Redistribution and Stabilization: A macroeconomic approach using microeconomic data[†]

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Abstract

This paper focuses on the study of the problems which arise when the redistribution and stabilization of the central government budget is carried out with aggregate data. Our point starts from the idea that the tax-benefit system is design at microeconomic level despite of having a microeconomic and a macroeconomic goal. Redistribution function reduces the structural income differences in order to get a more egalitarian income distribution. While stabilization is related to dynamic changes in the economic conditions, that is, changes in the expenses and the tax burden in response to income fluctuations, without taking into account the initial levels. Previous empirical literature is characterised by using aggregate regional data, which force them to assume that each region is integrated by a representative agent. We will show how aggregation introduces to biases. First, aggregation smoothes income differences and, consequently, biases downwards the redistribution and stabilization effect. Second, the potential redistribution or stabilization of the tax-benefit system is mixed with the initial income distribution within the region. To measure the magnitude of the biases, we exploit the Spanish microeconomic data provided by the European Union Household Panel (ECHP). The empirical analysis corroborates that aggregation underestimates the redistribution and the stabilization effect significantly.

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1. Introduction

The literature about the measurement of the functions of the Fiscal Policy was developed, basically in the nineties, when the repercussions of the creation of the European Monetary Union (EMU) were studied. The main goal of the empirical work[1] has always been the same: to characterise the role of the Public Administrations in the regional adjusting processes facing idiosyncratic shocks. Thus, regional aggregate data has been used and it has been assumed that the population in the region is characterised by a representative agent.

Our point starts from the idea that the tax-benefit system is design at microeconomic level despite of having a microeconomic and a macroeconomic goal. Almost all the taxes and benefits are designed at individual or household level. Thus, we believe that the microeconomic unit has to be used to measure redistribution or stabilization.

The work uses a common theoretical and econometric framework of the macroeconomic literature that tries to measure redistribution and stabilization between the regions. But instead of using macroeconomic data, the redistribution and stabilization function has been evaluated using microeconomic data (at a household level). The aim is to exploit the heterogeneity of the whole population and compare the results either with the same data when it is aggregated or with the available evidence at a macroeconomic level. In particular, the microeconomic information of the European Community Household Panel (ECHP, hereafter) for the Spanish population has been exploited.

The macroeconomic approach starts from the false premise that the tax-benefit system produces fiscal flows among regions in response to income differences. However, almost all the taxes and benefits are designed at individual or household level. Then, it is more convenient to analyse the stabilization and redistribution function at that level. The system is designed to reduce income differences between individuals and to smooth their income fluctuations along the time. Moreover, the macroeconomic level analysis has two biases. First, the aggregation reduces income differences, because those differences are smaller between regions than between households. And consequently,

[1] MacDougall (1977) anticipates the vast majority of the literature. During the nineties appear the contributions of Sala-i-Martín and Sachs (1992), Von Hagen (1992), Goodhart y Smith (1993), Pisani-Ferry, Italianer and Lescure (1993), Bayoumi and Masson (1995), Asdrubali, Sørensen and Yosha (1996), Mélitz and Zumer (2002), Duboz and Nicot (1998), Fatás (1998), Obstfeld and Peri (1998), Kauffmann and Laval (1999).

the measurement of the redistribution and stabilization effect is underestimated. Second, the results are conditioned by the own regional income differences and by the symmetry of their business cycles behaviour. That is, the same tax-benefit system may show a different redistributive[2] and stabilization capacity between regions depending on the regional discrepancies that tries to reduce.

Apart from the methodological issues, the results are especially relevant for Spain because the magnitude of the stabilization is much greater than previous studies report. That is a relevant fact in an economy where the stabilization through labour market (salaries and migrations) is small.

The paper proceeds as follows. In the next section the empirical works about redistribution and stabilization are revised. Section 3 is devoted to the data description and the methodological issues. The aggregate approach is criticized. Section 4 presents the results at microeconomic level and macroeconomic level using the Spanish data of the ECHP. Finally, section 5 concludes.

