Regional inequality in decentralized countries: a multi-country analysis using LIS

Javier Martín-Román
UNED

Luis Ayala
Universidad Rey Juan Carlos

Juan Vicente
Universidad de Valladolid

Abstract

The aim of this paper is to analyze the regional disparities of six decentralized countries using LIS microdata. In order to determine the extent of the territorial variable in the explanation of income inequality, we carry out two complementary analyses. On the one hand, we perform the classical decomposition by population subgroups of different inequality measures. On the other hand, we implement a semiparametric decomposition analysis based on the method proposed by DiNardo, Fortin and Lemieux.

JEL codes: D31; D33; R23.

Key Words: income inequality, regional inequality, subgroup decomposition, semiparametric decomposition.

1.- INTRODUCTION

This paper contributes to the existing literature by studying the territorial variable as a determining factor in the explanation of the income inequality. Using the Luxembourg Income Study (LIS) data archive, we carry out a comparative analysis in six decentralized countries: Spain, Italy, Germany, Australia, Canada and the United States, and in two specific moments: 2000 and 2010[1].

Although there is a growing theoretical and empirical literature on the relationship between inequality and fiscal decentralization, as concluded in the recent survey of Martinez-Vazquez et al. (2016), more research need to be performed in this area. Nowadays, and as far as we know, secondary microdata datasets do not provide direct information on the level of government of origin and destination of transfers with households, so that they have to be combined with other sources to get a complete picture on the subject. In this paper, we explore what LIS database can contribute in this regard. After a short review of the recent works on inequality and fiscal decentralization, we introduce the LIS database in context and account of the previous research on inequality and redistribution at subnational level. Then, we calculate the impact of redistribution on *between* and *within* regional inequality in a few representative decentralized countries before and after the great recession. Finally, we show a set of preliminary results after implementing the DiNardo et al. approach in the countries chosen, emphasizing the relevance of the territorial variable.

[1] In this work we use the NUTS-2 level to desagregate the variable of interest, *"región_c"*. Data at this level is not available for Spain before 2004 so we use the decade 2004-2013 for this country. There is also no data for Australia 2000 and we use 2001 instead.

2.- FISCAL DECENTRALIZATION AND INEQUALITY

First evidence on the relationship between fiscal decentralization and regional disparities in the European Union revealed a negative correlation (Ezcurra and Pascual, 2008). Further evidence on broader samples shows a change of sign for developed and emerging economies (Rodríguez Pose and Ezcurra, 2010 and Lessmann, 2012) and for developed countries the negative sign remains only after generous equalization grants (Sorens, 2014). In a context of national convergence and regional divergence (mainly due to productivity differences), recent research on OECD countries finds that replacing intergovernmental transfers by own source revenue to sub-national governments dampens regional disparities (Blöchliger et al., 2016).

The *between* component of regional inequality is a relevant issue but it explains a small part of national inequality, whose main component is the *within* component. Moreover, there is some evidence about the relationship between fiscal decentralization and national disparities in the OECD countries showed that tax decentralization is associated with higher national inequality (Sacchi and Salotti, 2014). Additional conclusions for a globally representative sample from International Monetary Fund data suggests that the government expenditure decentralization can help to achieve a more equal distribution of income conditioned to a sufficient government size, the decentralization of redistributive spending and the subcentral revenue sources instead of intergovernmental transfers (Goerl and Seiferling, 2014). The most recent research from OECD area corroborates a weak and unstable relationship between decentralization and national inequality and suggests a bias of decentralization benefits in favor of the middle income earners (Stossberg et al., 2016)

Empirical evidence seems to be in line with the evolution of the theory on fiscal federalism. Early theories assumed that governments wish to maximize the welfare of their constituencies and that the redistributive function should be assigned to the central government because factors mobility constrains the potential of local policies (Tiebout, 1956, Prud'homme, 1995).

However, the current theories assume that public agents wish to maximize their own objective functions and considers that the impact of redistribution policies does not depends on decentralization *per se* but on what form it takes (Oates, 2008) (*e.g.* Padovano (2007) predicts a more efficient redistribution when carried out by subcentral entities and financed with their own resources).

The more recent data from regional income distribution and fiscal decentralization OECD databases suggest, at first glance, a negative impact of decentralization on the *within* component of regional redistribution.

[Insert Figure 1 about here]

Nevertheless, a careful examination of the relationship between decentralization and the inequality of primary and disposable income, separately, reveals that centralized countries needs to redistribute more just to compensate a higher market inequality.

[Insert Figure 2 about here]

As for the *within* component at the regional level (bottom dashed lines), although the compensation is more uncomplete the more decentralized is the country, the positive slope is mainly due to over representation of the two less redistributing countries (83 US and Mexico states against the 188 regions of the 25 other countries in the sample).

According with Martínez-Vázquez et al. (2016), the impact of fiscal decentralization and inequality is a field where more research needs to be performed. The main purpose of this paper is, precisely, to examine the LIS database to find out how it can contributes in this regard.

3.- DATABASE

Nowadays, several databases offer inequality statistics for multiple countries and years. Appraisals of the more relevant have been included in a recent special issue of the Journal of Economic Inequality (Ferreira et al., 2015). The available databases confront a trade-off between scope and depth of content. The one with the greatest country coverage and time frame is, perhaps, the World Income Inequality Database (WIID) of the United Nations-World Institute for Development Economics Research (WIDER), and its current version 3.4 contains 8817 Gini indices from 182 countries gathered from all the other microdata-based sources. The only institutional micro-data based dataset which is global in coverage is the World Bank-WDI-PovcalNet, whose last update (10/18/2016) reports 1261 Gini coefficients for 155 countries for the period 1980-2014 computed from data based on primary household surveys. The rest of institutional datasets are limited by country coverage. Two of them focus exclusively on Latin-America and Caribe -CEPALSTAT and SEDLAC, supported by UN and WB, respectively- and the other OECD-IDD focus mainly on advanced economies. Most of discrepancies between the figures reported are due to the use of diverse original sources, the choice of different units and variables or the adjustment to national accounts. The former reason explains, for instance, why CEPAL’s inequality figures are higher than those of CEPALSTAT, despite both draw basically from the same household official surveys. Such integration of surveys (and registers) sources in a national account framework it is awakening a growing institutional and academic interest (Zwijnenburg et al., 2017 and Piketty et al. 2016)

The LIS database, like OECD-IDD, focus mainly in advances countries. They use different calculation procedures (OECD figures are computed by country micro-data providers on the basis of standardized questionnaires, while LIS figures are calculated internally on the stored and harmonized microdata) but their figures are highly correlated in levels (Gasparini, 2015). The LIS's primary advantage is that allows to external researchers to access to their harmonized microdata through their remote execution software, LISSY, enabling us to make our own methodological decisions (Gornick et al., 2015).

The use and influence of LIS has been steadily rising according to EconLit or Google Schoolar (Ravallion, 2015). Most of the research using LIS is initially published as LIS's working papers, 21 out of the over 700 appeared at the time of writing are classified as "regional" by the search tool of LIS in its WPS website. Among them, only a few report calculations of inequality at subnational level.

Early works computing regional inequality using LIS data for developed countries (Mahler, 2002) and Central and Eastern European Countries (Foster et al., 2003), reported an increase of inequality during the first half of the 1990s and highlight the relevance of intraregional inequality to explain national inequality. Preliminary work of the impact of redistribution on interregional inequality is carried out by Ravishankar (2003), who reported an interregional distribution of disposable income (D) between one third and one half less unequal than that of the market income (M). The impact of fiscal redistribution at national level have been computed by Mahler and Jesuit (2006) for 13 developed countries using 59 LIS surveys conducted during the 1980s and 1990s. At 2000 the (country average) inequality of private and disposable income reached respectively the 44,1 and 29,4 Gini points, what amounts a redistribution of just one third. During the reporting period market inequality increased almost four Gini points. Throughout most of the years an more intensive redistribution enabled final inequality to remain below the 27 Gini points, but in the late 1990s redistribution was unable to avoid the rise of final inequality.

