The Measurement of Adequacy and Coverage in Decentralized Minimum Income Schemes: An Application to Spanish Regions

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Abstract

The existing literature on welfare decentralization has not produced a robust set of measures and properties and no consensus has emerged on how inequalities arising from welfare decentralization should be aggregated into a composite index. The measurement of the global effects on inequality has usually focused on one of two dimensions: adequacy and coverage. The orderings of regions or the levels of inter-regional inequality can be very different depending on the chosen outcome. In this paper we propose new approaches that may contribute to the development of a more comprehensive picture of these types of inequality. First, we propose new measures combining both dimensions. Second, we propose to measure the contribution of each region to inequality making use of the Gini index and the interpretation of this inequality measure in terms of deprivation. Third, we provide an interpretation of the decomposition of the change in welfare inequalities in terms of progressivity and re-ranking components. Fourth, we analyze the notions of inequality and convergence considering adequacy, coverage and a measure that combines both dimensions under a unified framework.

Keywords: minimum income, inequality, adequacy, progressivity, re-ranking

1. INTRODUCTION[1]

The potential effects of the decentralization of welfare benefits raise numerous interesting questions and have been a major focus of policy debates. In those countries where these benefits are decentralized inequalities in adequacy and coverage have provoked great controversy and heated debates concerning their potential in the fight against poverty. Problems of coordination and financing might produce a mosaic of highly varied schemes, over and above the natural regional differences, with a striking disparity of regulations and results, and above all a certain widening of the differences the poorest citizens experience. To the extent that equally poor people receive different treatments depending on where they live horizontal inequity problems might take place.

The questions of how jurisdictions in a decentralized welfare framework design their programs or whether decentralization leads to large territorial differences in benefit levels and recipient proportions have garnered a great deal of research attention over the years. An intensive literature has examined underprovision of welfare under decentralized designs both using partial equilibrium models of jurisdictions behavior (Brown and Oates, 1987, Brueckner, 2000) and full general equilibrium models of the problem (Wheaton, 2000). Another large literature has analyzed the different ways through which jurisdictions respond to new policy environments (Soss *et al.*, 2001), the impact of more decentralized rulemaking and authority over eligibility rules, level of benefits, sanctions and administrative procedures (Ziliak, 2007), and even partisan differences (Leigh, 2008). Nonetheless, most of the extensive amount of research on welfare inequalities across jurisdictions has evolved around regions strategic behavior (Shroder, 1995; Berry *et al.*, 2003; Baicker, 2005a; Fiva and Rattsø, 2006; Dahlberg and Edmark, 2008) and price and income effects in federal grants (Ribar and Wilhelm, 1999; Baicker, 2005b; Chernick, 1998, 2000; Marton and Wildasin, 2007; Toolsema and Allers, 2014).

Relatively little is known however about how inequalities across regions arising from welfare decentralization should be measured. The existing literature has not produced a

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robust set of measures and properties and no consensus has emerged on how the different outcomes should be aggregated into a composite index. The measurement of the global effects on inequality of decentralized welfare benefits has usually focused on one of two dimensions (Figari *et al*., 2011): adequacy (benefits over poverty thresholds) and coverage (proportion of no income households receiving benefits). Recent evidence shows that welfare systems are quite insufficient to keep benefit levels in line with the general living standard (Van Mechelen and Marchal, 2012). The economic crisis did also affect the possibilities of governments to provide adequate levels of benefits (Marchal *et al.*, 2014). The growth of social needs has been parallel to a growing constraint in the allocation of resources. Depending on a number of factors these adequacy problems could largely vary in different jurisdictions. While most comparisons across regions or countries have been made in terms of the distance between benefits and poverty lines (Ravallion, 2007) over the last years there has been a shift in focus towards measures relating benefits to in-work or net disposable income (Immervoll, 2010; Vandenbroucke *et al*., 2012).

On the other hand, the protection provided by welfare benefits can also be assessed in terms of the proportion of potential recipients who receive benefits. Eligibility and take-up rates stand as two of the main issues driving this rate. As shown by Figari *et al.* (2011), in several countries a large proportion of individuals are ineligible for welfare benefits even when they fall below a low poverty line. Eligibility rules limit coverage by design, either by introducing categorical conditions that exclude potential beneficiaries, or by setting the income threshold for entitlement too low. Possible high levels of non take-up also involve that some households eligible to receive benefits will not do it. Many studies have identified that eligible claimants do not participate in income support programs. Targeting errors (Duclos, 1996), stigma and transaction costs (Moffitt, 1983; Whelan, 2010), information asymmetries (Currie, 2006), expecting long-term unemployment and/or high levels of social assistance payments as factors encouraging take-up (Bargain *et al.*, 2012), or endogenous government policy (Ayala and Triguero, 2014) are some of the factors usually highlighted as key issues explaining why there is a gap between current and potential recipients.

The orderings of regions or the levels of inter-regional inequality can be very different depending on the chosen outcome. Governments can choose to maintain relative high levels of generosity while promoting low take-up rates by different means. The political costs they face will differ depending on the chosen strategy. As a result, rankings and social welfare assessments can be rather dissimilar whether adequacy or coverage are chosen as key indicators of the protection provided by welfare programs.

In order to circumvent these problems there is a need for research that provides a more complete picture of inequality in these welfare schemes considering both dimensions in a unique analytical framework. In this paper, we propose new approaches that may contribute to the development of a more comprehensive picture of these types of inequality. First, we propose new measures combining both dimensions. Second, we propose to measure the contribution of each region to inequality making use of the Gini index and the interpretation of this inequality measure in terms of deprivation. Third, following Silber (1995) and Jenkins and Van Kerm (2006), we provide an interpretation of the decomposition of the change in welfare inequalities in terms of progressivity and re-ranking components. Fourth, we analyze the notions of inequality and convergence considering adequacy, coverage and a measure that combines both dimensions under the unified framework proposed by Donghde and Silber (2015).

Some of the contributions of our approach are: i) to the best of our knowledge, there are no synthetic measures of adequacy and coverage in welfare programs that can be interpreted in terms of inequality; ii) further insight into the nature of this kind of inequality can be gained by decomposing this measure in such a way that the precise contribution of each region can be identified; iii) in this approach microdata on households income are not always necessary; iv) the methodology can be extrapolated to any decentralized welfare scheme.

To test the sensitivity and robustness of the proposed approach we use data from Spanish regional welfare programs. In Spain, regional welfare schemes are the last safety net for low-income households. Potential claimants can apply for these benefits only if they have used up entitlement to other income maintenance programs. These programs are completely decentralized. The lack of initiative by the central government in the late 1980s encouraged regional governments to begin establishing their own welfare programs. The result is a mosaic of highly variable schemes, with a striking disparity of regulations and benefit levels across the different regions. As a result, each regional government sets the level of benefits and any other aspect of the programs' design with total autonomy.

We use data from surveys on Living Conditions and Labour Force before and after the economic crisis. Our results show strong and significant differences in the regional rankings both using adequacy and coverage rates. The empirical evaluation conducted using the synthetic measure proposed also shows that in two thirds of the regions there has been an improvement in both the protection provided by minimum income programs and social welfare levels. Our estimates allow identifying some regions as the ones that contribute most to inequality in the three outcomes –coverage, adequacy and our synthetic measure. We also provide an interpretation of the decomposition of the change in inequality in coverage, adequacy and the synthetic index in terms of progressivity and re-rankings. In general terms, the growth in mean during the period 2007-2013 was pro-poor in coverage rates and the composite index, and this inequality-reducing effect was reinforced by the effect of re-rankings. We also find evidence of both σ- and β-convergence, and an increase in coverage and the synthetic measure in the period studied.

The structure of the paper is as follows. The following section proposes new measures to define an index of social welfare considering adequacy, coverage and a synthetic measure of both dimensions. Section three summarizes how to interpret this inequality in terms of deprivation in order to identify the contribution of each region to total inequality. Section four presents an additional approach to decompose this kind of inequality in terms of progressivity and re-rankings. In section five we include in the analysis of these regional differences the issues of pro-poor growth and convergence. The paper ends with a brief list of conclusions.