2. Related work

The main goal of the previous empirical studies has always been the same: to measure to what extend idiosyncratic shocks and regional income differences tend to be compensated with the fiscal policy, especially with the automatic stabilizer of the fiscal policy.

In the nineties, Sala-i-Martín and Sachs (1992) opened the debate of regional stabilization through the central government budget examining the separate responses of taxes and benefits to regional personal income in the US. The basic flow variables were expressed using constant prices and in *per capita* levels. Regional taxes, transfers, and incomes were defined as ratios of the corresponding national aggregates (*per capita*). After that, the natural logarithm of the variables had been taken. Finally, the income elasticity of the tax collection and the benefits of the Federal system for each region were estimated running a regression; where the dependent variable is the tax collection or the benefits of the central government of each region and the explanatory variable is the personal income. Although they ran separate regressions for each region, they

[2] Using microsimulation techniques and real data from UK and France, Spadaro (2005) shows how the same tax-benefit system may report a different effect when it is applied to different populations.

restricted the beta coefficient to be the same. The main critique was that their specification did not let to distinguish between redistribution and stabilization. Von Hagen (1992) avoided the problem turning to first differences to estimate the stabilization effect. The GDP were used instead of the personal income. Moreover, a dummy variable for each period of time was introduced rather than computing the ratio over the national *per capita* values. Methodologically, it was the first time that panel data econometrics analysis was conducted.[3]

In chronological order, the next study was carried by Bayoumi and Masson (1995), who were the first authors that distinguish between redistribution and stabilization. Redistribution was measured running the regression of the disposable income on the primary income. Both variables were computed as a ratio over the national level. The mean value over the period was taken to avoid the effect of the business cycle. The stabilization was measured following a similar equation, but instead of taking the average value they took the first difference of the time series.

Asdrubali et al. (1996) pursued a wider aim. A part from the estimation of the stabilization of the central government, they analysed the stabilization achieved by the capital and credit markets.

Starting from a more general expression, Mélitz and Zumer (2002) compared the results of the previous specifications using panel data econometrics, instead of running the equations separately for each region. Consequently, they forced the parameter that captures redistribution or stabilization to be equal for each region. Moreover, a dynamic equation was run to estimate the long run stabilization.

After them, most of the studies used similar specifications of the described above[4] using panel data econometrics, but it can be found other approaches in the literature. Pisani-Ferry et al. (1993) estimated the stabilization effect through a macroeconomic simulation model of one region inside a country (which is a monetary union). Then, the effects of a demand shock were simulated to obtain the stabilization provided by the government budget. Another example is Obstfeld and Peri (1998), who used a specification of bivariate autoregressive vectors to measure a dynamic adjustment. They

[3] Goodhart and Smith (1993) replicate Sala-i-Martín and Sachs (1992) and Von Hagen (1992) in order to extent the analysis to Canada and the UK.
[4] Decressin (2002) replicates the Bayoumi and Masson (1995), Obstfeld and Peri (1998) and Mélitz and Zumer (2002) for the Italian case.

used the same variables definition of Bayoumi and Masson (1995) but they took the logarithm of the variables. In addition, Fatás (1998) gave us another way to compute the stabilization as one minus the ratio of the standard deviation of the disposable income of the region over the standard deviation of the primary income.

In the Spanish case there were some attempts that replicate the methodology commented previously. First, Císcar (1992) following the specification proposed by Sala-i-Martín and Sachs (1992), but using panel data econometrics and incorporating fixed effects for each region and each period of time, estimates the stabilization of the Spanish regions. Alberola and Asdrubali (1997) use a more robust specification, and following the Asdrubali et al. (1996) methodology, estimated the stabilization of the consumption and income provided by the fiscal policy, the credit market and the labour market. In the line of Bayoumi and Masson (1995), De la Fuente (1999) and Lago (2001) analyse redistribution and redistribution and stabilization respectively. More recently, Bosch et al. (2002) extend their analysis to all the entries of the central government through the data of regional fiscal balance.[5] In spite of using the same specification used by Bayoumi and Masson (1995), this wider approach avoids the comparison of results with the previous Spanish studies. Capó and Oliver (2002a) started from a level equation with lags in the dependent and explanatory variable. After, they took first differences to obtain a dynamic relation that allows computing the stabilization effect in the short run and in the long run. In the same line, using Mélitz and Zumer (2002) specification, Capó and Oliver (2002b) evaluated the smoothing of the regional business cycles by the fiscal policy. In a second step (using the previous results) they proposed a fiscal mechanism of regional stabilization for the EMU.