The above paper also reports the cumulative redistributional contributions of the received transfers (R) and the paid taxes (T), by comparing the Gini indices of market (M), gross (M+R) and disposable (D=M+R-T) incomes. The redistributive impact of the social benefits using this path was twice that of the taxes and explained most of the trend of disposable income.

A recent and similar analysis of Wang et al. (2014) extending the coverage to 20 countries and updating the timeframe to 2005, corroborates the one third redistributional impact of tax and transfers and the continuity of both the rise of market inequality and the increasing difficulties to prevent through redistribution the rise of final inequality.

4.- CHOOSING INEQUALITY MEASURES

There are many proposals to quantify the inequality of distribution of income (or wealth). The two classical measures are the coefficient of variation (*C*) and the Gini index (*G*)[2] which can be expressed in terms of the ratios between income (q_i) and population (p_i) shares of the *i*=1… *n* receivers[3]**:**

[2] Commonly attributed to Pearson (1896) and Gini (1912)

[3] The individual population shares may be replaced by the mean income share ($\bar{q} = \sum_i q_i/n = 1/n = p_i$) and the ratios of shares by the ratios of incomes ($y_i/\bar{y} = ny_i/n\bar{y} = q_i/p_i = q_i/\bar{q}$).

$$0 \leq C^2 = \frac{1}{n}\sum_{i=1}^{n}\left(\frac{q_i}{p_i} - 1\right)^2 \leq n - 1 \quad (1)$$

$$0 \leq G = \frac{1}{n}\sum_{i=1}^{n}\frac{i}{n/2}\left(\frac{q_i}{p_i} - 1\right) \leq \frac{n-1}{n}, \quad q_i \leq q_{i+1} \quad (2)$$

Dalton (1920) recommended both measures, with certain preference for G because it measures twice the area between the Lorenz (1905) curve -which plots the cumulative income shares against the cumulative population shares of the poorest i=1,…n- and the 45-degree line of equality.

A third commonly used measure is the Theil (1967) index (T) which measures the inequality as the redundancy -entropy subtracted from its own maximum value- and can be derived from the mean logarithmic deviation (L) by exchanging the population and income shares.

$$0 \leq T = \sum_{i=1}^{n} q_i log\left(\frac{q_i}{p_i}\right) \leq log\, n \quad (3)$$

$$0 \leq L = \sum_{i=1}^{n} p_i log\left(\frac{p_i}{q_i}\right) \leq \infty \quad (4)$$

From the concept of the *equal equivalent* introduced by Kolm (1969) to measure the *injustice* of a distribution, Atkinson (1970) proposed the family (A_ε) for different degrees of inequality aversion ($\varepsilon \geq 0$) -or relative sensitivities to transfers at different income levels-.

$$0 \leq A_\varepsilon = 1 - \left[\frac{1}{n}\sum_{i=1}^{n}\left(\frac{q_i}{p_i}\right)^{1-\varepsilon}\right]^{\frac{1}{1-\varepsilon}} \leq 1 - n^{\frac{\varepsilon}{\varepsilon-1}} \quad (5)$$

Cowell (1977) reported on other measures of inequality and discussed extensively a measure initially called generalized information measure and renamed later as *generalized entropy measure* (E_θ) after some modification to allow the fulfillment of additional properties (Cowell, 2011):

$$0 \leq E_\theta = \frac{1}{\theta(\theta-1)}\frac{1}{n}\sum_{i=1}^{n}\left[\left(\frac{q_i}{p_i}\right)^\theta - 1\right] \leq \infty \tag{6}$$

When θ is 0 or 1, E is not defined, but by the l`Hôpital rule we have that $E_{\theta\to 0} \to L$ and $E_{\theta\to 1} \to T$. When θ is 2, E is half of the squared of the coefficient of variation $E_{\theta=2} = C^2/2$. Finally when $\theta = 1 - \varepsilon < 1$, E and A are ordinally equivalent (dE/dA>0).

All measures discussed above satisfy the following properties: (a) Inequality is affected by nothing but income, (b) Inequality is reduced by a transfer from a person to a poorer one, (c) Inequality is unaffected by proportionate additions to -or subtractions from-, the amount of income received by any given person[4], (d) Inequality is unaffected by proportionate additions to -or subtractions from- the number of persons receiving incomes of any given amount.

The measures that satisfy the (a, b y c) principles rank unambiguously distributions whose Lorenz's curves do not intersect[5]. However when Lorenz curves do intersect, ranking distributions unambiguously requires refined versions of (*b*) that assume some specific relationship between the positions of those involved in a transfer and the strength of its effect on inequality (Kolm, 1976 and Shorrocks and Foster, 1987). At this regard the Coefficient of Variation and the Gini index can be considered as the knife edges (Foster and Sen, 1997) that separate, within their respective families, the members more sensitive to the differences at one or the other tail of the distribution.

[4] An alternative is (c'): Inequality is unaffected by equal additions to, or subtractions from, all incomes. The use of relative/rightist measures (c) rather than absolute/leftist measures (c') or some compromise between both, it has to do with the fact that scale invariance properties make easier the analysis when income or population are not given.

[5] The anonymity (a) and transfer (b) principles are equivalent to the symmetry and convexity axioms satisfied by Schur-convex functions. The S-C measures that are relative (c) rank unambiguously distributions whose Lorenz's curves do not intersect (Kolm, 1969, 1976).

The members of the Atkinson family (5) concentrate its transfer sensitivity more at the lower end of the distribution the greater the parameter ε. The members of the Entropy family (6) with a parameter θ <2 also concentrate its transfer sensitivity more at the lower end the further away from 2 the parameter θ , while those with a θ>2 exhibit an opposite behavior with a transfer sensitivity more biased towards the top of the distribution the greater the θ value. When θ=2 the transfer sensitivity is uniform all along the distribution.

Accordingly, the use of different members of a family, not only allows one to test the robustness of the assessment on inequality changes, but also provides information on where in the distribution the greater changes occur. For this purpose in this work we have chosen the measures L, T and $C^2/2$ because they correspond to three different members of the entropy family and also because as we shall see below they have friendly decompositions.

5.- METHODOLOGY

The methodology that has been used in this work is twofold. On the one hand, additive decompositions of three of the indices of the generalized entropy family have been carried out: the logarithmic mean deviation, the Theil index and the coefficient of variation (which correspond to values of θ equal to 0, 1 And 2, respectively). On the other hand, a more complex analysis has been performed based on the initial proposal of DiNardo et al. (1996).

5.1.- Inequality decomposition by population subgroups

Inequality may be decomposed by subgroups, by sources or both together. In this paper we deal with the first of them. The procedure of decomposition is derived from the particular structure of aggregation of each measure. Decomposition of information/entropy measures initiated by Theil (1967) uses two terms while that of Gini measure introduced by Bhattacharya and Mahalanobis (1967) adds an extra term. Although extra terms may reveal more (Lambert and Decoster, 2005), the two terms decomposition is more frequently used because it simplifies the applied work.

The standard procedure to decompose total inequality (T) is to define the inequality between the subgroups (B) as that remains after replacing each income with the subgroup mean. Then the residual inequality (W=T-B) is expressed as a weighted average of the inequality within the subgroups.