2. A SYNTHETIC MEASURE OF WELFARE COVERAGE AND ADEQUACY

Welfare programs aim at providing an adequate level of economic security (B) to individuals or households in the lower part of the income distribution. The objective function in such programs can be identified through the income (y) distribution that –in a continuous setting– can be summarized by the cumulative distribution function $F(y)$. Given z and $F(y)$, the number of recipients (P) as a proportion of potential claimants would be given by a simple incidence measure. The expression of that measure depends on the number of individuals that fulfill the conditions to receive benefits (*L*). The level of protection provided by an antipoverty program can thereby be measured considering two different dimensions: the percentage of potential claimants receiving this benefit and the economic sufficiency that it provides.

The first of these dimensions represents the coverage provided by the program (*C*) and its measurement is relatively straightforward. It would consist of dividing the number of recipients registered in the administrative files by the number of potential recipients. The latter could be estimated empirically using household income surveys. In terms of poverty measures the former is similar to the headcount index and can be estimated as the ratio between the number of recipients (*P*) and the number of potential claimants (*L*),[2]

$$C = P / L \qquad [1]$$

Summarizing the second dimension into a single measure is somewhat harder. As abovementioned, many of the recent proposals of comparative analysis of adequacy place more emphasis on relative generosity than on economic sufficiency. A general approach is relating the level of benefits to a single measure representing average living standards like median income. A more precise alternative is measuring adequacy as the ration between the level of benefits and the poverty line:

$$A = B / z \qquad [2]$$

Sometimes these two dimensions –population coverage and adequacy– may produce conflicting results. In periods of economic downturn, governments might decide to modify some parameters –benefit levels– but use others –the proportion of claimants that enter the program– to prevent the increase in the number of welfare recipients and,

[2] In recent developments on efficiency in anti-poverty programs the notion of population covered by the program can also be approximated by the idea of a targeting function (Duclos *et al*, 2003). It can be defined as $\phi(y) = \tau(y) \cdot f(y)$, where $\tau(y)$ is the proportion of the population at income *y* that benefits from the program and $f(y)$ is the density function of *y*. In this case, $\Phi = \int_0^a \phi(y)dy \leq 1$ denotes the overall share of the population that benefits from the program.

thus, increase in spending. In this sense, it is important to have a synthetic measure combining the results of the two dimensions to offer an overall picture of the protection provided by the program. It might be observed, for instance, whether there are simultaneous improvements in both dimensions, opposite trends or overall gains despite possible declines in one of the two dimensions.

This index would make it possible to jointly consider adequacy and population coverage to measure differences across regions in the protection provided by their welfare schemes. Desirable properties for this index are the possibility of assigning different weights to both components and making inferences in terms of inequality and social welfare.

An appealing approach to constructing such an index is to first specify a social welfare function to be used in comparing distributions, and then from that derive an appropriate index to evaluate the protection provided by the minimum income program (MIP). Such an approach resembles the one proposed by Atkinson (1970) for inequality indexes. In adopting the welfare-based approach to the index the first step is to specify a social evaluation function. We consider a function defined over the potential claimants.[3] Even though we consider potential claimants as those with low incomes and the income received as minimum income protection is usually lower than the poverty line, Z, in a general setting we can consider a censored income distribution $t_i = min\{y_i, Z\}$ that caps individual incomes at the poverty threshold. The relevant issue here is not the income actually received but whether incomes are at least equal the level against which potential claimants assess their deprivation. When normalized by the poverty threshold it can be expressed in terms of normalized poverty gaps:

$$\frac{t_i}{Z} = 1 - \Gamma_i$$

where $\Gamma_i \quad = max\left\{1 - \frac{y}{z}, 0\right\}$.[4]

[3] Since we are interested in evaluating the MIP we do not consider the entire population focusing instead only on potential claimants.

[4] We compare incomes and poverty lines. As stressed by Ravallion (2007), we can assume that the government's aim for the program should be to provide cash transfers sufficient to bring everyone in each region up to an income level sufficient to not be deemed "poor".

Let us define the welfare function of the potential claimants as[5]

$$W(y|Z,\alpha) = \frac{1}{\alpha}\sum_{i=1}^{L}\frac{(1-\Gamma_i)^{\alpha}}{L}, \;\; 0 \neq \alpha \leq 1$$

and

$$W(y|Z,0) = \sum_{i=1}^{L}\frac{\ln(1-\Gamma_i)}{L}, \;\; \text{when } \alpha = 0$$

The coefficient α measures inequality aversion. We can calculate the equally distributed income level ξ such that $W(y|Z,\alpha) = W(\xi 1|Z,\alpha)$ where 1 is a vector of ones. In this terms, a measure summarizing the protection provided by a minimum income program can be defined as:

$$IMIP(y|Z,\alpha) = \frac{\xi}{Z}$$

The rationale for dividing ξ by Z is that a situation in which MIP were no needed is defined by all incomes being equal to Z. $IMIP(y|Z,\alpha)$ measures therefore the ratio of the equally distributed income level in the current situation (after receiving MIP) and the ideal situation in which everyone gets Z. In other words, it is the proportionate welfare loss caused by having individuals with incomes below this threshold after receiving MIP.[6]

This comes down to

$$IMIP(y|Z,\alpha) = \left\{\frac{1}{L}\sum_{i=1}^{L}(1-\Gamma_i)^{\alpha}\right\}^{1/\alpha}, \;\; 0 \neq \alpha \leq 1. \qquad [3]$$

[5] It is similar to Clark, Hemming and Ulph (1981) welfare function for the poverty index, but defined over the potential claimants.

[6] $IMIP(y|Z,\alpha)$ allows to evaluate the distribution of incomes of potential claimants after receiving MIP. If we want to assess the impact of MIP we should compare $IMIP(y|Z,\alpha)$ before and after receiving MIP.

that is the generalized mean of a function of normalized poverty gaps. For $\alpha = 1$ it is the arithmetic mean, for $\alpha = -1$ is the harmonic mean, and for $\alpha = -\infty$ is the minimum.

And this comes down to

$$IMIP(y|Z,0) = \{\prod_{i=1}^{L}(1-\Gamma_i)\}^{1/L}, \text{when } \alpha = 0 \qquad [4]$$

In this case it is the geometric mean of a function of normalized poverty gaps.

In a general setting in which the MIP provides an income level *B* this expression could be decomposed into:

$$IMIP(y|Z,\alpha) = \left\{\frac{1}{L}\sum_{i\in P}\left(\frac{B}{Z}\right)^{\alpha} + \frac{1}{L}\sum_{\substack{i\notin P\\ i\in L}}\left(\frac{y_i}{Z}\right)^{\alpha}\right\}^{\frac{1}{\alpha}} = \left\{\left(\frac{B}{Z}\right)^{\alpha}\frac{P}{L} + \frac{1}{L}\sum_{\substack{i\notin P\\ i\in L}}\left(\frac{y_i}{Z}\right)^{\alpha}\right\}^{\frac{1}{\alpha}}, \qquad [5]$$

$$0 \neq \alpha \leq 1$$

and to

$$IMIP(y|Z,0) = \left\{\left(\frac{B}{Z}\right)^{P}\prod_{i\notin P, i\in L}\left(\frac{y_i}{Z}\right)\right\}^{1/L}, when\ \alpha = 0 \qquad [6]$$

In addition to the possibility of interpreting changes in any dimension (adequacy and coverage) in terms of social welfare and assigning different weights to each dimension representing alternative value judgments, this index has other properties:

1. It lies in the closed interval [0, 1] whenever B<Z and P<L
2. It is invariant under changes in the income of non-potential claimants.
3. Anonymity: $IMIP_X(\alpha) = IMIP_Y(\alpha)$ whenever distribution Y is obtained from distribution X by a permutation of incomes, since the information provided by Y is the same as that provided by X.
4. As long as $\alpha > 0$, the greater proportion of beneficiaries the greater the index. In any case the greater the incomes of non-recipients who are potential claimants the higher the index, and the greater B the higher the index.

5. When $\alpha > 0$ and $\alpha \to 1$ more weight is given to those in the higher part of the distribution. When $\alpha < 0$ and $\alpha \to -\infty$ more weight is given to those in the lower part of the distribution and approaches a Rawlsian measure (only $1 - \Gamma_i$ of the person with the lowest income matters in the assessment of MIP programs).

