding to the years before, during and after the crisis.

More than the share of income appropriated by the top deciles, which cannot be excessively relied on as I based my calculation on incomes from surveys[13], it is interesting to note the reduction from market to net disposable income in the share obtained by deciles which is the object of Section IV. 2.


IV.2.   Inequality and Redistribution

After a preliminary exploration of inequality levels in the E(M)U as a single entity, I look at the effect of tax-and-transfer systems to reduce the inequality in market incomes. Accordingly, I compute Gini coefficients for the market incomes at the E(M)U-level and then measure the reduction in the Gini index from the market to the net disposable income distribution. This percentage may be loosely defined as the inequality-reducing effect of the tax-and-transfer systems.

Naturally, in the case of the EU-28 or the EA, there is no central, unified welfare state that imposes tax and pays benefits, therefore the reduction in inequality should be approximately interpreted as the aggregate effect of the national and sub-national tax-and-transfer systems[14].

The Gini coefficients for both the market and the net disposable incomes are shown in Figure 5.

Figure 5. Inequality Comparison. The US, the EU-28 and the Euro Area. Gini Index

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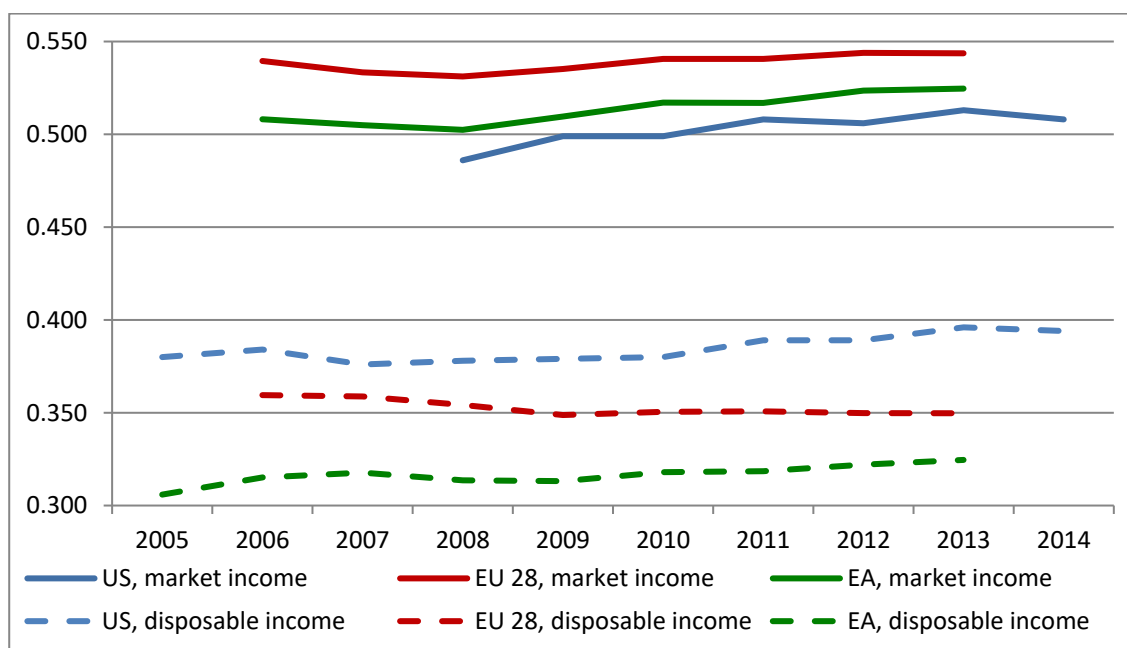
[13] Indeed the share appropriated by the top decile is much greater when it is computed from register data as Piketty (2014) shows for the US, the UK and Germany in 2010 (respectively 47%, 42% and 36%, Fig.9.7). Therefore, a comparison between my share measures and those obtained at the country level from tax data is inappropriate.

[14] The effect of redistributive policies, such as the Structural Funds and the Cohesion Fund, on individual incomes at the Eu-level are unlikely to be captured by EU-SILC data.

It is evident *ictu oculi* that the ordering changes from the market to the disposable income concept as the market inequality is remarkably higher in the EA and the EU-28 than in the US. This can lead us to conclude that the effect of national and sub-national tax-and-transfer systems is more pronounced in the EA and in the EU-28 than in the US.

In turn, the redistribution operated in the EA is greater than that in the EU-28. This is probably a consequence of the EU-28's country composition, in which countries characterized by regressive taxation that do not belong to the EA, such as Bulgaria or Romania, enter the distribution.
This is quantified in Figure 6, which shows the extent of redistribution in the Gini index for the US, the EU-28 and the euro area.

Figure 6. Tax-and-Transfer Systems of Redistribution. Gini Index Reduction (%)
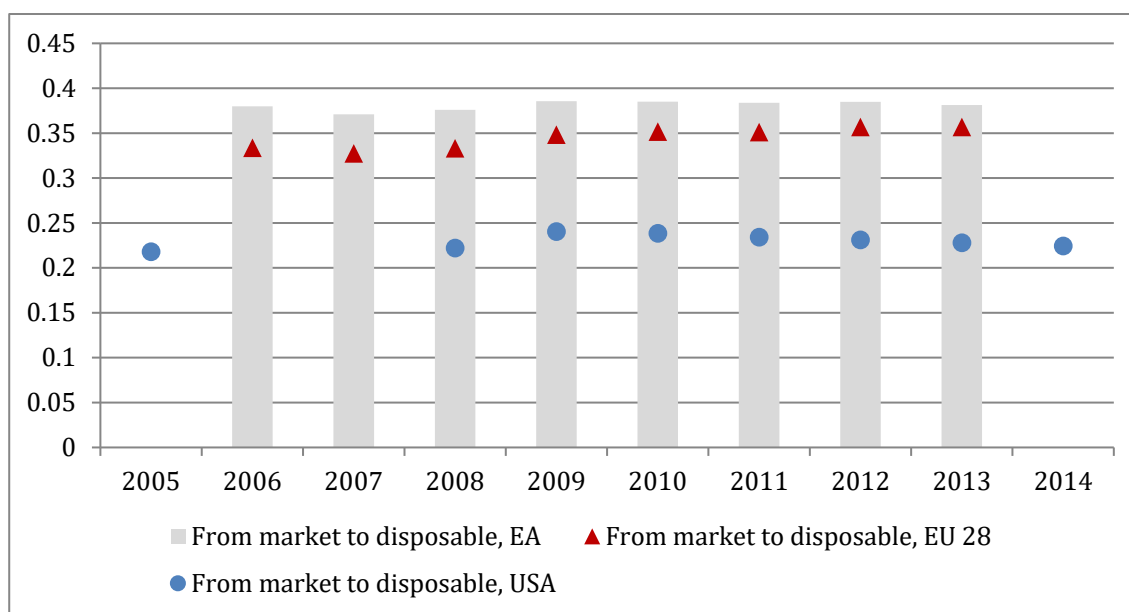
The redistribution of the incomes generated in the market by the state intervention can also be examined in different parts of the distribution both for the EU-28 and for the euro area.