The weights that correspond to the entropy family are a first-order homogeneous function of the population and income shares $\left(q_g^{\theta} p_g^{1-\theta}\right)$ and E_{θ} decomposition is:

$$E_{\theta} = BE_{\theta} + WE_{\theta} = \frac{1}{\theta(\theta-1)}\frac{1}{n}\sum_g n_g\left[\left(\frac{q_g}{p_g}\right)^{\theta} - 1\right] + \sum_g q_g^{\theta} p_g^{1-\theta} E_{\theta g} \qquad (6')$$

The weights sum to unity when θ=1 (the "population weighted" L) or θ=0 (the "income weighted" T (Theil, 1967, Bourguignon, 1979 and Shorrocks, 1980)

$$T = BT + WT = BT + \sum_g q_g T_g \qquad (3')$$

$$L = BL + WL = BL + \sum_g p_g L_g \qquad (4')$$

In some sense L is considered "the most satisfactory of the decomposable measures" because is path independent (Foster and Shneyerov, 2000) and generates the same assignment that the Shapley decomposition (Shorrocks, 2013).

In this paper, subgroups for European countries are defined by the NUTS-2 level, while for non-European countries are defined by their common administrative divisions: Australia (7), Canada (10) and United States (51).

5.2.- DFL approach

The second practical application that is developed in this work is a simulation exercise inspired by the semiparametric approach proposed by DiNardo et al. (1996). We propose to analyze what would have happened on the distribution of disposable income per capita in the final moment (t=2) if the territorial distribution had remained constant and equal to that of the initial time (t=1).

Following the works of DiNardo et al. (1996), Butcher and DiNardo (2002) and Author (2015) or the most recent of Dickey (2014), we can develop the different stages of the procedure as set out below. DiNardo et al. (1996) describe each individual by means of three variables: the wage, a vector of individual characteristics and a temporal variable. As far as our work is concerned, we have to clarify some ideas. Instead of analyzing wage distributions, we examine distributions of per capita disposable income in order to complete a homogeneous and consistent exercise with the previous section (additive decompositions by population subgroups). On the other hand, we work with household characteristics and our vector is formed by the following variables[6]: household composition, age, sex, marital status, immigrant, highest completed education level, employed, number of own children living in household, owned/rented housing, disabled and region. Finally, we take into account the time period considered. In this paper, we

[6] The variables related to the personal characteristics of the people have been used as representatives of the household head.

start from the beginning of the century and study how inequality has evolved over a period of ten years.

Formally, and following the notation used by Dickey (2014), we consider a joint distribution function that characterizes each one of our households. We will assume the following: *F(d, x, t)*, where *"d"* refers to per capita disposable income, *"x"* represents the household characteristics and *"t"* is the moment of time analyzed. Thus, we could denote the marginal distribution of per capita disposable income, at the initial time, as follows:

$$f(d|t=1) = \int_x f(d,x|t=1)\, dx \tag{7}$$

From the definition of conditional probability, we can confirm that:

$$f(d|x,t=1) = \frac{f(d,x|t=1)}{f(x|t=1)} \tag{8}$$

Moreover, we also know that the relationship between a distribution function and a density function can be specified in this way:

$$\frac{dF(x)}{dx} = f(x) \tag{9}$$

Regrouping terms from expressions (7), (8) and (9) we would get the two following expressions (which are equivalent):

$$f(d|t=1) = \int_x f(d|x,t=1) f(x|t=1)\, dx \tag{10}$$

$$f(d|t=1) = \int_x f(d|x,t=1) F(x|t=1) \tag{11}$$

At this point, it is convenient to remember the purpose of this second application, since it is very specific: to carry out a simulation exercise, for each one of the chosen decentralized countries, by which we can estimate what would have happened with the distributions of per capita disposable income in the final period (t=2) if the population weights at the regional level had remained constant at their origin level (t=1).

Regarding the above expressions, DiNardo et al. (1996) describe this goal in a formal way as follows:

$$\int_x f(d|x,t=2)F(x|t=1) = f(d|t_d=2,t_x=1) \qquad (12)$$

This expression would give us the hypothetical distribution we are looking for. The key to calculate this counterfactual distribution is to rewrite it as follows:

$$f(d|t_d=2,t_x=1) = \int_x f(d|x,t=2)\frac{F(x|t=1)}{F(x|t=2)}dF(x|t=2) \qquad (13)$$

In fact, through this expression we would be obtaining a hypothetical distribution of per capita disposable income in the final period (t=2) if the household characteristics were those of the initial period (t=1), which is our objective in this stage.

The next step is to identify the so-called reweighting factor, which is one of the fundamental elements of the analysis:

$$\Psi(x) = \frac{F(x|t=1)}{F(x|t=2)} \qquad (14)$$

Using the definition of conditional probability again and applying the Bayes' rule, the above expression could be redefined as follows:

$$\Psi(x) = \frac{\frac{F(t=1|x)F(x)}{F(t=1)}}{\frac{F(t=2|x)F(x)}{F(t=2}} = \frac{\frac{Pr(t=1|x)}{Pr(t=1)}}{\frac{Pr(t=2|x)}{Pr(t=2)}} = \frac{Pr(t=1|x)Pr(t=2)}{Pr(t=2|x)Pr(t=1)} \qquad (15)$$

That is, *Pr* $(t = 1 \mid x)$ represents the probability of belonging to the initial period, given some characteristics (the household variables we have considered relevant in our analysis) and *Pr* $(t = 2 \mid x)$ would reflect the same idea, but for the second period. The way to determine these probabilities is through the estimation of a logit or probit model.

Once the pool of data is created, we have to estimate two probit models. The first one, it would be an estimation considering all the characteristics of interest; the second one, it would include all the explanatory variables of the previous estimation except the variable relative to the territory (*"region_c"*).

As we have stated above, our objective is to isolate the weight of territorial changes from variations in other characteristics. Implemented the estimates of the two probit models, the calculation of the contribution to the inequality of the territorial variable would be very simple. It would consist in determining the difference between the two counterfactual distributions generated.

Finally, to highlight some of the advantages of this methodology, we could point out the following three. Firstly, this approach allows us to analyze in detail what happens in different parts of the distribution and not only in some specific points, promoting the implementation of deeper analysis and investigations. In addition, it is also noteworthy that this methodology let us control by multiple factors at the same time. Finally, a third advantage worth noting is about the possibilities of applying the method, which is not restricted to a specific area or field, but quite the opposite.

6.- PRELIMINARY RESULTS

Starting with the first of the two aims of this work, the decomposition by population subgroups of conventional measures, the main results are reported in table 1. The figures have been obtained by running the *ineqdeco* software through *LISSY*.

The table presents seven inequality measures at three points of time for each of the six chosen countries. It also includes the regional decompositions of inequality for three representative parameters of the generalized Entropy measure (E0, E1 and E2)

The path of total inequality is displayed in figure 1, where countries are ranked from lower to higher inequality. Because the different ranges of the measures, the values have been standardized. Focusing in the Gini index their values are within two standard deviations (SD 0,028) above and below the mean (0,318). The extreme values are those of the United States (the highest inequality) and Germany (the lowest one).

[Insert Table 1 about here]

During the period considered the average inequality of the six countries increased barely one Gini point. Gini inequality increased in all countries but Italy. The simultaneous analysis of different measures gives some idea about the distribution shapes and where within them are taking place the changes. Thus for example the comparison between Germany and Canada shows a quite similar inequality when it is measured by E2, while if we focus in a more bottom-sensitive measure (E0) inequality appears to be is lower in Germany than in Canada

[Insert Figure 3 about here]

With regards to the regional decomposition of inequality the figure 4 shows the main results for the three representative measures of the entropy family. As is well known the *within* term is the major component of total inequality, however the *between* term may be relevant as it occurs in the Spanish and Italian cases.