6. It satisfies subgroup consistency, that is, overall IMIP should fall if the index of one subgroup falls, *ceteris paribus*. This is because IMIP is an increasing transformation of canonical indices (see Foster and Shorrocks, 1991).

Sometimes these programs are targeted to households suffering from extreme poverty being a special case those who have no income. If we consider potential claimants as those with no income and that recipients receive B as minimum income protection, the index after receiving the benefit is:

$$IMIP(y|Z,\alpha) = \left\{\frac{1}{L}\sum_{i\in P}(B/Z)^{\alpha}\right\}^{1/\alpha} = \frac{B}{Z}\left(\frac{P}{L}\right)^{1/\alpha}, 0 \neq \alpha \leq 1 \qquad [7]$$

$$IMIP(y|Z,0) = 0, \quad \text{when } \alpha = 0$$

In this case, $IMIP(y|Z,\alpha)$ is the adequacy rate weighted by a function of the coverage rate, $(P/L)^{1/\alpha}$. A remarkable advantage of this index is that depending on α different weights can be given to the coverage rates summarizing alternative value judgments on the relevance of adequacy and coverage in the social welfare measurement of minimum income protection. Positive and lower values of α mean larger weightings of coverage rates.

3. AN APPLICATION OF THE SYNTHETIC MEASURE TO SPANISH REGIONS

3.1. Data

Minimum income protection in Spain is completely decentralized. While Central Government is in charge of means-tested benefits for the unemployed, the elderly or disabled people, the general risk of poverty is covered by regional welfare schemes. The lack of initiative by the central government at the end of the eighties encouraged some regional governments to begin establishing their own systems. This process provoked great controversy and heated debates concerning their potential in the fight against poverty. Since their beginning, regional initiatives have been handicapped by serious problems of co-ordination and financing. This shortcoming, over and above the natural regional differences, has produced a mosaic of highly varied schemes, with a striking disparity of regulations and results, and above all a certain widening of the differences the poorest citizens experience regarding rights and resources

The number of people incorporated into such programs testifies to their growing scope and their contribution to regional social action. Not only does a wide range of experience exist, but in addition the development of work-related activities has meant an important step forward in public social intervention and above all in innovative strategies providing an alternative to the traditional working methods of the social services. Whatever the case, with regard to the possible lessons this extreme model of fiscal federalism may have, the key question is the extent of inequality existing in the protection offered by each region. As abovementioned, there are two possible ways to look at the different inequality sources embedded in this design: adequacy and coverage of potential claimants.

Adequacy rates can be estimated comparing the level of benefits in each region with the national poverty line. Every year the Department of Social Services and Equality of the Central Government publishes the number of recipients and the amounts set for these benefits in each region. Table 1 provides a thumbnail sketch of the existing differences in the level of benefits for different types of households. While benefits are considerable above the average in some regions, like the Basque Country, Navarre or Asturias, they are clearly below in others, like the Canary Islands, Cantabria and Valencia. These differences are particularly striking in the case of households with more members.

[TABLE 1]

Given the level of benefits in each region for different types of households, adequacy rates can be estimated comparing these amounts with the corresponding poverty lines. We use the Spanish sample from the 2008 and 2014 EU Survey on Income and Living Conditions (EU-SILC). The Spanish sample consists of 13,000 households comprising information for approximately 37,000 individuals. The income variable we use to set the poverty line is annual disposable income. EU-SILC data refer to income for the previous year. It includes all household monetary income after direct taxes and social security contributions: earnings, cash property income, regular social transfers, private transfers and other cash income. It does not include in-kind earnings or imputed rents. This variable is adjusted for each household by the so-called modified OECD equivalence scale.[7]

The coverage rates can be calculated comparing the number of current recipients with the one corresponding to potential claimants in each region. Annual data on the distribution of recipients across regions are also provided by the Department of Social Services and Equality of the Central Government. Figure 1 illustrates how the recipients are unevenly distributed by regions. Basque Country, Catalonia, Andalusia and Madrid accumulate more than two thirds of the recipients, with more than one quarter of recipients located in the first of these regions. This marked concentration is not rooted in the changes that took place in the crisis or how each region has been able to meet the dramatic increase in the demand for these services but in the initial design of these schemes. They are dependent on the initiative of each regional government and, thus, largely, on the available resources and the unequal budgetary ability.

[FIGURE 1]

In any case, the key issue here is not how many recipients there are in each region, a number that may depend on the size of the population or the shape of the income distribution, but how does each regional program cover the potential recipients. One way to estimate potential recipients is to identify eligible recipients in the abovementioned survey. The problem with this option is that recipients of these benefits are poorly coded in the survey and, in addition, household incomes suffer major problems of underreporting. One possible alternative is considering as potential claimants to all households in each region who do not earn any income from labor and do not receive any benefit from Social Security transfers (i.e. pensions or other benefits) nor from unemployment insurance or assistance payments. In theory, these poor

[7] The modified OECD equivalence scale assigns a value of 1 to the first adult in the household, 0.5 to each other adult, and 0.3 to each child.

households should be receiving benefits from the last safety net, or in other words the minimum income protection provided by each region. The data we use to estimate potential claimants in this way come from the Spanish Labour Force Survey. This survey is conducted quarterly by the National Institute of Statistics (INE). The sample size of the survey is 60,000 households comprising information for a sample of approximately 190,000 individuals.

3.2. Results

Table 2 presents adequacy and coverage rates for all regions in 2007 and 2013. The table gives general support to the notion that there are very marked differences across regions in both dimensions. Adequacy rates are twice higher in some regions –Basque Country and Navarra– than in others –Valencia and la Rioja. Differences in coverage rates are even larger. While in some regions the number of recipients is higher than the one corresponding to no income households in others the programs only cover less than a 10 per cent of these households. It must be noted that some regional governments pay benefits to households whose earnings are clearly insufficient to meet their family needs while others restrict these benefits to households with no labor income. Nevertheless, some regions have very low percentages of households covered by the program with rates that are below the 10 per cent –Balearic Islands, Extremadura and Castile-La Mancha.

[TABLE 2]

While in most regions adequacy rates increased during the economic crisis, in some cases the programs were overwhelmed by the growing demand for benefits. The result was a significant reduction in the percentage of potential recipients covered by the programs in a number of regions. In other regions, governments made a great effort to offset the increase in poverty. In any case, changes in adequacy must be interpreted taking into account the relative approach in the measurement of poverty. Since poverty thresholds fell drastically with the reduction in median income during the crisis, the simple fact of maintaining the level of benefits –or even slightly reducing it– almost automatically improved adequacy rates. It is rather remarkable, then, that the relationship between the amounts and thresholds fell in some regions in the time period under study.

Above all, the most outstanding result in the analysis of adequacy and coverage rates is the change in regional orderings that occurs when we move from one indicator to another. While there are hardly any changes in the positions of the regions with better indicators in the two dimensions –being Basque Country, Navarre and Asturias the regions with the best outcomes– re-rankings are large in the others especially at the bottom of the respective distributions. For instance, while Castile-La Mancha is the region with the lowest coverage rate there are two regions with lower adequacy rates. Re-rankings are even more marked in the case of Extremadura –moving from the penultimate position in coverage to the median in adequacy–, Balearic Islands –fifth in adequacy and fifteenth in coverage–, or La Rioja –the last one in adequacy and the fifth in coverage.

[TABLE 3]

These differences complicate the overall assessment of the protection provided by minimum income programs in terms of social welfare in each region. One way to address this problem jointly considering the two dimensions is by using the synthetic measure proposed in the previous section. Table 3 presents estimates of the synthetic index for the different regions in 2007 and 2013 taking as unit of reference a couple with two children. Several points are worth mentioning. First, by giving positive and low values to α the synthetic index becomes extremely lower in those regions with the lowest rates of coverage and much higher in the ones where these rates are the highest – Basque Country and Navarre.[8] Second, in two thirds of the regions the programs improved both the protection provided and social welfare levels expressed in the terms

[8] Since weightings are an increasing and concave function of α, positive but close to zero values of this parameter can yield almost zero values for the IMIP when $P<L$ –the most standard case. If α approaches 0 the weighting scheme assigns such a value to the coverage rate that the synthetic index can take very low values. It is only the case of values of P close to L that adequacy has a determining role. In that case the value given to α is not so important since the weighting corresponding to the coverage rates is going to be very close to 1. It seems therefore that the most neutral approach would be giving equal weight to both dimensions (α=1). This is the strategy we adopt in the next sections. Another reason is the appealing interpretation of the index for α=1 when the outlined restrictions are met –potential claimants are those with no income and recipients receive B.

set out above. In contrast, in Murcia, Asturias, Madrid, Galicia and the Basque country the overall levels of social welfare achieved by these programs decreased during the economic crisis.