However, the studies do not agree in the degree of stabilization and redistribution. There are several reasons that may explain the discrepancies: accounting differences; the use of the personal income instead of using the gross product; different definition of the disposable income, taxes or benefits; the period of time analysed, different specification and different method of estimation (panel data, individual estimation). Mélitz and Zumer (2002) explain how different methodologies and different definition of the variables can explain the wide range of redistribution and stabilization estimations.

[5] The assumptions that are necessary to compute the regional fiscal balance are not straight forward. And the methodological and statistical troubles forced to adopt compromise solutions. Moreover, the hypothesis that the fiscal balance only benefits to the households is implicit.

3. The proposed framework

The tax-benefit system plays two roles simultaneously. In one hand, it reduces the differences in the *per capita* income between the individuals. In the other hand, it smooths the income cycle variations. Thus, both functions (redistribution and stabilization) are closely related. Although it is possible to estimate them separately.

3.1. Redistribution

The redistribution function reflects the concern about equity and social cohesion. Thus, Fiscal Policy wants to compensate the structural divergences between individuals/regions equalizing the *per capita* income. The central government budget plays the role automatically. Taxes are colleted from individuals/regions with higher primary incomes (before tax and benefits), while transfers and benefits are given to those with relatively lower ones. The redistribution effect answers the following question: if an individual/region has a *per capita* income 10% below the national average, which is the difference with respect to the disposable income? For sure the answer will be less than 10%, which means that the redistribution effect of the Fiscal Policy tend to compensate the incomes differences.

There exist a wide methodological agreement about how to measure the redistribution [see Mélitz and Zumer (2002)]. The long run redistributive effect is measured by equation [1]. That is, the disposable income is regressed on the primary income before tax and transfers. Specially, a cross section of the mean values of the income over the period is used.

$$\overline{X}_{d,i} = \alpha_R + \beta_R \overline{X}_i + \mu_i \qquad \text{(i=1, 2, …, M)} \qquad [1]$$

Where M is the number of the i individuals[6]. $X_{d,i}$ is equal the natural logarithm of the relative disposable income, $Y_{d,i}/Y_{d,N}$; $Y_{d,i}$ is the gross disposable income *per capita* of individual i; $Y_{d,N}$ is the mean gross disposable income *per capita* of the population; X_i is equal the natural logarithm of the relative primary income, Y_i/Y_N; Y_i is the gross primary income *per capita* before taxes and benefits of the individual i; Y_N is the gross primary income *per capita* before taxes and benefits of the population; $\overline{X}_{d,i}$ y $\overline{X}_i$ are the

[6] Individuals can stand either for households or regions depending of the level of the aggregation.

averages over the period. Using a wide enough average of the period avoids the effect of short run business cycles; α_R is a constant; and μ_i is the error term. The redistribution value will be given by ($1-\beta_R$) and it shows the degree of the reduction of the income inequalities by the tax-benefit system.[7]

Nevertheless, the magnitude of the redistribution effect in the present paper has been computed with the equation [2]. Which measures the distance between the income of the individual and the national average as a percentage of the deviation, instead of taking the log of the ratio between individual income over the mean income.

$$\overline{Z}_{d,i} = \alpha_R + \beta_R \overline{Z}_i + \psi_i \qquad \text{(i=1, 2, …, M)} \qquad [2]$$