In Figure 7 I plot the change in the share of income possessed by the top and the second-highest decile from the market to net disposable distribution. As panel a) illustrates, the top decile reduces its market income share after taxes and transfers by ca. 25%, with a slightly increasing trend over time. The reduction in the top share is somewhat larger in the EU-28 than in the EA, and is probably due to the country composition of the top decile, as more individuals from Scandinavian countries, characterized by very progressive taxation but not present in the EA distribution, are likely to make it into the top EU decile.

Figure 7. Reduction (%) in the Share Possessed by Decile, from Market to Disposable Income

a) Top decile
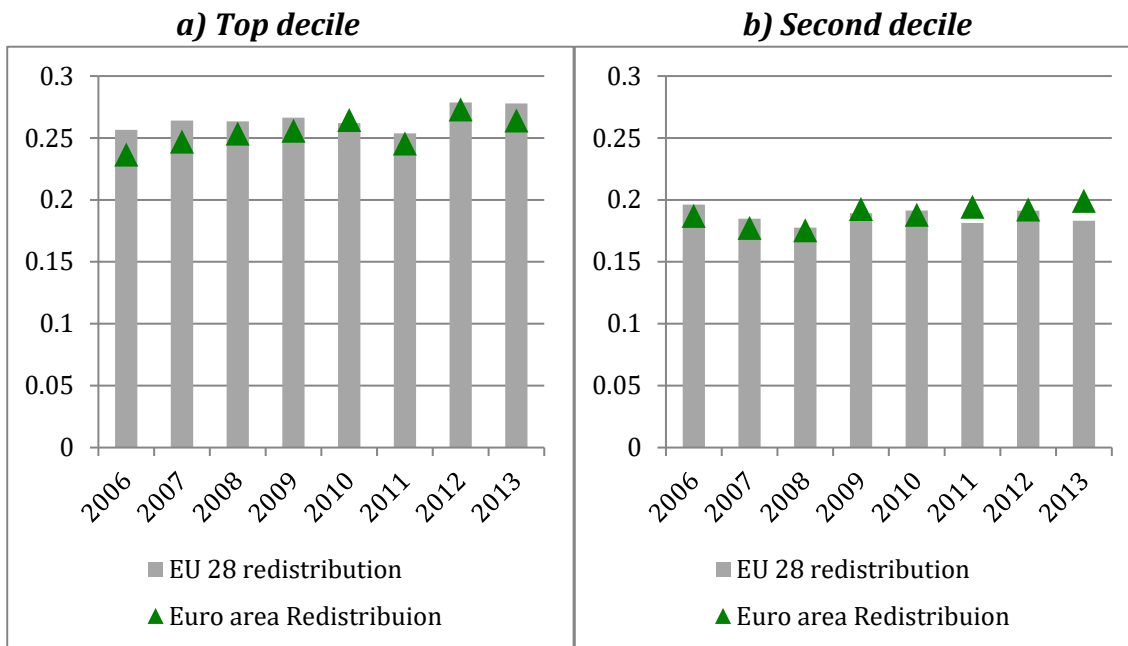
b) Second decile

Indeed, if we move to the second-highest decile, as shown in panel b), the redistribution ordering for the two areas is less clear-cut, as after the crisis the reduction in the share of income possessed looks greater in the EA than in the EU-28.

To hypothesize about the different tax systems to which individuals in the same decile of the EU-28 and the EA are subject, I plot the shares of net disposable income in the hands of the top and the bottom decile, respectively, as shown in Figure 8.

Figure 8. Share of Total Net Disposable Income Possessed by Decile

a) Bottom decile
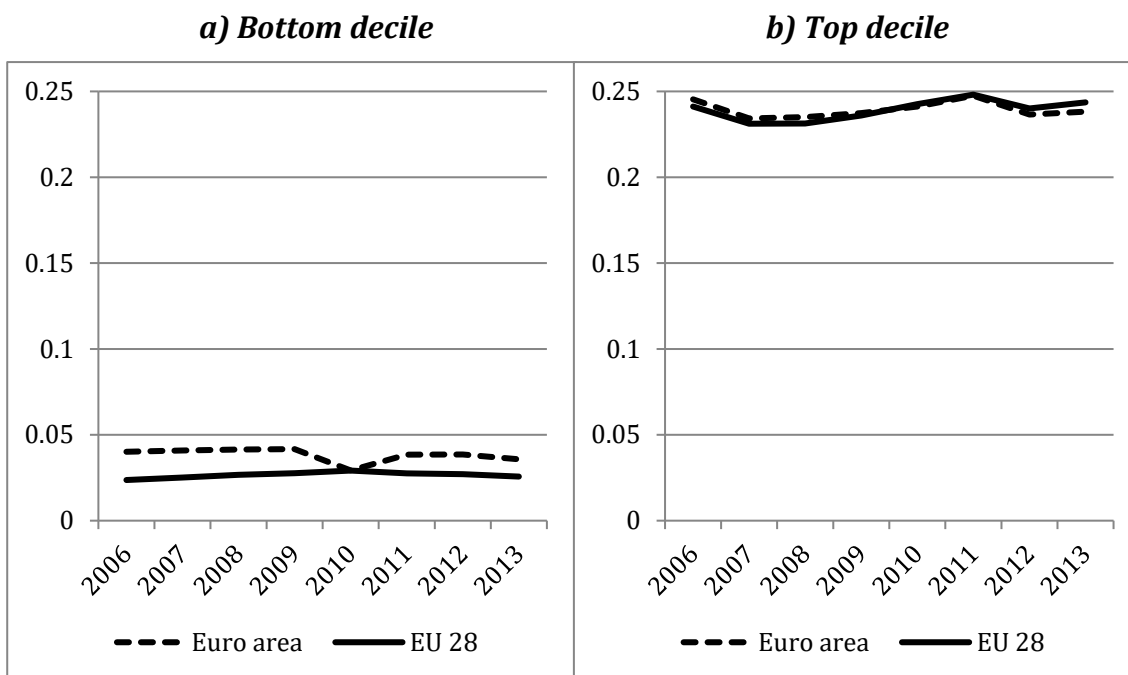
b) Top decile

At first glance the shares of the top decile do not seem to change significantly between the two areas, while there is a visible change in the share of income possessed by the bottom decile, as greater for the EA than for the EU-28. This is because the bottom decile of the EU-28 is likely to be strikingly composed of EE countries with chronic low percentages of income shares.