Third, while the index drastically changes as different values of α are considered there are not however significant variations in the regional rankings when α is reduced from 1 by less than 0.5. In that case, nine regions change their order in the ranking but never more than two positions. When α changes from 1 to 0.25 more re-rankings are found affecting thirteen of the seventeen regions in a range that goes from one to six positions.

Therefore, taking into account how these programs provide coverage to no income households qualifies decisively the overall assessment of minimum income schemes in terms of social welfare. Assessing welfare gains focusing only on standard measures of adequacy may introduce an important bias, making difficult the proper identification of the real differences between programs of different jurisdictions. Our measure also allows calibrating the relevance of this second dimension, finding that differences can be very large depending on the weight given to the coverage component.

4. REGIONAL CONTRIBUTIONS TO WELFARE INEQUALITIES

Differences across regions in adequacy and coverage contribute to inequality in terms of the different protection provided. This is the case either for each dimension as well as for the synthetic index presented in the previous section. These inequalities can be measured and the same can be done in the case of the contribution of each region to inequality in the different outcomes. Considering the synthetic index as a measure of changes in social welfare produced by changes in the protection provided by each program it is possible to use traditional indicators of inequality to summarize the concentration in the distribution of social welfare.

We will make use of the Gini index and the interpretation of this inequality measure in terms of deprivation. The approach adopted is similar to that of Sen (1973), which is also closely related to Pyatt's (1976) interpretation of the Gini index in terms of the expected gain of a game in which each individual is able to compare himself or herself with someone drawn from the total population. The measurement of social or overall deprivation involves a two-stage process. At first a deprivation profile is defined which consists of the list of individual deprivations felt by each individual in society. In a second step these individual indices are aggregated into overall deprivation. So far, all indices proposed in the literature (Yitzhaki, 1979; Chakravarty and Chakraborty, 1984; Berrebi and Silber, 1985; Paul, 1991; Chakravarty and Mukherjee, 1999) have been derived by means of this approach.

Since the background we use is based on the analysis of income inequality and deprivation, we will apply it to inequality in the coverage and adequacy rates and the synthetic measure across regions. We consider that a region expects to increase the coverage rate or any of the two other outcomes and therefore compares itself with the level of coverage of all those regions with higher levels of coverage, and similarly for the other indexes.

We consider a fixed homogeneous population N {l, 2, . . . , n} of n (n≥2) individuals that in our framework are regions. They are identical, but generally differ in the outcome of interest. A feasible distribution Y is given by an outcome vector $(y_1, y_2, \ldots, y_n) \in \boldsymbol{R}^n$ where y_i is individual i's outcome, $i = 1, 2, \ldots, n$, $y_1 \leq y_2 \leq \ldots \leq y_n$ and μ is the mean outcome. Following Runciman's (1966) statement that "the magnitude of a relative deprivation is the extent of the difference between the desired situation and that of the person desiring it", the deprivation, $I_D(y_i, y_j)$, felt by an individual with outcome y_i, where $y_j \geq y_i$, can be considered to be the outcome share differential. That is

$$I_D(y_i, y_j) = \begin{cases} y_j - y_i & if\ y_j \geq y_i \\ 0 & if\ y_j < y_i \end{cases} \qquad [8]$$

The average deprivation felt by an individual with outcome y_i over the whole population, $I_D(y_i)$, is

$$I_D(x_i) = \frac{1}{n} \sum_{j=i+1}^{n} (y_j - y_i) = \mu\big(1 - L(i)\big) - \frac{(n-i)}{n} y_i = \mu_i^+ - \frac{(n-i)}{n} y_i \qquad [9]$$

where $L(i) = \frac{1}{\mu n}\sum_{j=1}^{i} y_j$ is the cumulative proportion of the total outcome enjoyed by the bottom *i*/*n* proportion $(0 \leq i \leq n)$ of the population and μ_i^+ is the mean outcome of individuals with outcome higher than y_i .

The average feeling of deprivation of the whole population is I_D:

$$I_D = \frac{1}{n^2}\sum_{i=1}^{n}\sum_{j=i+1}^{n}(y_j - y_i) = \frac{1}{n^2}\sum_{i=1}^{n}\sum_{j=i+1}^{n} y_j - \sum_{i=1}^{n}\frac{(n-i)}{n^2}y_i$$
$$= \frac{1}{n^2}\sum_{i=1}^{n}(2i - n - 1)y_i = \mu G \qquad [10]$$

As we want to analyse inequality and not the absolute index of inequality, we will compute deprivation in relative terms respect to the mean of the whole population.

The contribution of each individual to overall inequality is

$$C(x_i) = I_D(y_i)/nI_D \qquad [11]$$

Table 4 shows the contribution of each region to overall inequality in coverage, adequacy and the IMIP (α=1)[9] in two periods, 2007 and 2013, and the corresponding Gini indexes. A first finding is that inequality in the synthetic measure decreased during the period under study with the reduction in inequality in coverage rates offsetting the increase observed in adequacy rates. We observe that if we interpret the Gini index in terms of the expected gain of a game in which each region compares with regions in a better position, not all regions contribute the same to the different outcomes. The extreme positions are hold in the three cases by almost the same regions regardless of the measure and year analyzed.

[TABLE 4]

[9] From now on we work with IMIP (α=1) for the sake of space and given also the appealing interpretation of the index with this value (the index is the ratio between the amount of MIP and the total amount of money needed to bring the potential claimants up to the poverty line).

Basque Country contributes nothing to inequality, no matter the year or measure analyzed, as this region has the highest coverage, adequacy and IMIP index. Navarre also has a low ranking in the contribution to inequality in the three measures. The greater contributions to inequality in coverage rate and IMIP (α=1) are for Castile-La Mancha and Extremadura in both years while the contribution to inequality in adequacy was the highest for Valencia. We observe that dispersion in the regional contribution to inequality in adequacy rates is the highest even though the Gini index is the lowest. This means that while regional contributions to inequality are smaller dispersion is higher than in the other measures. As abovementioned, during the economic crisis inequality in the coverage rates slightly decreased while regional inequality in adequacy modestly increased resulting in a decrease of the synthetic index.

5. INEQUALITY, PROGRESSIVITY AND RE-RANKINGS

Inequality changes are associated with changes in regional levels of the index and changes in their ranks in the index distribution. These two types of changes may not be independent since, for instance, a large increase in coverage rates will often be associated with an increase in rank. This makes to go further in the analysis necessary. The dispersion observed in the synthetic index and both in adequacy and coverage rates makes important to disentangle whether changes in inequality are due to the re-rankings of regions or a higher progressivity in the distribution of the different outcomes.

Following Silber (1995) and Jenkins and Van Kerm (2006), consider the change in the Gini index of coverage rates –similar for the remaining measures– between some base year (0) and final year (1) for a fixed number of regions. Letting G_t denote the Gini index for year t, the change in this measure can be written as

$$\Delta G = G_1 - G_0 \qquad [12]$$

When the change in inequality is measured through the Gini index an assumption of anonymity is made. It is not known whether the various regions had the same rank at times 0 and 1. We analyze the changes in the three measures (adequacy, coverage and MIPI) over time and decompose these changes into one component related to the changes in regions' relative measures and another related to the changes in their ranks in the corresponding measure distribution.

There are two steps through which inequality may be introduced in different stages. Our starting point is the distribution of the coverage rate in the initial year (year 0) and we assume that the regions keep the rank they had in year 0 but they are given their coverage rate in year 1. Let $C_1^0(p)$ be the concentration curve for the coverage with respect to this "lexicographic coverage parade". The argument *p* denotes regions' rank in a coverage parade where regions are ordered by increasing initial rates. It is easy to observe that for each *p*, $C_1^0(p)$ corresponds in fact to the ratio of the mean coverage of the *Np* first regions in the current stage of the coverage parade and the mean coverage for the whole population in year 1. The re-ranking component between year 0 and year 1 can be identified by rearranging the regions from the lowest to the highest in the distribution of year 1. This gives us the true coverage parade.