[Insert Figure 4 about here]

As for the second of the exercises developed, inspired by the approach of DiNardo et al. (1996), the results included in Figure 3.1 of Appendix 3 provide a decomposition of the Gini[7] index observed in three components. In the results included in the table, we find a double effect or result. On the one hand, we can identify an *unexplained inequality* that would be included in the *Variation attributable to "other characteristics"* column. It would show the contribution to inequality by those characteristics or explanatory variables not taken into account in the analysis. On the other hand, we have two other results (two last columns) that we would group within the term *"explained inequality"*. The first one would represent the contribution of the territorial variable to inequality (*Variation attributable to "region_c"*), our main objective in this work. Secondly, and within the so-called *"explained inequality"* as well, we would have the contribution to the inequality of the other regressors considered in the analysis (*Variation attributable to "distribution conditioned to characteristics"*).

In general, we can highlight the following remarks for being the most interesting. First of all, we note that there are three countries where global inequality increases significantly: Spain, Germany and Canada. In addition, in these three countries the territorial component reduces inequality (in Germany and Canada, in a very remarkable way). And a last common pattern is the one observed in the last column, since the

[7] We could have chosen any other reference inequality index, such as the Theil index or the coefficient of variation.

Variation attributable to "distribution conditioned to characteristics" (the explanatory variables except “region_c”) increases notably in all three cases. In Italy, on the other hand, the trends shown by the three components in which we have decomposed the inequality is totally opposite to that observed in Spain and Germany. As for the United States, presents a minimum variation in the global index (*observed Gini*) that is compensated, fundamentally, with the increase of the *Variation attributable to other characteristics* and the reduction due to the *Variation attributable to “distribution conditioned to characteristics”*.

A second and more specific comment would be linked to the changes in our variable of interest: *region_c*. According to the figures of the table (column identified as: [2]), if the territorial distribution had remained constant and equal to that observed at the initial moment, inequality would have been reduced in four of the five countries analyzed[8]. It is also necessary to emphasize the magnitude of the variations. In Germany and, especially, in Canada the effects are very remarkable. In Spain and the United States, which also reveal a trend of reducing inequality in this factor, the changes are much less important.

[Insert table 2 about here]

An alternative option to analyze the latter results is to use kernel density functions, a very useful graphical tool for the study of income distributions. The visualization of these figures let us appreciate the existing differences between the different distributions in a faster and intuitive way.

In order to carry out a correct identification of the three previously mentioned effects, four graphs have been included for each country. One picks up the difference observed

[8] We do not have any results for Australia yet.

in the Gini index between the two selected years, while the other three allow to conceive the contribution to inequality of each one of the three recognized effects.

[Insert Figures 5-9 about here]

…

7.- PRELIMINARY CONCLUSIONS

This work had a very defined and specific objective that was answer to the following question: How relevant is the territory in the explanation of inequality? Traditionally, studies on regional inequality had focused on the analysis of labor market policies and other institutional factors on wage distribution. Here we propose a double approach to analyze the importance of the territorial variable on disposable income. In this sense, we have selected six representative countries of the world economy with a decentralized structure.

In a first stage, we have implemented an additive decomposition by population subgroups for each country. The empirical evidence obtained demonstrates the high weight of the *within* component over the *between*, which shows the most outstanding differences in the European countries analyzed.

Then, we have performed a simulation exercise to verify the contribution of the territorial variable in explaining the differences in inequality. Applying the semiparametric methodology proposed by DiNardo et al. (1996), and despite our preliminary results that must be reviewed in detail, the first evidence shows important differences in the impact of this factor. Moreover, these disparities are observed not only in the magnitude of the results, but also in the sign of variation.

TABLES AND FIGURES

Table 1: Inequality measures and Entropy decomposition

edpi	E(0) *L*	E(1) *T*	E(2) *C**	Gini	A(0,5)	A(1)	A(2)
AU01	0,17733	0,16656	0,20067	0,31340	0,08112	0,16250	0,45860
W	0,17481	0,16403	0,19813				
B	0,00253	0,00253	0,00255				
AU03	0,17504	0,16054	0,19032	0,30856	0,07896	0,16057	0,49304
W	0,1736	0,15911	0,18887				
B	0,00144	0,00144	0,00145				
AU10	0,18113	0,17257	0,21202	0,31737	0,08338	0,16568	0,4743
W	0,17944	0,17085	0,21025				
B	0,0017	0,00173	0,00176				
CA00	0,16767	0,15324	0,17616	0,30137	0,07589	0,15437	0,41065
W	0,16264	0,14824	0,17117				
B	0,00503	0,00500	0,00499				
CA04	0,17046	0,15568	0,17758	0,30459	0,0772	0,15673	0,40884
W	0,16623	0,1515	0,17345				
B	0,00423	0,00417	0,00413				
CA10	0,16687	0,15286	0,17448	0,30174	0,07574	0,15369	0,39176
W	0,16314	0,14908	0,17066				
B	0,00373	0,00377	0,00383				
DE00	0,12282	0,12392	0,15318	0,26541	0,05927	0,11557	0,25233
W	0,11940	0,12064	0,15000				
B	0,00342	0,00329	0,00317				
DE04	0,13283	0,13589	0,17144	0,27748	0,06445	0,12438	0,2535
W	0,12832	0,13154	0,16723				
B	0,00451	0,00435	0,00421				
DE10	0,13925	0,14054	0,17545	0,28361	0,06692	0,12999	0,3619
W	0,13463	0,13608	0,17112				
B	0,00462	0,00446	0,00433				
IT00	0,20576	0,19544	0,25294	0,33291	0,09347	0,18597	0,64445
W	0,17779	0,16898	0,22751				
B	0,02797	0,02645	0,02542				
IT04	0,2052	0,20537	0,28626	0,33624	0,09588	0,18552	0,51494
W	0,17225	0,17449	0,25682				
B	0,03295	0,03087	0,02945				
IT10	0,21715	0,18803	0,23523	0,32629	0,09199	0,19519	0,93276
B	0,18905	0,16151	0,20981				
W	0,0281	0,02652	0,02542				
SP04	0,18706	0,16591	0,18994	0,31477	0,08259	0,17061	0,86275
W	0,1772	0,15605	0,18002				
B	0,00991	0,00986	0,00986				
SP10	0,20759	0,17617	0,19285	0,32608	0,08934	0,18746	0,81538
W	0,19976	0,16827	0,18483				
B	0,00783	0,0079	0,00802				
SP13	0,22044	0,19334	0,22069	0,33976	0,09662	0,19783	0,52435
W	0,20349	0,17647	0,20375				
B	0,01694	0,01687	0,01694				
US00	0,23787	0,22234	0,29462	0,35442	0,10629	0,21169	0,94247
W	0,23386	0,21837	0,29066				
B	0,00401	0,00397	0,00396				
US04	0,25152	0,22858	0,29778	0,36063	0,11016	0,22238	0,95418
W	0,24699	0,22398	0,29310				
B	0,00454	0,00460	0,00468				
US10	0,25158	0,23018	0,29058	0,36534	0,11149	0,22243	0,81863
W	0,24751	0,22602	0,28632				
B	0,00407	0,00416	0,00426				