However, to better understand the effect of the fiscal system in different parts of the distribution for supranational entities, be they the euro area or the EU-28, an assessment of their country composition is needed as well as their a study of their evolution.

IV.3.   Decomposition by Country

After this description of inequality levels and trends for the E(M)U, I investigate how much inequality documented at the EU-level can be ascribed to inequality within the countries constituting it or between these countries.

As I sketched in Section II, this issue may be relevant as we assume that an increase in the between-country component may trigger increasing intra-EU mobility on the one side and undermine social cohesion on the other side.

Here I exploit the property of decomposition in non-overlapping groups of individuals typical of some inequality indices. For example, the overall inequality measured by the Theil index (GE_1) can be additively decomposed as the sum of the between-country and the within-country inequality:

$$GE_1(Y) = GE_1^B(Y) + GE_1^W(Y) \qquad (1)$$

with:

$$GE_1^W(Y) = \sum_{m=1}^{M} v_m\, GE_1(Y^{(m)}) \qquad (2)$$

where v_m is country m's share of the total income and $GE_1(Y^{(m)})$ is the inequality within m. In turn, $GE_1^B(Y)$ is the between-country inequality, in which each individual is assigned the mean income of the country where he or she lives in.

Thus, I compute two indices of the family of generalized entropy indices such as the Theil index (GE_1) and the mean logarithmic deviation (GE_0) and I decompose them by country. In the following results I present only the Theil index decompositions but the figures for the MLD are available in the Annex[15].

By country I mean country of residence, as explained in Section III. In such a fashion, the between-country component of the decomposition should be interpreted as inequality between the mean incomes of citizens *residing* in the different European countries. Therefore, European cross-border migration is already taken into account as citizens born, say, in Greece but residing in Germany are treated as German citizens.

The decomposition results for the EU-28 are presented in Figure 9.

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[15] The levels of the between-country contribution to overall inequality are sensitive to the index chosen, especially in the case of the EU-28 income distribution. This is due to the different function of "distance" between income shares incorporated in the different measures of the Generalized Entropy family (Jenkins 1991). This is the main reason why I put more emphasis on the general trends of the inequality decomposition, which are similar regardless of the index chosen, rather than on the precise levels.

Figure 9. Theil Decomposition by Country, Disposable Income


a) EU-28

b) EA
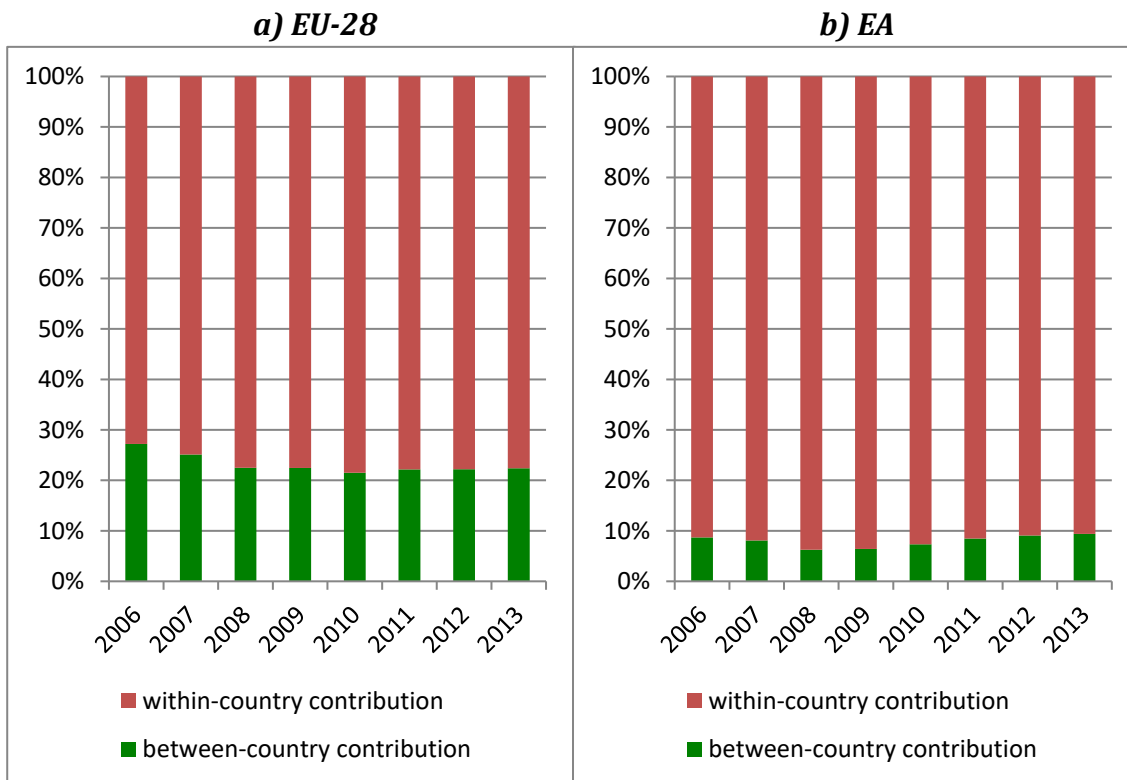
They show that inequality between the EU MSs accounted for almost 30% of the overall inequality in the EU-28 before the crisis, with a declining trend until 2010 and then a stationary contribution to total inequality slightly above 20%.

The decomposition evidence for the EA, illustrated in panel b), points to a much smaller contribution of between-country inequality, never accounting for more than 10% of the EA inequality, as the EA countries have more similar mean incomes than the EU-28 countries, but with a seemingly increasing trend.