In short, we may define V and R as:

$$V = G_0 - C_1^0 \qquad [13]$$

$$R = G_1 - C_1^0 \qquad [14]$$

where C_1^0 is the concentration index.

V summarizes the progressivity or pro-poor growth across the base year coverage distribution. When every region experiences an equi-proportionate growth in the coverage rate relative measures remain constant, and V=0. When $\mu_1 > \mu_o$ and there is no equi-proportionate growth but it is more concentrated at the bottom of the distribution, V>0. This can be considered a pro-poor growth in coverage rates (progressive). By contrast, if gains are more than proportionally concentrated among regions with higher coverage rates, V<0. This would be the case of non pro-poor growth in coverage rates (regressive). The opposite occurs when $\mu_1 < \mu_o$. R summarizes re-rankings from the initial to the final year. Clearly, when there is no re-ranking, R=0, and R>0 otherwise. R/G is the asymmetric Gini mobility index', whose desirable properties are discussed at length by Wodon (2001) and Yitzhaki and Wodon (2004). And it, in turn, has the same form as the Atkinson (1980)-Plotnick (1981) measure of horizontal inequity in the income tax literature.

Therefore, the change in inequality can be decomposed in two terms, progressivity and re-ranking:

$$\Delta G = R - V \quad [15]$$

As stressed by Jenkins and Van Kerm (2006), V is a social-weighted average of the changes in relative outcomes between years 0 and 1 with weights determined by year 0 ranks and R is a relative- outcome-weighted average of changes in social weights.

[FIGURE 2]

This decomposition can be represented graphically. The increase or decrease in inequality over this period is represented by an outward shift in the Lorenz curve. Figure 2 shows the Lorenz and concentration curves for the different outcomes in years 2007 and 2013. The difference between the Lorenz curves can be broken down into two components. One is the difference between the Lorenz curve for 2007 measures (L_{2007}) and the concentration curve for 2013 measures constructed using 2007 ranks (C_{2013}^{2007}). It summarizes the progressivity of the change: V is twice the area between these two curves. The second component is the difference between the concentration curve (C_{2013}^{2007}) and the Lorenz curve for 2013 (L_{2013}), which summarizes the extent of re-rankings. Note that, by construction, the latter lies nowhere below the former. R is twice the area between these two curves.

The increase in coverage rates during the period 2007-2013 (from 0.48 to 0.49) is clearly pro-poor, as the concentration curve lies everywhere above the Lorenz curve for 2007. This inequality-reducing effect was reinforced by the effect of re-rankings. In the case of the adequacy rate it increased during the period under study (from 0.43 to 0.49) but it is not clear whether this growth was progressive or not. The concentration curve has sections above and below the Lorenz curve for 2007, and the inequality increasing effect of re-rankings is slightly mitigated by that of progressivity. The growth of the IMIP during the same period (from 0.25 to 0.30) follows a similar pattern than that of the coverage rate. That is, it was clearly pro-poor as the concentration curve lies everywhere above the Lorenz curve for 2007, and this inequality-reducing effect is strengthened by the one of re-rankings.

Following the same reasoning than in the previous section, the contribution of each region to overall progressivity and re-rankings are respectively $\frac{V(y_i)}{nV}$ and $\frac{R(y_i)}{nR}$, where:

$$V(y_i) = \frac{1}{n^2\mu_0}\sum_{j=i+1}^{n}(y_j - y_i) - \frac{1}{n^2\mu_1}\sum_{j=i+1}^{n}(x_j' - x_i') \qquad [16]$$

$$R(y_i) = \frac{1}{n^2\mu_1}\sum_{j=i+1}^{n}(x_j - x_i) - \frac{1}{n^2\mu_1}\sum_{j=i+1}^{n}(x_j' - x_i') \qquad [17]$$

and y_i is region i's outcome in period 0, $y_1 \leq y_2 \leq \ldots \leq y_n$, x_i is region i's outcome in period 1, $x_1 \leq x_2 \leq \ldots \leq x_n$ and x_i' is region i's measure in period 1 with regions keeping the rank they had in year 0.

[TABLE 5]

Table 5 shows the share of each region in the change in inequality in coverage, adequacy and the IMIP index. La Rioja and Aragón are the regions with the greatest contribution to the reduction in inequality in coverage rates, while Murcia, Balearic Islands and Asturias contribute in the opposite direction. The different contributions might be driven by changes in the initial level of the different outcomes or from changes in the regional ranking of the corresponding distribution. This information is contained in columns %V and %R in Table 5. Regarding coverage, La Rioja and Aragón are the regions that contribute most to the reduction in inequality through a progressive growth of the rates and relevant re-rankings. In terms of adequacy, La Rioja is the region with the greatest contribution to the inequality growth in these rates and the highest re-ranking, with Madrid and Castile-La Mancha. Finally, regarding the IMIP, Aragón, Navarre and La Rioja are the regions with the greatest contribution to the reduction in inequality, while Murcia and Madrid contribute in the opposite direction. The former regions are also those that contribute most to the reduction in inequality through a progressive growth of the IMIP indices, and Aragon experienced the greatest re-ranking.

6. INEQUALITY AND CONVERGENCE

In considering whether changes in adequacy and coverage rates in the different regions gave rise to increasing or decreasing levels of social welfare a central issue is the relationship between convergence and inequality. In this section we move from the static to the dynamic analysis of coverage, adequacy and IMIP indices. We analyze the notions of inequality in growth rates and convergence under the unified framework proposed by Donghde and Silber (2015). This methodology allows the estimation of measures of distributional change even when the number of observations is limited and only available in aggregate form. This methodology is particularly useful in the case of regional data due to the relatively small number of observations. In such a case traditional econometric approaches to convergence analysis cannot be used.

First we make use of the well-known Individual Growth Incidence Curves introduced by Grimm (2007) and Non-Income Growth Incidence Curves (Grosse *et al.*, 2008) to obtain a graphical analysis of the distribution of growth in coverage, adequacy and the IMIP index. Then we compute distributional change indices: first, we use Silber's (1995) measure of distributional change to assess inequality in the individual growth rate; second, following Donghde and Silber (2015) we estimate the index of distributional change that summarizes convergence in a non-anonymous case –this index measures the degree of β-convergence across regions in the different outcomes; finally, we compute the index of convergence in the various centiles –the anonymous case– for the three measures assessing the extent of σ-convergence.

[FIGURE 3]

Figure 3 shows the Individual and the Anonymous Growth Incidence Curves for the coverage rates. These curves provide valuable insight about the distributional impact of growth for the indices that cannot be derived from the study of inequality. In the anonymous case, we estimate the growth rate in the outcome of a region ranked *i* in 2007 compared with that of a region with the same rank *i* in 2013. In the non-anonymous case, we compute the growth rate in the outcome in a region in 2007 with the outcome corresponding to the same region in 2013. The figure confirms our previous conclusion of a progressive growth in coverage rates. In general terms, the greatest growth in these rates during the period 2007-2013 was that of regions who had low coverage rates in 2007. In a similar vein, the analysis in an anonymous setting shows that the highest growth in the coverage rates during the same period took place in the lower centiles.

[FIGURE 4]

Figure 4 depicts the same curves in the case of adequacy rates. In keeping with the results shown in the previous sections, in this case there is not such an evidence of progressive growth in the non-anonymous setting. If we move to an anonymous framework there is even a regressive growth.

[FIGURE 5]

Results are clearer in the case of the IMIP index. Our previous estimates showed a progressive growth of the synthetic index. The progressive growth of coverage rates offset the opposite effect of adequacy rates: a progressive growth of the IMIP indices took place both in the non-anonymous and in the anonymous setting.

We consider the non-anonymous and the anonymous case in the analysis of the distributional change as they are connected to two different concepts of convergence. In the non-anonymous case, we compare the outcome in a region in 2007 with the outcome corresponding to the same region in 2013. In the anonymous case, we compare a region ranked *i* in 2007 with a region with the same rank *i* in 2013, these regions being generally but not necessarily different. In general terms, we find that the estimated values of the various non-anonymous and anonymous indices are not distant (Table 6). As abovementioned, this is so because there is not much difference in the rankings of the regions over time.