Source: *Luxembourg income study database.*

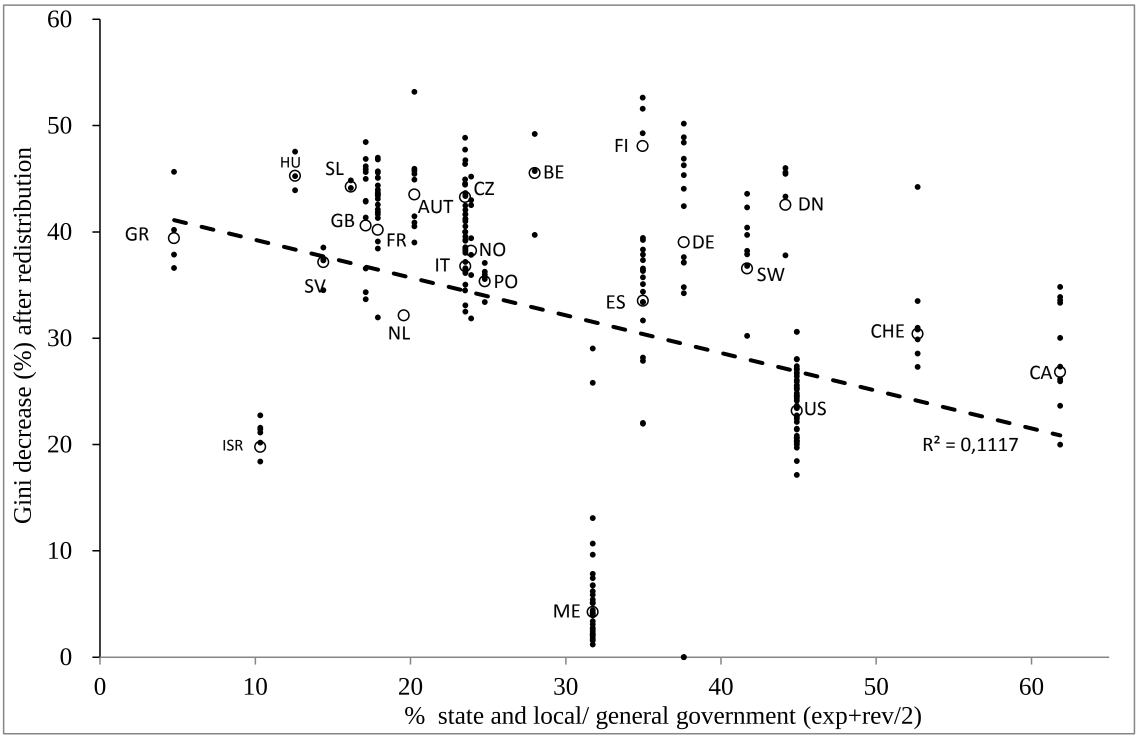
Table 2: Estimation results[9]

Gini change	Observed	Attributable to		
	= (1) + (2) + (3)	(1) "Other caracteristics"	(2) "region_c"	(3) "distribution conditioned to characteristics"
	Gini (t=2) - Gini (t=1)	*Gini (t=2) - Gini (t=2; cf1)*	*Gini (t=2; cf1) - Gini (t=2; cf2)*	*Gini (t=2; cf2) - Gini (t=1)*
Spain	0,35666 - 0,34059 = 0,01607	0,35666 - 0,34782 = 0,00884	0,34782 - 0,34873 = -0,00091	0,34873 - 0,34059 = 0,00814
(2004-2013)	△ 4,72%	2,54%	▽ 0,26%	2,39%
Italy	0,34245 - 0,35389 = -0,01144	0,34245 - 0,34287 = -0,00042	0,34287 - 0,34066 = 0,00221	0,34066 - 0,35389 = -0,01323
(2000-2010)	▽ 3,23%	▽ 0,12%	0,64%	▽ 3,74%
Germany	0,30575 - 0,29474 = 0,01101	0,30575 - 0,29535 = 0,01040	0,29535 - 0,30725 = -0,0119	0,30725 - 0,29474 = 0,01251
(2000-2010)	△ 3,74%	3,52%	▽ 3,87%	4,24%
Canada	0,34617 - 0,33846 = 0,00771	0,34617 - 0,35436 = -0,00819	0,35436 - 0,37419 = -0,01983	0,37419 - 0,33846 = 0,03573
(2000-2010)	△ 2,28%	▽ 2,31%	▽ 5,30%	10,56%
United States	0,40043 - 0,40131 = -0,00088	0,40043 - 0,39466 = 0,00577	0,39466 - 0,39486 = -0,00020	0,39486 - 0,40131 = -0,00645
(2000-2010)	▽ 0,22%	1,46%	▽ 0,05%	▽ 1,61%

Source: microdata from Luxembourg income study database.
Notes: cf 1= counterfactual controlling for all the explanatory variables (including "region_c")
cf 2= counterfactual controlling for all the explanatory variables (except "region_c")

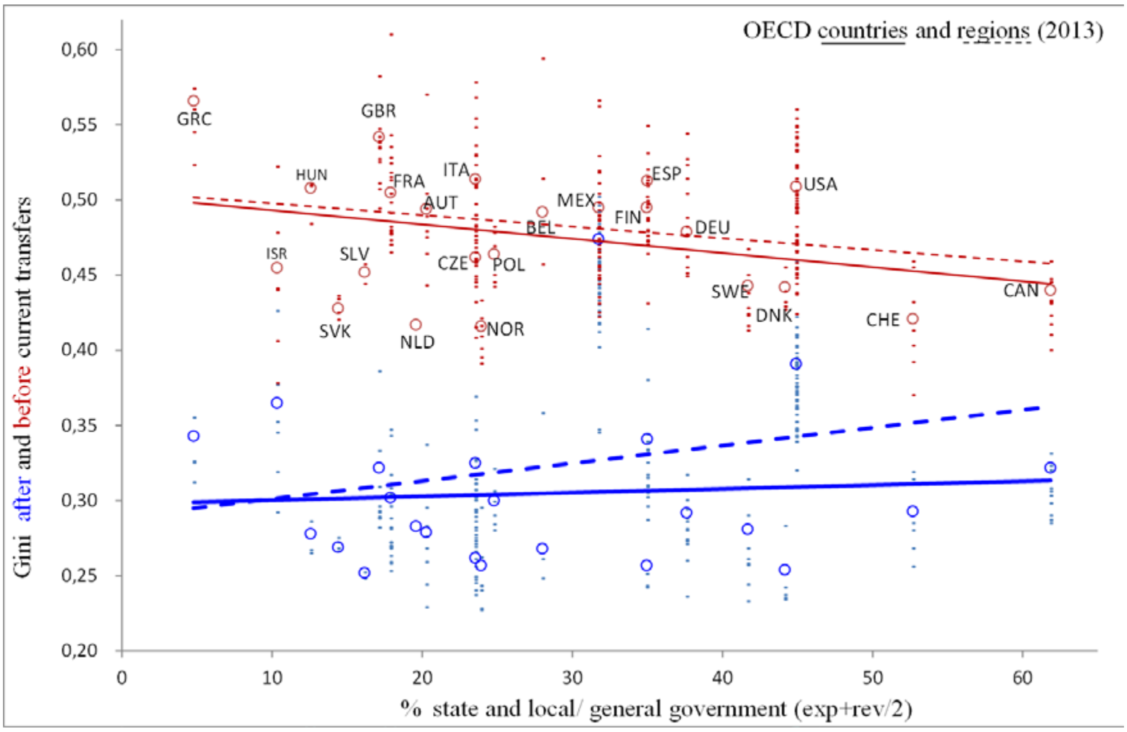
[9] We have not found any results for Australia yet. The estimation of the probit model does not run for this country and we are analyzing the possible causes of the error.