To obtain a synoptic view of the between-country contribution to the overall inequality in the two areas I plot their trends in Figure 10. As it stands clear the levels are quite different, but the trends provide us with an interesting comparison: in the EU-28 the inequality between countries accounted for almost 30% of the total inequality in 2006 but this figure constantly reduced to 22% in 2010, probably due to the catching up of mean incomes in some EE countries – for example the success story of Poland is notorious. However, as of 2010 the between-country inequality path has arrested its decline.

The trend in the euro area looked similar until 2008, with inequality between the euro area MSs in decline until the historical low of 6% of the overall EA inequality in 2008, but, in the aftermath of the crisis, the mean incomes between the eurozone MSs diverged as a result of different economic performances so that between-country inequality between in 2013 accounts more (ca. 10%) for the total EA inequality than it did back in 2006.

Figure 10. Between-Country Contribution to Theil Index, Disposable Income (%)
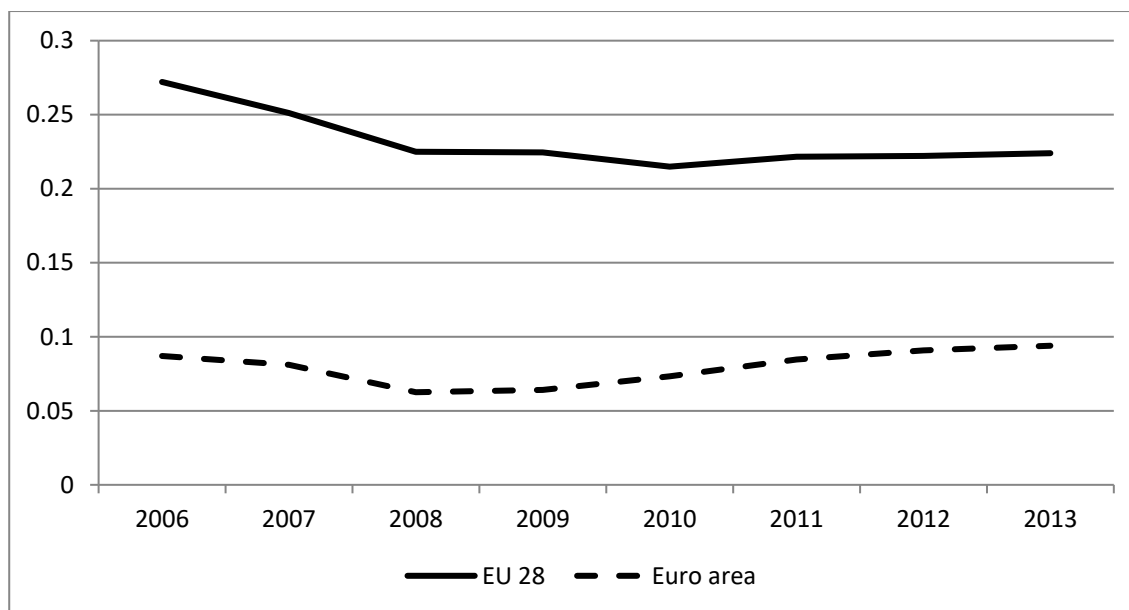
In brief, if the inequality between countries disappeared as a result of national mean income convergence, the total inequality would reduce by ca. 20% in the EU-28 and by ca. 10% in the euro area.

To put these figures further into perspective with the inequality trends in the two areas as a whole, it is useful to remember what was evidenced in Section IV. 1: that is, inequality in the eurozone has slowly increased over the last 5 years while it has remained stationary in the EU-28, even though in 2013 it was still 8.5% higher in the latter entity[16].

To sum up, the inequality between the countries amounts to ca. 20% of the overall inequality in the EU-28 and displayed a static path from 2009 in the context of unchanging inequality, while the inequality between the EA countries, although it was very low in the first 2000s, is slowly increasing in the context of mildly increasing inequality in the EA.

In the wake of these results, it is instructive to discuss here, albeit only on a purely speculative side, which spatial dimension, whether the EU-28 or the EA, is relevant to the normative issues stated in Section II.

The conventional wisdom could suggest that the between-country inequality within the EU-28 may be more relevant to understanding cross-country migration in the EU-28, especially as mobility flows usually move from EE countries towards core EU MSs (2016 Annual Report on intra-EU Labour Mobility, forthcoming), while between-country inequality in the euro area may be relevant to understanding the declining trust in the EU institutions, especially for Southern European citizens who are more likely to compare their incomes with those in other eurozone countries than with those prevalent in the EU MSs that are not part of the eurozone[17].

In this regard Heidenrich (2016), using data on subjective wellbeing from EU-SILC, also found that the perception of economic stress for the citizens of the EU-28 may not depend

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[16] According to the Gini index, if using the Theil index, also for consistency issues with decomposition analysis, the inequality in the EU-28 is actually 16% higher than in the euro area.
[17] Maybe except Great Britain.

exclusively on the individual living conditions in their national context but may be affected by a European relative reference group.

This result is particularly interesting as it may integrate and challenge previous behavioral studies (Norton 2013) that postulate that the income reference groups of interest for life satisfaction and well-being are essentially "local".

These hypotheses[18] are anyway just sketched here and require further investigation as the link between between-country inequality and migration or social cohesion poses challenges from both an empirical and a theoretical viewpoint.

IV.4.   Decomposition by Region

So far I have described the extent to which the overall inequalities existing in the E(M)U are ascribable to inequality between countries and documented how this component has changed over time in the two areas. Nevertheless, the subnational level has not been considered in the analysis while recent studies show how much inequality also takes place at the regional level, even within the same country, in the EU (OECD 2014).

Moreover, some EU policies occur at the regional level, so an assessment of the between-region inequality component in the EU may also inform regional policies about their need and scope in tackling this issue.

The data that I use are the same as in the previous analysis, with the exception that I use the region instead of the country in the decomposition exercise so that two addends of the decomposition in (1) become the inequality within regions and the inequality between regions.

The regional identifier is recorded in the EU-SILC data as the region of residence at the moment of the interview, so, as for the country, migration from a region different from that of birth is already taken into account. Unfortunately, some countries do not provide a regional identifier in the EU-SILC data, as shown in Table 2.