[TABLE 6]

The indices of inequality across Spanish regions in the growth of adequacy rates in the non-anonymous and anonymous cases are small. This is not the case however for the coverage rates and the IMIP index. In the non-anonymous case, the index of convergence of coverage rates is negative meaning that on average the rates in those regions with lower initial values grew at a higher rate than that of those with a high coverage rate so there is convergence of the coverage rates over time. Such a case corresponds to what in the literature is characterized as β-convergence. In this context, regions with lower rates than the average contribute positively to the overall distributional change. This is the case of Murcia, Asturias, Basque Country, Balearic Islands, Cantabria, Galicia and Madrid. Regarding adequacy rates we observe a slight β-convergence. Aragón, Balearic Islands, Castile and León, Extremadura, Galicia, Madrid and Navarre contribute positively to the overall distributional change. Concerning the IMIP index, conclusions are similar as those for the coverage rate. We observe β-convergence and the regions contributing positively to the overall distributional change are the same as those for coverage rates except Cantabria.

In the anonymous case we look at the rates of growth in the various centiles. This case seems to make no sense in our framework as we work with regions, but it might be useful to assess σ-convergence in coverage or adequacy rates. The finding that for coverage rates and the IMIP index the convergence index is negative in the anonymous case implies that on average the growth rates were higher in the lower than in the higher centiles so that inequality decreased (σ-convergence). In the case of adequacy rates the result of a positive but small convergence index in the anonymous case implies that on average the growth rates were slightly lower in the lower than in the higher centiles so that inequality increased (modest σ-divergence).

[TABLE 7]

Finally, in order to get a further insight in the analysis of coverage and adequacy rates and their relationship with the IMIP index we analyze convergence with respect to other variables. Table 7 presents estimates of these conditional convergence rates in both an anonymous and non-anonymous settings. It can be observed that as the sign of the index of convergence in coverage growth with respect to the level of adequacy is negative, those regions with lower adequacy rates had a higher growth rate in coverage, while those region with high level of coverage had a higher growth rate in adequacy. In other words, those regions where adequacy rates were the lowest in the initial year somewhat offset this drawback trough higher coverage rates. In contrast, the regions that in the initial year provided a better coverage of the poorest households also increased their adequacy rates. Both results can be interpreted as a sign of a good performance of the regional minimum income schemes during the economic crisis. In terms of the proposed index and convergence, results for the IMIP index to evaluate the convergence of the minimum income protection programs across Spanish regions show that there is evidence of β- and σ-convergence, as expected from results in Table 7.

7. CONCLUSION

In this paper, we propose new approaches that may contribute to the development of a more comprehensive picture of inequality in welfare schemes under a decentralized design. First, we propose a new synthetic measure combining adequacy (benefits over poverty thresholds) and coverage (proportion of recipients over potential claimants). We have analysed the Spanish regional levels of coverage, adequacy and the proposed synthetic measure (IMIP) for the period 2007-2013. We observe that there are changes in regional orderings when we move from coverage to adequacy rates. These differences complicate the overall assessment of the social protection provided by minimum income programs in terms of social welfare in each region. Nevertheless, the empirical evaluation conducted using the synthetic measure proposed shows that in two thirds of the regions there has been an improvement of both the protection provided and social welfare levels. Therefore, assessing welfare gains focusing only on standard measures makes difficult the proper identification of the real differences between programs of different jurisdictions. Our measure allows calibrating the relevance of adequacy finding that differences in the protection provided by each program can be very large depending on the weight given to this component.

Second, in order to define an overall evaluation framework we propose strategies to measure of the contribution of each region to inequality in coverage, adequacy and the IMIP (α=1) index. Our estimates show that Basque Country as the region that has the highest coverage, adequacy and IMIP index. Navarre also has a low ranking in the contribution to inequality in the three measures. The greatest contributions to inequality in coverage rate and IMIP are for Castile-La Mancha and Extremadura in both years while the contribution to inequality in adequacy was the highest for Valencia.

Third, in a dynamic evaluation of the changes in the welfare schemes we provide an interpretation of the decomposition of the change in inequality in coverage, adequacy and the IMIP index in terms of progressivity and re-rankings. For the coverage rate and the IMIP index the growth in mean during the period 2007-2013 was clearly pro-poor, and this inequality-reducing effect was reinforced by the effect of re-rankings. The average adequacy rate increased during that period but it is not clear whether this growth was progressive or not. The modest inequality increasing effect of re-rankings was slightly mitigated by that of progressivity. Our results also allow to identify which regions contribute most to inequality reduction trough the different effect of progressivity and re-rankings. La Rioja and Aragón were the regions with the greatest contribution to the reduction in inequality in coverage through a progressive growth and relevant re-rankings. Quite the opposite, the greatest contribution to inequality increase in the adequacy rate was for La Rioja which had the greatest reduction in adequacy rates and the greatest re-ranking. Aragón, Navarre and Rioja are the regions that contributed most to the reduction in inequality through a progressive growth of IMIP rates. Basque Country was the region with the highest IMIP rate in both years despite the reduction in the coverage rate.

Finally, we analyzed the notions of convergence and inequality and found evidence of both σ- and β-convergence, and an increase in coverage and the IMIP index over the period 2007-2013 –an economic crisis period. Nonetheless, average adequacy rates increased during the same period showing a slight β-convergence and modest σ-divergence. It is worth mentioning that in a recession period Spanish regions with lower levels of adequacy experienced a higher growth in coverage rates. Simultaneously, the higher the initial coverage rate, the higher the growth in adequacy.

In short, from a policy point of view it is important to analyze not only the evolution of the basic outcomes of regional welfare systems but also aspects of the distributional change that may take place when looking at the variation over time. The very notions of inequality, mobility, progressivity and convergence are essential references for a better understanding and identification of the policies that are working properly.

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Table 1. Minimun Income Benefits in Spanish Regions, 2007 and 2013 (euros)

	2007			2013		
Region	Single person	Couple, 2 children	Single-parent, 2 children	Single person	Couple, 2 children	Single-parent, 2 children
Andalusia	353.8	490.7	445.1	400.1	555.0	503.3
Aragón	336.0	629.0	524.2	441.0	749.7	661.5
Asturias	396.7	610.9	547.4	443.0	682.1	611.3
Balearic Islands	364.5	583.2	546.7	425.7	681.1	638.6
Canary Islands	342.8	410.5	376.6	472.2	584.0	534.3
Cantabria	286.8	418.2	383.6	426.0	585.8	532.5
Castile-La Mancha	349.4	464.8	426.3	372.8	454.8	413.8
Castile and León	374.4	499.2	464.3	426.0	639.0	596.4
Catalonia	385.0	514.2	473.8	423.7	589.6	534.3
Extremadura	374.4	494.2	454.3	399.4	585.8	532.5
Galicia	374.4	524.2	484.2	399.4	516.5	463.3
Madrid	340.0	578.0	510.0	375.6	532.5	532.5
Murcia	300.0	498.0	422.0	300.0	498.0	442.0
Navarre	456.5	656.2	599.1	548.5	898.0	832.8
Basque Country	585.6	831.9	818.6	662.5	941.1	941.1
Rioja	335.4	518.0	464.7	372.8	372.8	372.8
Valencia	364.5	414.5	400.5	385.2	434.9	416.2
Mean	371.8	537.4	490.7	427.9	605.9	562.3

Source: *El Sistema público de Servicios Sociales. Informe de Rentas Mínimas de Inserción.* Ministerio de Sanidad, Servicios Sociales e Igualdad.