Figure 1. Decentralization and redistribution. OECD countries (2013)



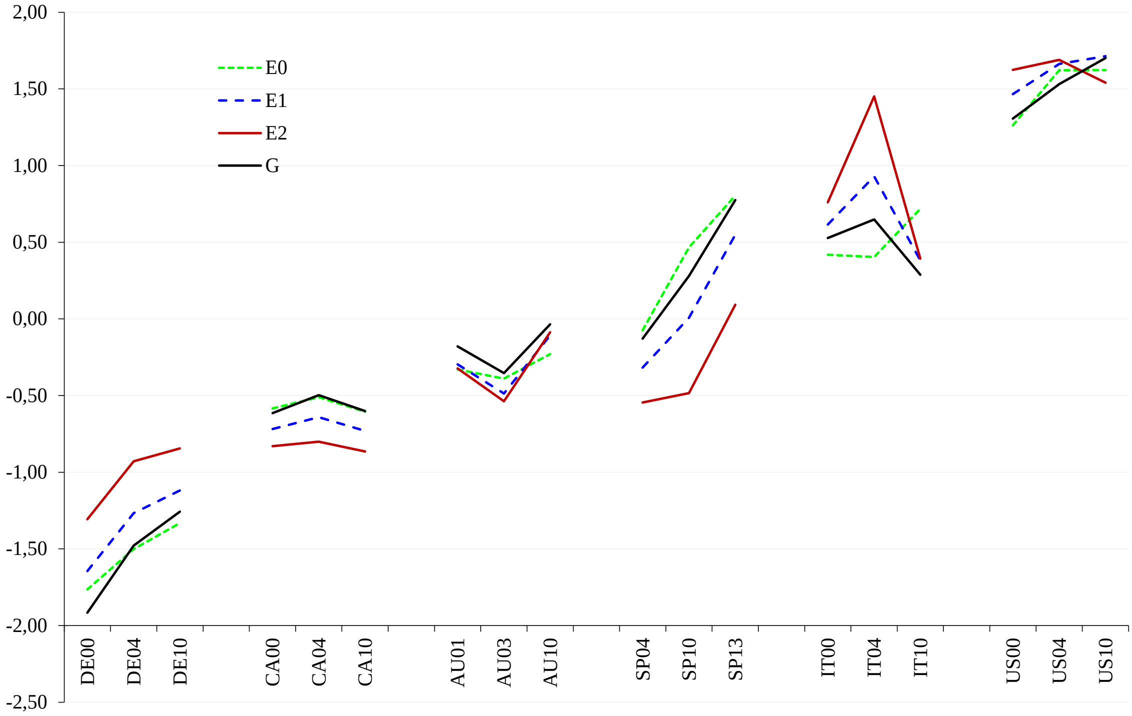
Source: *OECD.Stat Regional Well-Being* and *Fiscal decentralization* databases.

Figure 2: Decentralization and redistribution. OECD countries and regions (2013)



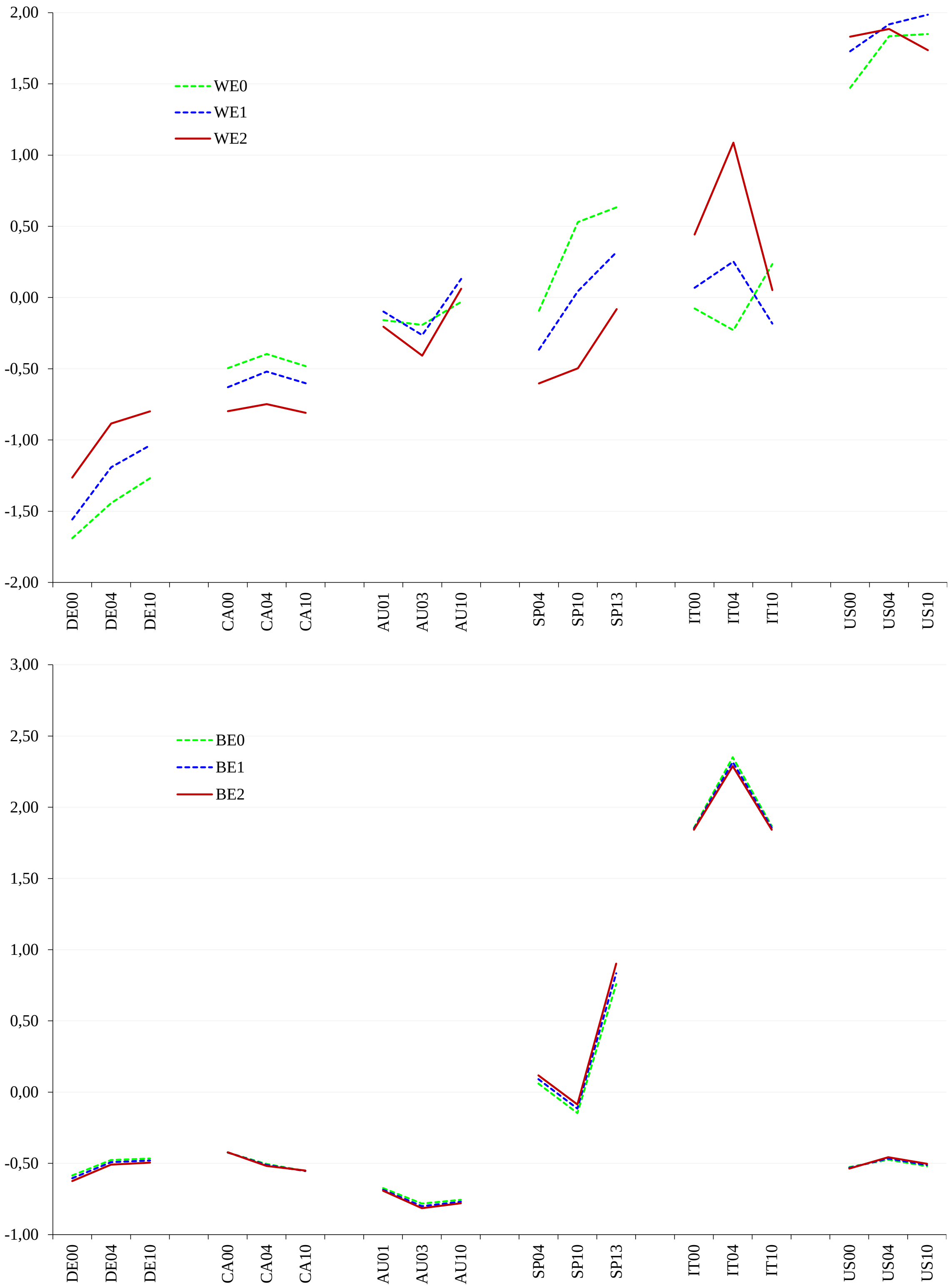
Source: *OECD.Stat Regional Well-Being* and *Fiscal decentralization* databases.

Figure 3: Inequality 2000-2010. Standardized Gini and Entropy (θ = 0, 1, 2)



Source: microdata from Luxembourg income study database.

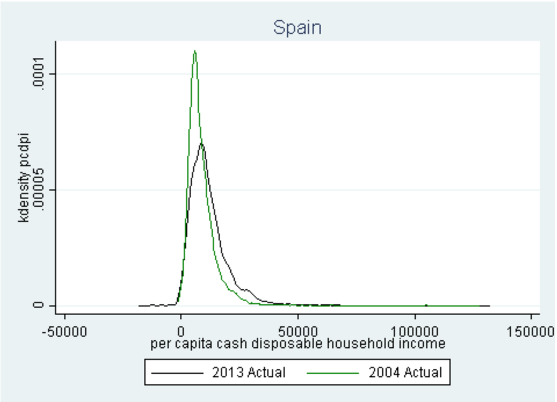
Figure 4: Between and whitin inequality. 2000-2010 Entropy (θ = 0, 1, 2)



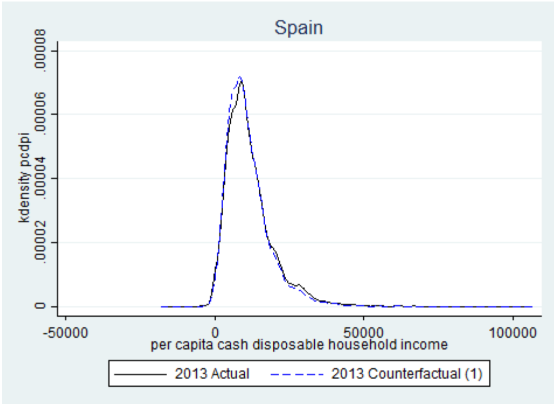
Source: microdata from Luxembourg income study database.