Table 2. Countries with No Regional Identifier in EU-SILC

	2006	2007	2008	2009	2010	2011	2012	2013
DE	x	x	x	x	x	x	x	x
NL	x	x	x	x	x	x	x	x
PT	x	x	x	x	x	x	x	x
SI	x	x	x	x	x	x	x	
SK	x							
UK	x	x	x					

For countries with limited regional variation such as Slovenia or the Netherlands, the lack of regional identifiers is not an insurmountable limitation but in the case of Germany, well known for long-running regional disparities, this lack is a major shortcoming.

Therefore, the following results are obtained by decomposing income inequality in an E(M)U-wide distribution in which each year the individuals from countries with no regional identifier

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[18] In addition to that, these hypotheses implicitly assume partial-equilibrium effects, while intra-EU mobility is also likely to affect support to in the EU institutions *directly*.

have been removed, so the results must be interpreted with caution and bearing in mind the absence of these countries from the supranational distribution.

The decomposition results show that the inequality between regions accounts for about a third of the overall EU-wide inequality[19], as shown in Figure 11.

Figure 11. Theil Decomposition by Region, Disposable Income

a) EU-28   *b) EA*
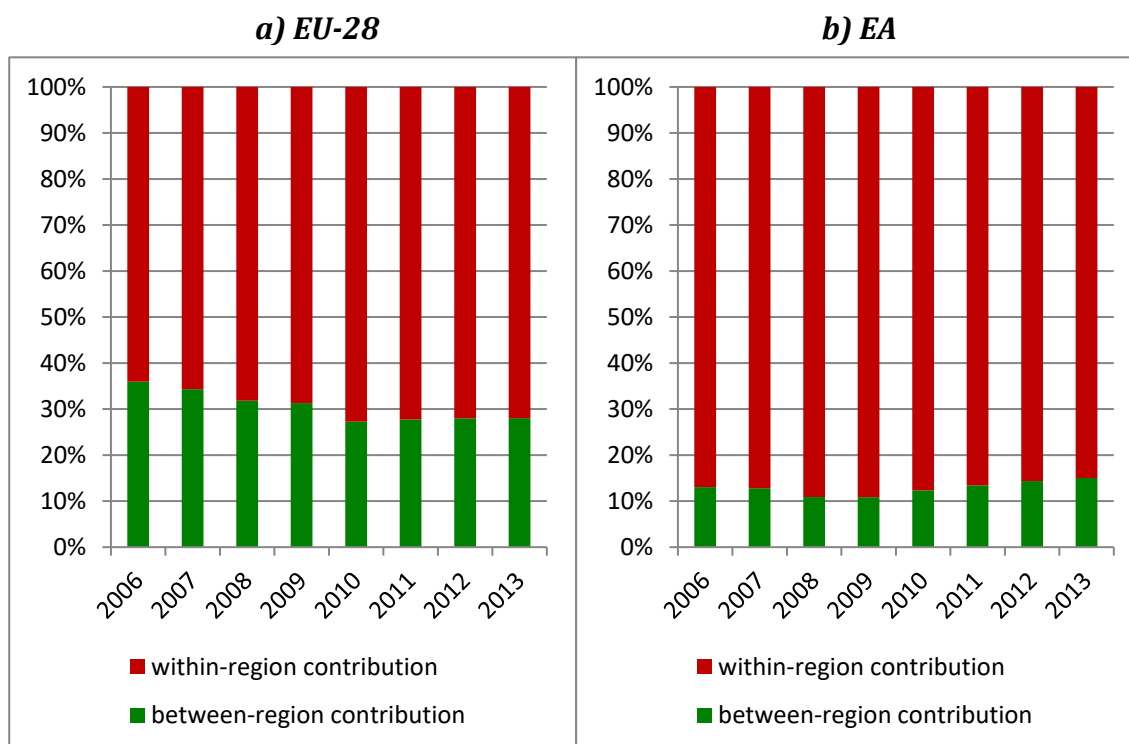
The trend of the between-region component declines slightly until 2010 and then it arrests around 28%, similar to the trend of the inequality between countries. Therefore, the convergence of regional mean incomes also seems to have stopped after the crisis.

I repeat the same exercise for the euro area (Panel b), without the countries lacking a regional identifier, and I find that, if the mean incomes between regions in the euro area were converging, the total eurozone inequality would reduce by circa 15%.

To better underscore the trends of the between region component in the two areas, I plot them in Figure 12.

Here also, the trends of the between-region inequality component for the EU and the EA backtrack those obtained for the between-country component, albeit at higher levels, as the inequality between regions is greater than that between countries for both the EU-28 and the euro area.

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[19] With the exclusion of the countries highlighted in Table 2.

Figure 12. Between-Region Contribution to Theil Index, Disposable Income (%)
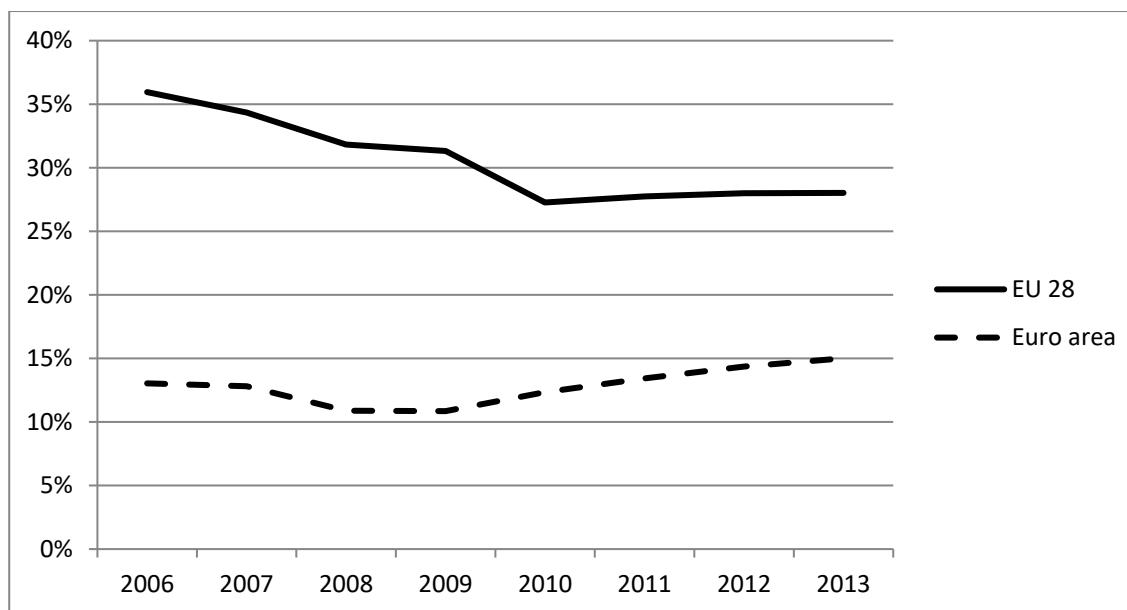
All in all, this evidence points to the need to address income inequality in its regional dimension as well, as the divergence (lack of convergence) of mean incomes experienced by countries in the euro area (EU-28) is also at play for regions. In a sense, this is an empirical underpinning for the importance of EU-wide regional policies aimed at reducing regional income gaps.