Table 2. Adequacy and coverage rates (couple, 2 children)

Rank	Coverage rate, 2007		Adequacy rate, 2007		Coverage rate, 2013		Adequacy rate, 2013	
1	Basque Country	3.54	Basque Country	0.66	Basque Country	2.77	Basque Country	0.77
2	Asturias	1.08	Navarre	0.52	Navarre	1.16	Navarre	0.73
3	Cantabria	0.73	Aragón	0.50	Asturias	0.68	Aragón	0.61
4	Navarre	0.51	Asturias	0.48	Cantabria	0.61	Asturias	0.55
5	Galicia	0.38	Balearic Islands	0.46	Rioja	0.58	Balearic Islands	0.55
6	Murcia	0.36	Madrid	0.46	Aragón	0.51	Castile and León	0.52
7	Andalusia	0.29	Galicia	0.42	Castile and León	0.34	Catalonia	0.48
8	Madrid	0.26	Rioja	0.41	Galicia	0.33	Cantabria	0.48
9	Catalonia	0.24	Catalonia	0.41	Andalusia	0.32	Extremadura	0.48
10	Aragón	0.14	Castile and León	0.40	Catalonia	0.26	Canary Islands	0.47
11	Castile and León	0.14	Murcia	0.40	Madrid	0.23	Andalusia	0.45
12	Balearic Islands	0.11	Extremadura	0.39	Valencia	0.14	Madrid	0.43
13	Canary Islands	0.11	Andalusia	0.39	Canary Islands	0.12	Galicia	0.42
14	Valencia	0.09	Castile-La Mancha	0.37	Murcia	0.12	Murcia	0.40
15	Rioja	0.09	Cantabria	0.33	Balearic Islands	0.09	Castile-La Mancha	0.37
16	Extremadura	0.06	Valencia	0.33	Extremadura	0.08	Valencia	0.35
17	Castile-La Mancha	0.04	Canary Islands	0.33	Castile-La Mancha	0.05	Rioja	0.30

Table 3. Results of the synthetic index (couple, 2 children)

	2007				2013			
Region	(α = 0.25)	(α = 0.5)	(α = 0.75)	(α = 1)	(α = 0.25)	(α = 0.5)	(α = 0.75)	(α = 1)
Andalusia	0.00	0.03	0.07	0.11	0.00	0.05	0.10	0.15
Aragón	0.00	0.01	0.04	0.07	0.04	0.16	0.25	0.31
Asturias	0.67	0.57	0.54	0.53	0.12	0.26	0.33	0.38
Balearic Islands	0.00	0.01	0.03	0.05	0.00	0.00	0.02	0.05
Canary Islands	0.00	0.00	0.02	0.03	0.00	0.01	0.03	0.06
Cantabria	0.10	0.18	0.22	0.24	0.07	0.18	0.25	0.29
Castile-La Mancha	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.02
Castile and León	0.00	0.01	0.03	0.05	0.01	0.06	0.12	0.18
Catalonia	0.00	0.02	0.06	0.10	0.00	0.03	0.08	0.13
Extremadura	0.00	0.00	0.01	0.02	0.00	0.00	0.02	0.04
Galicia	0.01	0.06	0.11	0.16	0.00	0.05	0.10	0.14
Madrid	0.00	0.03	0.07	0.12	0.00	0.02	0.06	0.10
Murcia	0.01	0.05	0.10	0.14	0.00	0.01	0.02	0.05
Navarre	0.04	0.14	0.21	0.27	1.31	0.98	0.89	0.85
Basque Country	103.9	8.28	3.56	2.34	45.0	5.87	2.98	2.12
Rioja	0.00	0.00	0.02	0.03	0.03	0.10	0.15	0.18
Valencia	0.00	0.00	0.01	0.03	0.00	0.01	0.02	0.05

Table 4. Regional contribution to inequality, 2007 and 2013

	% Coverage		% Adequacy		% IMIP (α=1)	
Region	2007	2013	2007	2013	2007	2013
Andalusia	5.64	5.72	6.80	6.03	5.91	6.03
Aragón	7.06	4.21	1.49	1.47	6.61	4.42
Asturias	2.83	3.33	1.83	2.35	3.56	4.06
Balearic Islands	7.38	8.92	2.54	2.37	6.95	7.79
Canary Islands	7.49	8.37	13.88	4.75	7.38	7.64
Cantabria	3.64	3.61	13.13	4.70	4.71	4.58
Castile-La Mancha	7.08	5.55	6.16	3.28	6.91	5.62
Castile and León	8.68	9.90	8.92	11.57	8.01	8.79
Catalonia	6.02	6.41	5.28	4.59	6.11	6.33
Extremadura	8.20	9.11	6.51	4.70	7.66	8.11
Galicia	5.02	5.64	4.80	7.92	5.38	6.12
Madrid	5.88	6.79	2.71	7.08	5.83	6.78
Murcia	5.14	8.39	6.24	8.96	5.54	7.85
Navarre	4.41	2.09	1.13	0.19	4.58	2.34
Basque Country	0.00	0.00	0.00	0.00	0.00	0.00
Rioja	7.82	3.77	5.09	17.21	7.37	5.64
Valencia	7.70	8.20	13.49	12.85	7.50	7.90
Inequality (Gini)	0.63	0.54	0.10	0.13	0.70	0.63

Table 5. Regional contribution to changes in inequality, progressivity and re-rankings. 2007 and 2013

	Coverage			Adequacy			IMIP (α=1)		
Region	% Δ G	% V	%R	% Δ G	% V	% R	% Δ G	% V	% R
Andalusia	5.14	5.07	5.00	3.60	19.52	5.63	4.78	5.99	7.29
Aragón	24.71	17.22	10.20	1.40	-9.62	0.00	28.21	24.18	19.86
Asturias	-0.28	1.72	3.60	3.98	-27.24	0.00	-1.40	3.67	9.11
Balearic Islands	-2.13	1.14	4.20	1.82	-12.47	0.00	-1.38	0.53	2.58
Canary Islands	2.05	2.93	3.75	-23.92	253.01	11.35	4.78	2.63	0.31
Cantabria	3.86	4.00	4.14	-21.74	220.72	9.13	6.02	3.32	0.42
Castile-La Mancha	16.61	10.63	5.03	-5.78	106.93	8.57	19.61	13.19	6.30
Castile and León	1.08	0.52	0.00	19.91	-94.35	5.36	0.30	0.15	0.00
Catalonia	3.60	4.90	6.11	2.41	32.22	6.20	3.97	5.69	7.54
Extremadura	2.53	1.22	0.00	-0.98	58.61	6.61	3.19	1.65	0.00
Galicia	1.20	2.30	3.32	17.69	-67.21	6.88	-1.91	1.41	4.97
Madrid	0.27	3.51	6.55	20.83	-100.51	5.38	-3.64	2.63	9.36
Murcia	-15.01	-1.32	11.50	17.48	-65.32	6.94	-17.19	-1.87	14.60
Navarre	18.80	13.09	7.74	-2.77	19.00	0.00	26.67	18.21	9.11
Basque Country	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rioja	32.94	28.84	25.02	55.24	-185.01	24.64	24.47	16.80	8.57
Valencia	4.63	4.22	3.83	10.85	-48.29	3.31	3.53	1.83	0.00

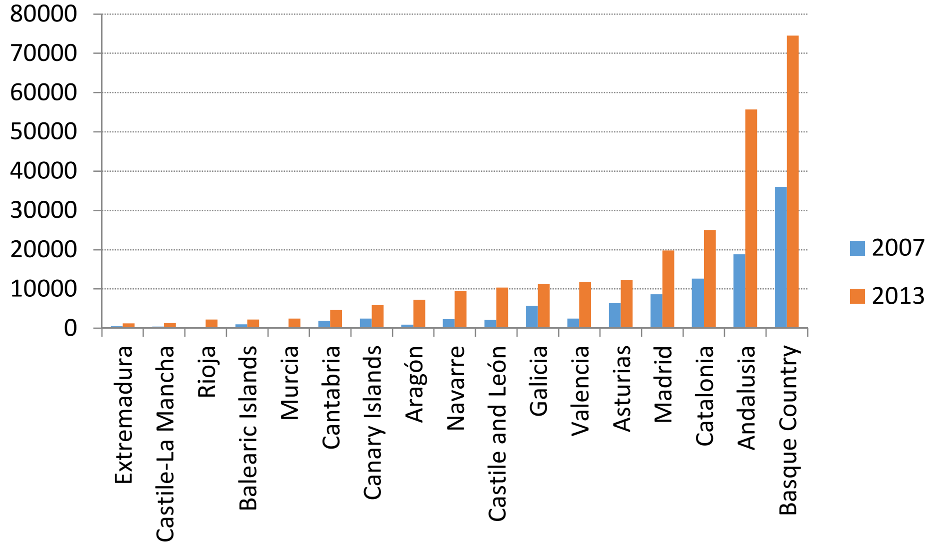
Table 6. Inequality and convergence in coverage and adequacy rates.