Figure 5: Spain, 2004-2013

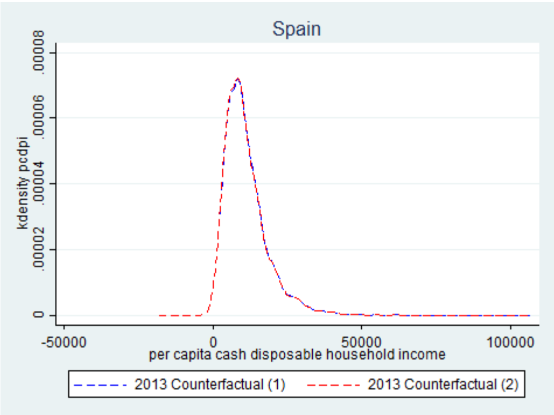
Scenario 1: Gini (t=2) - Gini (t=1)



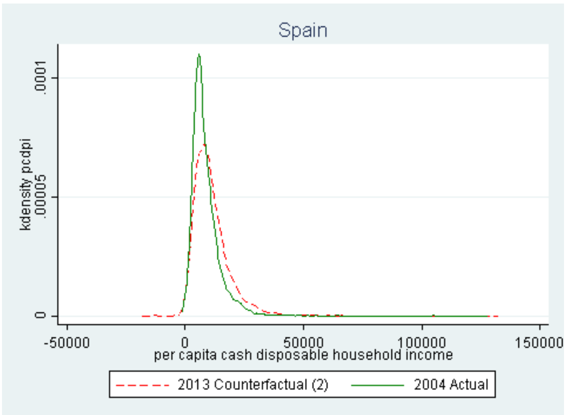
Scenario 2: Gini (t=2) - Gini (t=2; cf=1)



Scenario 3: Gini (t=2; cf1) - Gini (t=2; cf2)



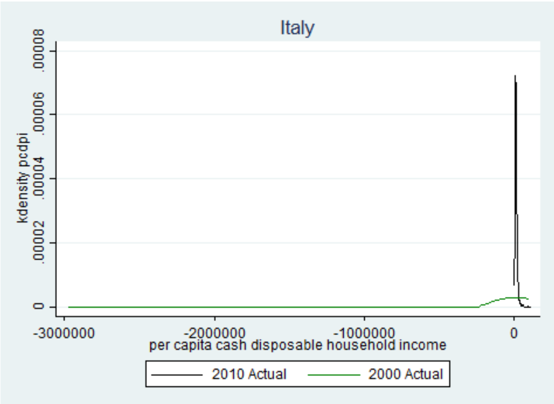
Scenario 4: Gini (t=2: cf2) - Gini (t=1)



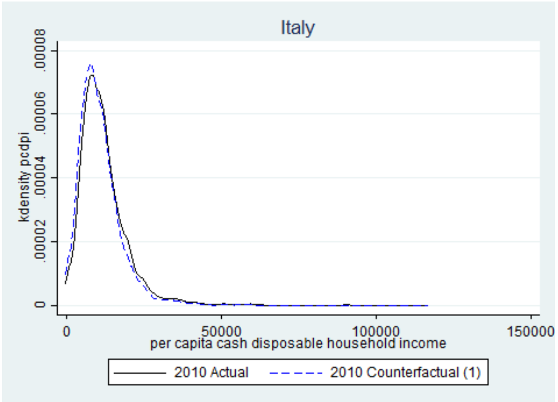
Source: microdata from Luxembourg income study database.

Figure 6: Italy, 2000-2010 [10]

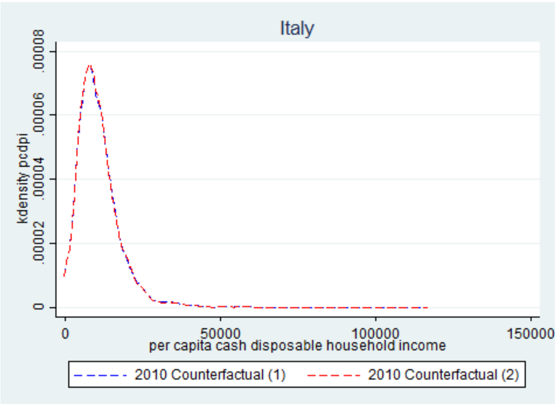
Scenario 1: Gini (t=2) - Gini (t=1)



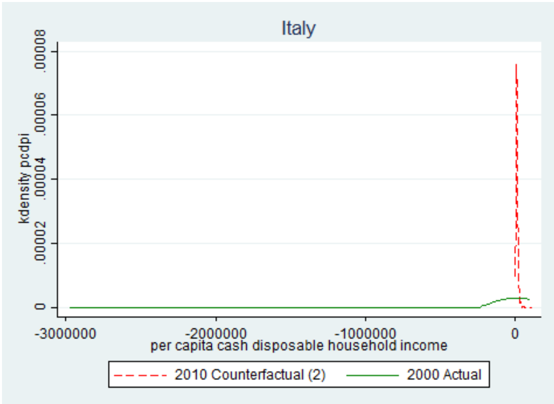
Scenario 2: Gini (t=2) - Gini (t=2; cf=1)



Scenario 3: Gini (t=2; cf1) - Gini (t=2; cf2)



Scenario 4: Gini (t=2: cf2) - Gini (t=1)



Source: microdata from Luxembourg income study database.

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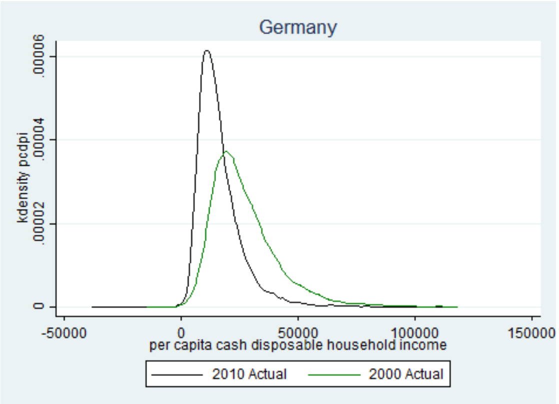
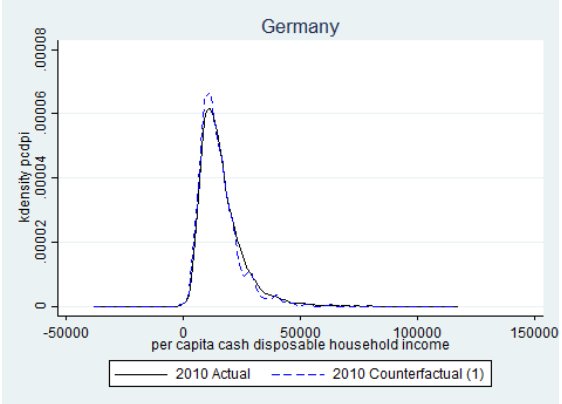
[10] NOTE: At the last minute an error has been discovered in the generating process of density graphics for Italy 2000. I will be corrected before the presentation.