The decomposition analysis can be summarised as follows. If the inequality between countries were eliminated, the total inequality would reduce:

- by ca. 20% in the EU-28 and
- by ca. 10% in the euro area.

Likewise, if the inequality between regions[20] disappeared, the overall inequality would reduce:

- by ca. 30% in the EU-28 and
- by ca. 15% in the EA

V. How Much are EU-Wide Incomes Determined by Country of Residence?

Along the lines of the previous evidence in terms of inequality decomposition I aim to quantify the extent to which individual incomes in the EU-wide distribution depend on the country of residence. This "country effect" has recently been studied by Milanovic (2015) on a global scale. He argues that around two-thirds of the income variability in the global income distribution was explained by the country of origin in 2008. This result is particularly relevant in the framework of the equality of opportunity. This strand of research indeed maintains that disparities in income are no longer acceptable if they are the result of external circumstances as opposed to individual efforts (Roemer 2008). In this case, whether income differences are

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[20]Among the regions in the analysis, without considering the regions of DE, NL, SI and PT.

explained to such a great extent by a circumstance such as country of origin, over which the individual has no control, this is a moral foundation for individuals to migrate in order to reduce inequality of opportunities.

The same theoretical framework can be applied in the context of supranational income distributions as in the EU-28 or the EA. Whether the effect exerted by the country of residence in determining individual incomes in the supranational distribution is particularly relevant, this may flag a potential propensity for individuals to move from one country to another one within the EU. Thus, this evidence is closely related to the convergence in mean country incomes, which determines the between-country inequality of Section IV. 2.

The method used here follows the research strategy used by Milanovic (2015), adapted to the E(M)U context to trace the country effect over the period 2006-2013 with EU-SILC data. Therefore I use a definition of ppp-adjusted net disposable household income as already described in Section III and I regress (the log of) individual net disposable incomes on country dummy variables such as in (3):

$$\log(y_{ij}) = \beta_0 + \beta_1 Country_1 + \beta_2 Country_2 + \cdots + \beta_{J-1} Country_{J-1} + \varepsilon_{ij} \qquad (3)$$

where the income of individual i in country j just depends on country dummies with countries j=1,2,…,J, and more specifically J=28 for the EU-wide distribution while J=19 for the EA-wide distribution.

This least-square dummy variable regression (LSDV) may then be interpreted as a model in which the variability in incomes at the E(M)U-level is just explained by the country of residence.

We choose as country dummy to be removed respectively Romania and Latvia for the regression of the EU-wide and the EA-wide income distribution as the poorest countries in the two areas. Thus, the regression coefficients are to be interpreted as the % advantage of living in a country that is different from the baseline country, i.e. Romania or Latvia. We show the coefficients in the Annex.

As discussed in Section III, country is defined in EU-SILC as country of residence and so the effect of interest should be the interpreted as the impact of *residing* in a particularly country on income.

Naturally, this model is not meant to describe comprehensively the determinants of individual incomes on the E(M)U scale as it explicitly excludes many individual- and country-level variables that are known to affect income. Hence, the interpretation of the coefficients is very likely to be affected by omitted variable bias, but the inspection of the r-squared may inform about the relevance of the country effect and tracking its evolution over time may illustrate how much it has changed.

I treat the national population sizes following two different approaches. First I take account of the current E(M)U population size by running population-weighted regressions so as to consider the country effect in the E(M)U as it is (EAII). Along with that, I run regressions in which I treat countries as having the same population[21]. This is to give account of a counterfactual situation in which EU citizens compare their income with the income that they might have had were they moving to the income distribution of another EU MS. From this individual viewpoint (IV) population sizes do not matter.

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[21] We achieve this by adjusting personal weights (RB050) so that the sum of the personal weights is equal in each country.

The first approach (EAII) gives account of the magnitude of the real country effect in determining income in the E(M)U-wide distribution, the second one (IV) identifies the individual advantage an individual would in principle gain by moving from one country to another one within the E(M)U.

I run the different regressions for 2006, 2010 and 2013 to identify the evolution of this effect.

Here I inspect the R-squared in the EU and in the EA as they are in their population size (EAII).

Table 3. Regression Output

EU-28 as it is				Euro area as it is			
	2007	2010	2013		2007	2010	2013
Country dummies' significance	All but FI	All	All	Country dummies' significance	All	All but LT	All
# of observations	553.320	565.141	551.111	# of observations	377.205	378.118	380.294
R-squared	**0,3585**	**0,2969**	**0,298**	R-squared	**0,1105**	**0,1033**	**0,123**
EU-28, Individual viewpoint				Euro area, Individual viewpoint			
	2007	2010	2013		2007	2010	2013
Country dummies' significance	All	All	All	Country dummies' significance	All	All	All
# of observations	553.322	565.221	551.285	# of observations	377.205	378.118	380.444
R-squared	**0,4187**	**0,3809**	**0,3603**	R-squared	**0,3029**	**0,3054**	**0,2658**

As Table 3 shows, for the EU-28 the country of residence explained as much as 35.8% of the overall net disposable income variability in the 2007 distribution while subsequently this figure declined to 29.6% in 2010 to stabilize around this percentage in 2013. Thus the process of convergence that brought about a reduction in the country effect from 2007 to 2010 seems to have stopped in recent times.

For the EA the country effect is much smaller, as expected, slightly more than 10%. However, it must be noted that while this effect reduced from 2007 to 2010, it has recently increased, to the extent that the country of residence explained more income variability in 2013 than it did back in 2007.