Indices	Non Anonymous	Anonymous
Inequality of coverage rates growth	0.275	0.143
Convergence of coverage rates	-0.184	-0.130
Inequality of adequacy rates growth	0.083	0.038
Convergence of adequacy rates	-0.002	0.031
Inequality of IMIP rates growth	0.265	0.144
Convergence of IMIP rates	-0.157	-0.121

Table 7. Convergence in coverage and adequacy rates with respect to related variables

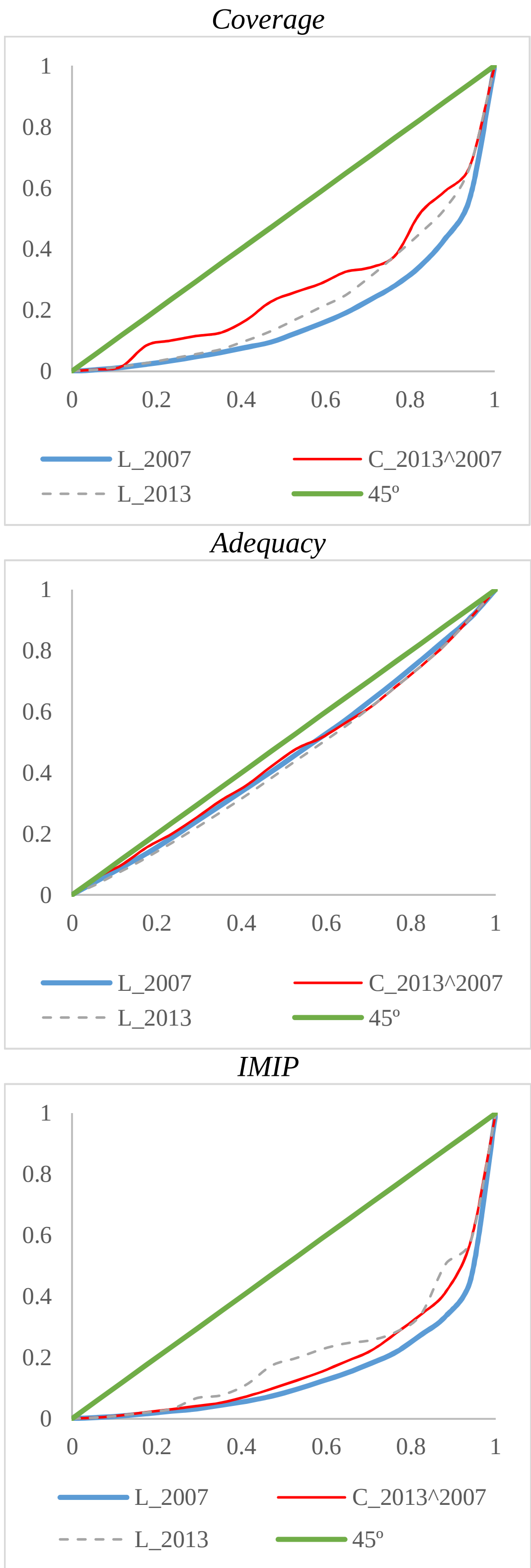
Convergence in:	Non Anonymous	Anonymous
Coverage growth with respect to level of adequacy	-0.0617836	-0.0984755
Adequacy growth with respect to level of coverage	0.0202176	0.0144007

Figure 1. Number of recipients in each region, 2007 and 2013



Source: *El Sistema público de Servicios Sociales. Informe de Rentas Mínimas de Inserción.* Ministerio de Sanidad, Servicios Sociales e Igualdad.

Figure 2. Lorenz and concentration curves for coverage, adequacy and the IMIP



Source:

Coverage rate:	G_{2007}= 0.63; G_{2013}= 0.54; V= 0.18; R=0.09
Adequacy rate:	G_{2007}= 0.10; G_{2013}= 0.13; V= 0.01; R=0.04
IMIP rate:	G_{2007}= 0.70; G_{2013}= 0.63; V= 0.12; R=0.06

Figure 3. Individual and Anonymous Growth Incidence Curves of regional coverage rates

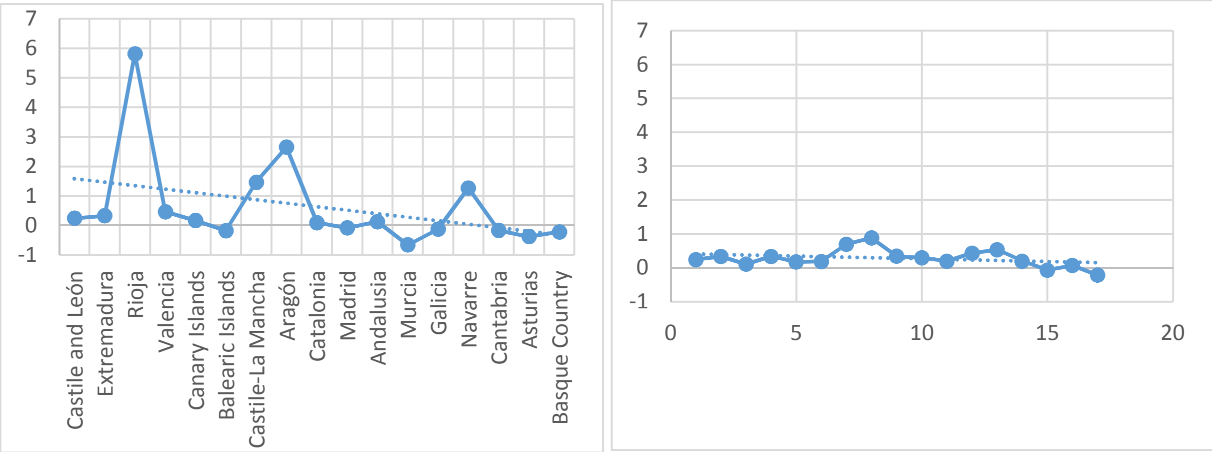


Figure 4. Individual and Anonymous Growth Incidence Curves of regional adequacy rates

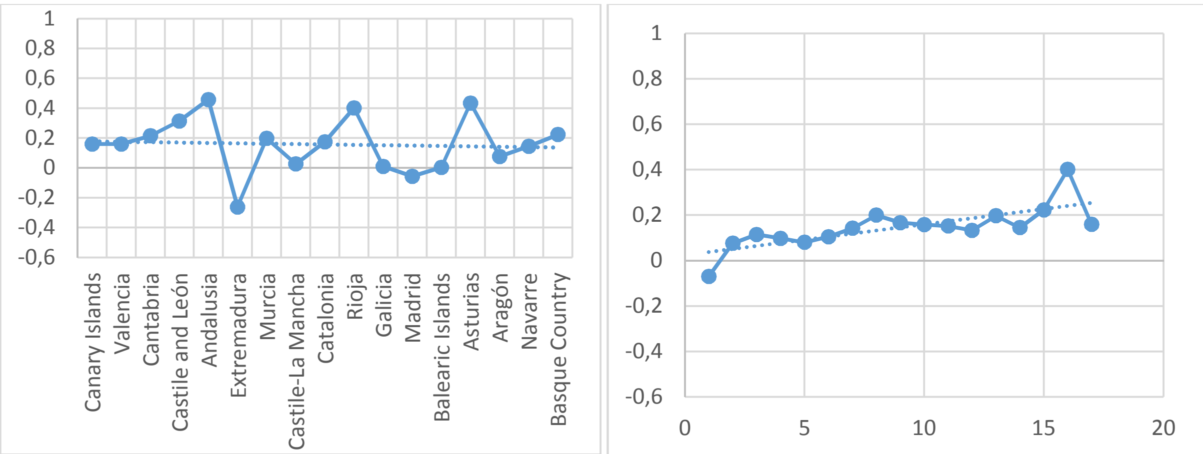


Figure 5. Individual and Anonymous Growth Incidence Curves of regional IMIP rates