Figure 7: Germany, 2000-2010

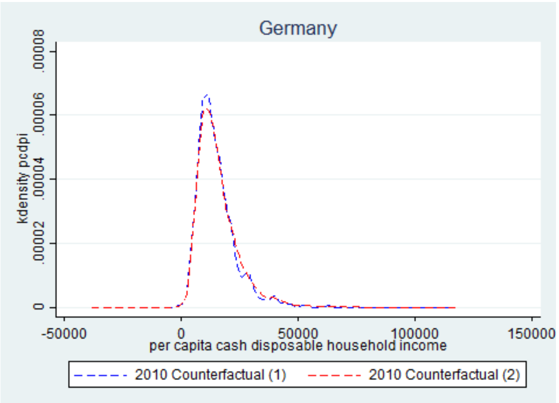
Scenario 1: Gini (t=2) - Gini (t=1)



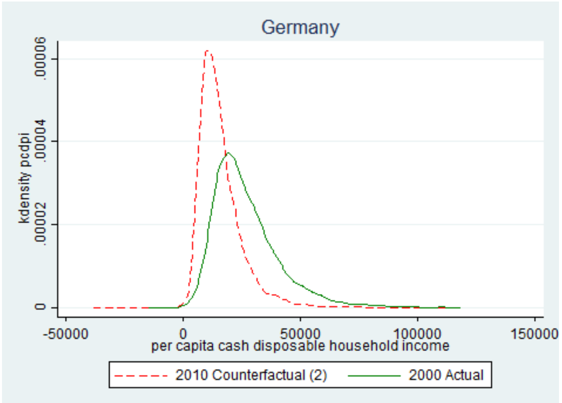
Scenario 2: Gini (t=2) - Gini (t=2; cf=1)



Scenario 3: Gini (t=2; cf1) - Gini (t=2; cf2)



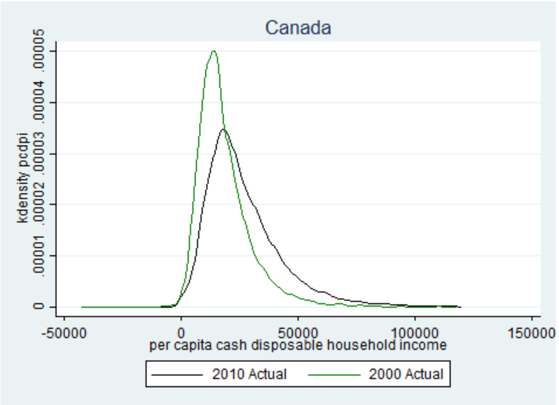
Scenario 4: Gini (t=2: cf2) - Gini (t=1)



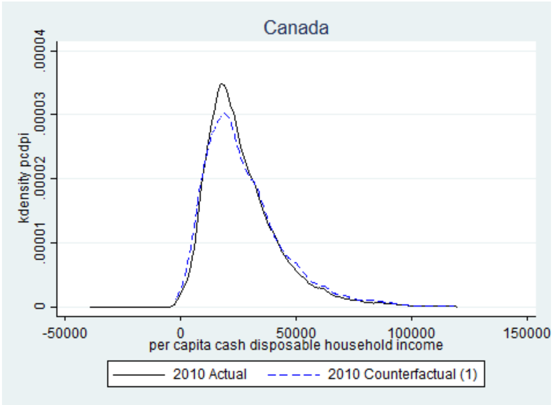
Source: microdata from Luxembourg income study database.

Figure 8: Canada, 2000-2010

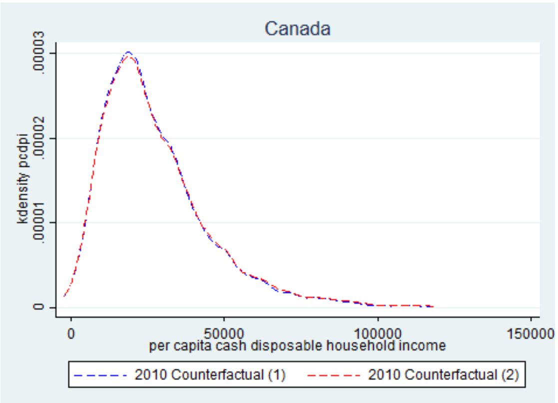
Scenario 1: Gini (t=2) - Gini (t=1)



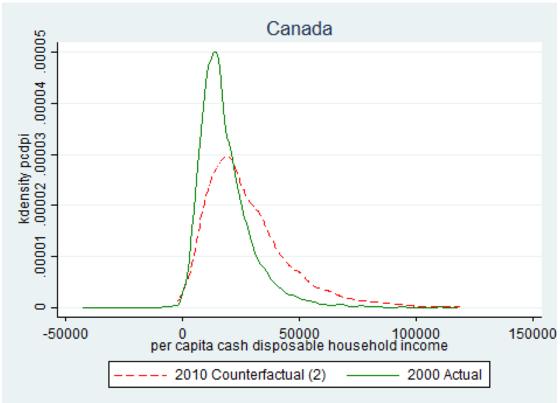
Scenario 2: Gini (t=2) - Gini (t=2; cf=1)



Scenario 3: Gini (t=2; cf1) - Gini (t=2; cf2)



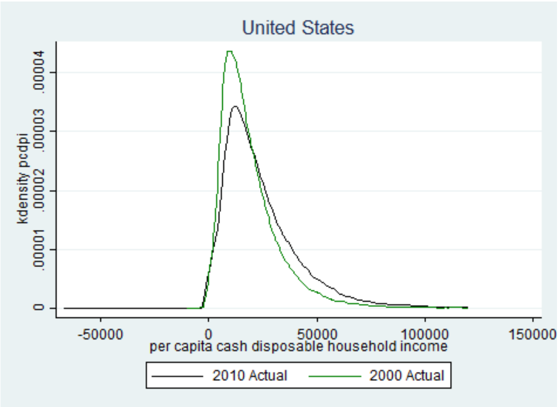
Scenario 4: Gini (t=2: cf2) - Gini (t=1)



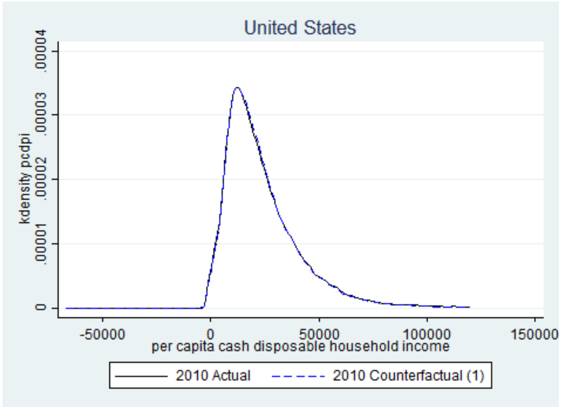
Source: microdata from Luxembourg income study database.

Figure 9: United States, 2000-2010

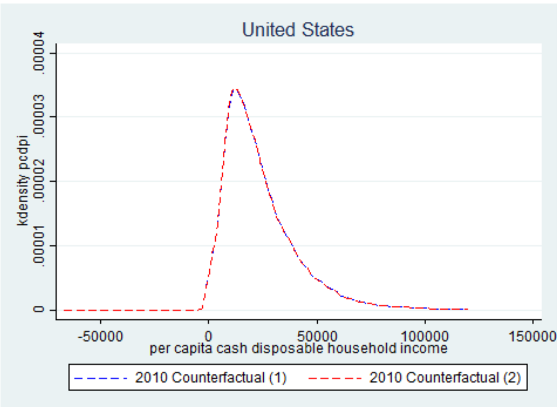
Scenario 1: Gini (t=2) - Gini (t=1)



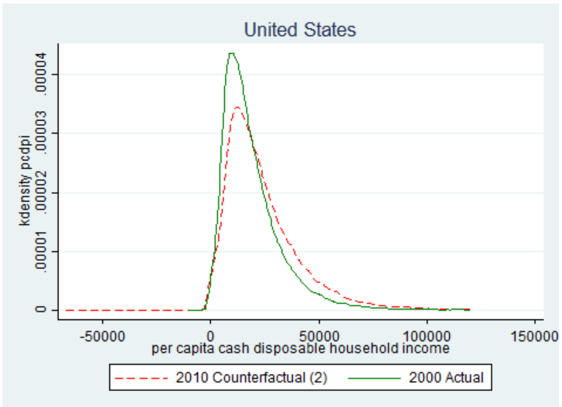
Scenario 2: Gini (t=2) - Gini (t=2; cf=1)



Scenario 3: Gini (t=2; cf1) - Gini (t=2; cf2)



Scenario 4: Gini (t=2: cf2) - Gini (t=1)



Source: microdata from Luxembourg income study database.

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