Where $Z_{d,i}$ stands for $\frac{Y_{d,i} - Y_{d,N}}{Y_{d,N}}$ and Z_i is defined as $\frac{Y_i - Y_N}{Y_N}$; $\overline{Z}_{d,i}$ and $\overline{Z}_i$ are averages over the period; α_R is a constant; and ψ_i is the error term, which is assumed to be normally distributed. The reason for the redefinition of the variables obeys to the extend that some households, specially those with only unemployed or retired people, do not perceive primary income at all and make impossible to compute the distance between the household income and the average income taking the logarithm of Y_i/Y_N. To solve the problem the formula $\frac{Y_i - Y_N}{Y_N}$ has been calculated.

From equation [2] is possible to quantify the redistributive effect of each of the fiscal instruments considered independently. Thus, the primary income is redefined as the disposable income plus the tax or minus the benefit considered in each case.

3.2. Stabilization

The stabilization function of the Fiscal Policy tries to cover macroeconomic objectives. Thus, the stabilization function concerns to the compensation by the public sector of the effects of the asymmetric fluctuations that suffer the individuals/regions. Stabilization is related with the dynamic changes in the economic conditions. Taxes and benefits

[7] Some studies such as Bayoumi and Masson (1995), Mélitz and Zumer (2002) and Decressin (2002) propose to estimate the equation [1] without taking the logarithm of the variables. In those cases, the parameter β_R reflects an average tax rate and redistribution will exist if and only if there was progressivity in the tax-benefit system. That only happens when the tax rate increases with the income, which in terms of equation 1 implies a positive α_R.

change in order to compensate cycle fluctuations without taking into account the initial levels of income. Thus, there is a second question to answer: if as a consequence of an asymmetric shock the primary income of an individual/region rise a 10% below the average growth, which is the difference in the increase of the disposable income? The expected answer is less than a 10%. The stabilisation can be computed by the comparison of these two values.

Following the specification in Capó and Oliver (2002a), the importance of the fiscal flows in the stabilisation of the individual/regional income has been estimated by an autoregressive model with distributed lags [ADL(1,1), see Davidson and MacKinnon (1993, pp. 682-684)] that captures the dynamic of the relation.

$$X_{d,it} = \alpha_{Ei} + \delta X_{d,i,t-1} + \beta_0 X_{it} + \beta_1 X_{i,t-1} + \varepsilon_{it} \qquad \text{(i=1, 2, …, M; t=1, 2, …, T)} \qquad [3]$$

Where the sub-index *t* stands for the year and there are *T* periods of time. α_{Ei} are the fixed effects or unobserved heterogeneity and ε is the error term, which is assumed to be normally distributed. All the variables are in relative terms with respect to the national average, which allows the distinction between long and short run effects.

Instead of using the equation [3] directly, it has been carried out a transformation that is closely related with the specifications that are found in the literature.

$$\Delta X_{d,it} = \alpha_{Ei} + \beta_0 \Delta X_{it} + (\delta - 1)\left[X_{d,i,t-1} + \frac{\beta_0 + \beta_1}{\delta - 1} X_{i,t-1} \right] + \varepsilon_{it} \qquad [4]$$

Finally, the expression that is estimated is given by equation [5], which is obtained from the equation [4] if the parameter are redefined.

$$\Delta X_{d,it} = \alpha_{Ei} + \beta_0 \Delta X_{it} + \gamma_1 X_{d,i,t-1} + \gamma_2 X_{i,t-1} + \varepsilon_{it} \qquad [5]$$

The short run stabilization will be given by $(1-\beta_0)$. That coefficient reflects how the tax-benefit system reduces the asymmetric shocks of the income instantaneously. And the expression $1 + \frac{\gamma_2}{\gamma_1}$ stands for the long run stabilization.[8]

[8] The long run stabilisation is obtained under the assumption that the contemporary value of the variable is equal the lagged value and assuming that the error term is cero. The long run elasticity of the disposable income with respect to the primary income will be given by $\frac{\beta_0 + \beta_1}{1 - \delta} = \frac{-\gamma_2}{\gamma_1}$, where γ_1 is the

The stabilization effect of each tax or transfer can be computed using equation [5], as it happened with the redistribution function. In order to do it, primary income must be defined as the disposable income plus the tax or minus the benefit that is going to be analysed.