In a sense the evidence collected in Section IV 2. about the increasing relevance of the between-country component in explaining income inequality is also confirmed in this analysis, albeit with a different interpretation.

The same regression approach, when framed under the individual viewpoint, reveals slightly different trends as illustrated in the bottom panels of Table 3.

From the individual viewpoint, the country effect in the EU 28 is stronger than in the EAII framework but slightly decreasing. The same effect in the EA stands at much higher levels compared to the euro-area-as-it-is approach but is slowly reducing its relevance in explaining income variability: from around 30% in 2010 to 26.5% in 2013.

To evaluate the difference of this effect for the E(M)U and the world, as computed by Milanovic (2015) for 2008, I present the following summary table (Table 4).

Table 4. Country effects

	EU-28	Euro area	World (2008)
E(M)U (World) as it is	0,318	0,112	0,733
Individual viewpoint	0,387	0,291	0,657
Country effect for the world is derived from Milanovic (2015). Country effect for the EU-28 and the EA is their time average over the period 2007/2013			

The much smaller magnitude of the country of residence in explaining income variability in the E(M)U with respect to the world appears clear from this table. However, the comforting result that the country of residence at the EA-levels explains no more than one-seventh of the individual incomes at the world-level should also be interpreted in light of the historically much closer income levels of the European countries and bearing in mind that this country effect in the EA is nevertheless on the rise (while it is decreasing at the world-level). To this end, it would also be interesting to compare these results with those estimated in such a way for the US, to check whether levels and trends of the country effect in explaining incomes on a federal level are similar with those documented for the E(M)U but, to my knowledge, such a study has not yet been carried out for the US.

Finally, an analysis of the "regional effect" could also inform us about the need for convergence from a regional point of view, but the mentioned lack of regional identifiers for some EU countries is a big limitation to conduct such an analysis.

VI. Conclusions

This study has expanded the prior research on supranational income distributions to shed light on the role of the country of residence in contributing to the overall inequality and in determining people's income in the E(M)U as a whole.

In times of increasing intra-EU mobility and general dissatisfaction with EU institutions the analysis of how much the EU countries concur to determine the income position on a supranational scale may be informative in this respect, even though no causal analysis has been carried out in this sense.

The results obtained are then complemented with estimates of the role of the E(M)U welfare states in reducing market income inequality in comparison with the US and with a regional decomposition of the E(M)U-level inequality.

The main evidence points in the direction of a slow decline in between-country inequality in the EU-28, at least before the crisis, followed by a stationary level of between-country inequality versus increasing between-country inequality in the EA in recent years, although for levels no greater than 10% of the overall inequality in the EA.

Similar between-region inequality trends are observed, but for larger between-region contributions to overall inequality.

These results are further validated by an assessment of the country role in determining individual incomes in the E(M)U-wide income distribution, which displays the same trends as the between-country contribution to inequality both for the EU-28 and the EA. Furthermore, the effect of the E(M)U welfare states to reduce market inequality is observed to be more pronounced than in the US, but with no clear-cut time trend.

Finally, this study paves the way for improvements and follow-up research as the analysis of EU-wide income distribution is a relatively nascent field of investigation both from an empirical and from a theoretical point of view.

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Annex

Figure I – Inequality Comparison: EU-28 and Euro Area, Imputed Rents. Gini Index
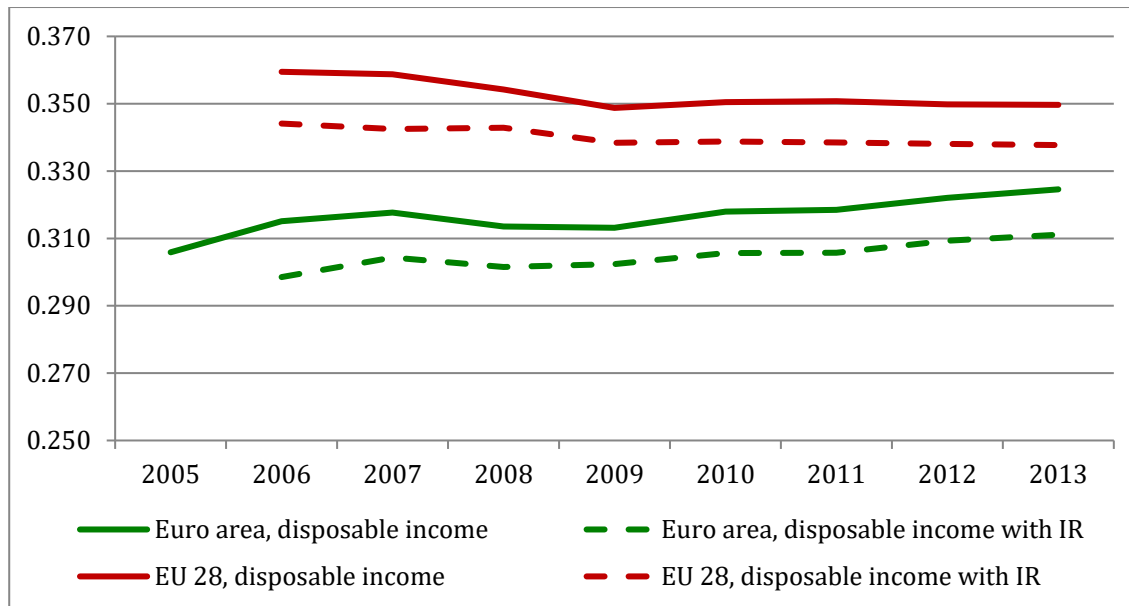
Table I - Inequality Comparison: EU-28 and Euro Area, Imputed Rents. Gini Index

	Euro area		EU-28	
	/	Imputed rents	/	Imputed rents
2006	0,315	0,299	0,359	0,344
2007	0,318	0,304	0,359	0,342
2008	0,314	0,302	0,354	0,343
2009	0,313	0,302	0,349	0,338
2010	0,318	0,306	0,350	0,339
2011	0,318	0,306	0,351	0,338
2012	0,322	0,309	0,350	0,338
2013	0,325	0,311	0,350	0,338

Figure II – Between-Country Contribution to Overall Inequality (%), Disposable Income
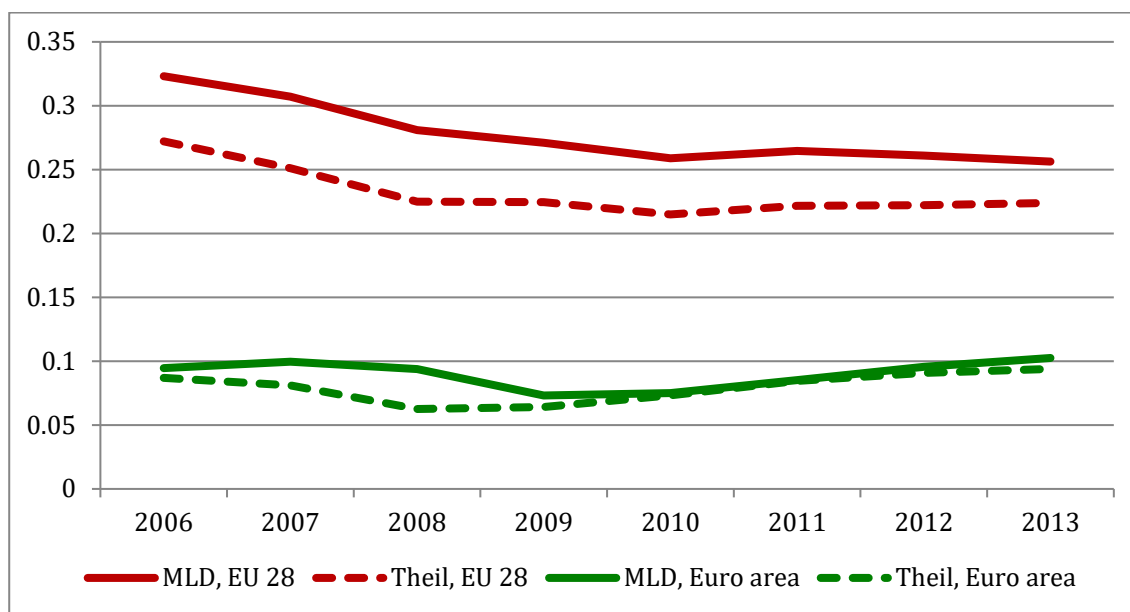
Figure III – Between-Region Contribution to Overall Inequality (%), Disposable Income
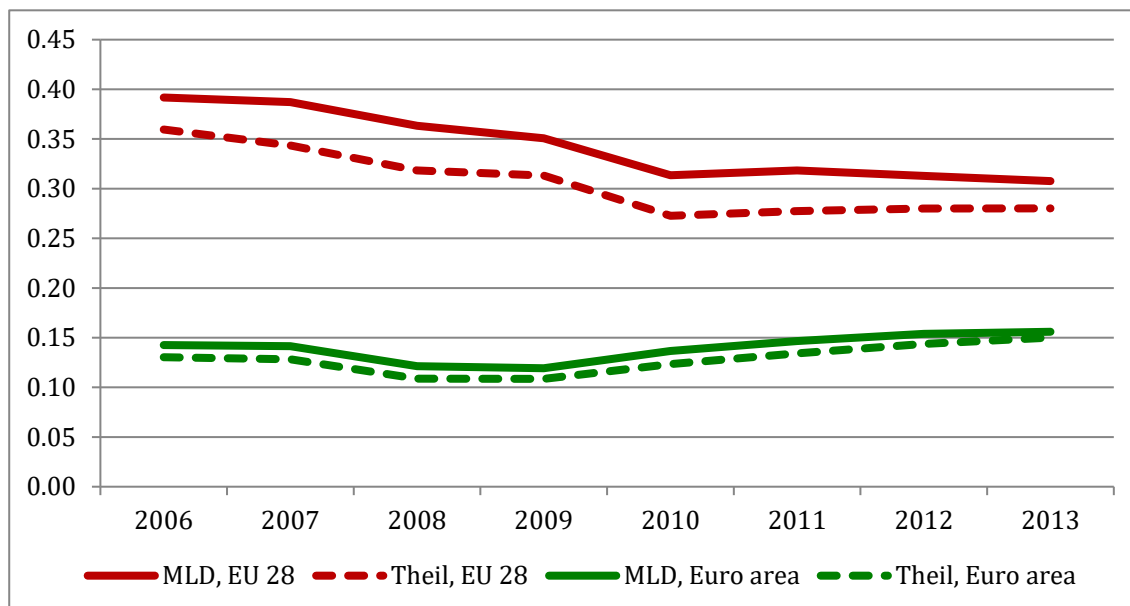
Table II – Population-Weighted Regression Output (β coefficients)

EU-28: the % impact on individual income due to living in a country x rather than Romania				EA: the % impact on individual income due to living in a country x rather than Latvia			
	2007	2010	2013		2007	2010	2013
AT	433.9	373.7	429.3	AT	155.7	192.7	177.9
BE	390.3	336.2	381.3	BE	134.8	169.5	152.7
BG	60.81	56.33	67.20	CY	167.2	198.4	115.7
CY	458.0	383.0	310.8	DE	157.9	179.2	148.0
CZ	201.5	163.8	192.4	EE	14.60	24.57	32.79
DE	438.7	351.8	372.4	EL	76.07	77.29	14.52
DK	424.3	372.2	415.9	ES	94.83	121.9	82.56
EE	139.3	101.6	152.9	FI	145.8	181.1	152.7
EL	267.7	186.9	118.1	FR	157.5	181.3	156.8
ES	306.9	259.1	247.7	IE	184.5	175.9	135.3
FI	413.3	354.9	381.3	IT	118.1	128.4	96.96
FR	437.8	355.2	389.2	LT	3.361	-1.786	7.417
HR		87.14	94.66	LU	300.6	319.2	276.1
HU	105.3	91.53	96.65	MT	102.3	127.3	114.1
IE	494.1	346.5	348.2	NL	173.3	186.3	154.6
IT	355.5	269.7	275.2	PT	48.53	60.48	34.38
LT	115.9	58.95	104.6	SI	100.1	116.2	90.05
LU	736.6	578.4	616.5	SK	13.85	43.38	31.16
LV	108.8	61.84	90.48				
MT	322.5	267.9	307.9				
NL	470.7	363.3	385.0				
PL	110.6	107.5	132.0				
PT	210.2	159.7	156.0				
SE	409.2	338.4	381.1				
SI	317.9	249.9	262.0				
SK	137.8	132.1	149.8				
UK	439.8	310.5	330.9				