3.3. Data

The Spanish data of the ECHP has been used for the empirical part of the work. The ECHP is a yearly survey conducted by Eurostat. It covers the period that goes from 1994 until 2001 and it interviews households belonging to the European Union (EU). It includes a wide range of topics and the harmonized questioner permits international comparisons easily. The ECHP is a panel, then the households are selected the first year and they are followed each year. Unfortunately, there is an attrition problem, which reduce the number of available observations each year (as it may be seen in table 1). Consequently, the ECHP is an unbalanced panel.

As it was previously commented, either GDP or personal income has been used to estimate the stabilization and redistribution effect. In the database there are only data about the sources of income of the personal income. No information about the GDP is available. But, the disaggregation in the sources of income allows computing the degree of redistribution and stabilization of each instrument of the tax-benefit system detailed in the database.

The household is selected as the unit of the microeconomic analysis. In the survey there is information about each of the adults of the households; but if we want to explore redistribution and stabilisation we consider more adequate[9] to use the household instead of the individual as the unit of our analysis. A first problem emerges: to transform the household incomes in comparable units. It is not possible to compare household incomes, with different sizes, without converting the incomes in equivalent incomes first. Following the proposal by Buhmann et al. (1988) the equivalence scale consist in the number of members of the household to the power of a coefficient *s*, where *s* takes

adjustment speed and it is always negative. The long run stabilization will be given by one minus the long run elasticity of the disposable income with respect to the primary income.

[9] It has to be taking into account that the Spanish tax-benefit system, as it happens with all the developed countries, redistributes income considering other characteristics apart from the individual income. One of the most important is the household composition.

values from 0 to 1. One the equivalence scale is computed, the equivalent incomes are obtained dividing the income over the equivalence scale[10].

Two variables are needed for the econometric estimation: disposable income and primary income. The disposable income is defined as the monetary income of the household once the taxes and social contributions have been paid and all the benefits/transfers have been received. The primary income is defined in a different way depending of the instrument that wants to be evaluated. Unfortunately, the database does not offer information about the direct taxes or the social contributions paid by the household[11]. Then, the study will be focus on the effects of the benefits. The primary income can be computed as the disposable income minus the benefits.

In table 1 the summary statistics of the income variables and each of the benefits are shown. Disposable income is always bigger than the primary income because taxes and social contributions are not included. Income rises each year due to the variables are in current euros and the Spanish economy was growing in such years. Three types of benefits must be distinguished: subsidies, pensions and "other benefits". The subsidies include unemployment benefits and social assistance to the family. Pensions are defined as retirement pensions, invalidity benefit and widow's pension. Finally, "other benefits" contain grants, housing benefits, fellowships… The mean of each benefit (conditioned to receive it) and the proportion of households who perceive it can be found in table 1 for each year. Around 60% of the households receive any type of benefit. The more frequent and substantial benefit are the pensions, which are perceived by almost the half of the households and represent and average income of 4,160 euros in 1994 and 6,133 euros in 2001[12]. After, the average subsidies are between 1,431 euros and 1,716 euros in 1994 and 2001 respectively. The proportion of households perceiving unemployment benefits decrease from the 20% in 1994 to 12% in 2001 because the Spanish economy was in an expansion and the unemployment rate decreased dramatically after the crisis

[10] If *s=1* the equivalent income is the result of dividing the household income over the number of members of the household (that is, the *per capita* income of each household). While if *s=0* the equivalent income is equal to the household income. In this study it has been chosen an intermediate value, *s=0.5*, although the results are similar to other values of *s*.

[11] In the data base there exists a variable that allows transforming the disposable income into gross income. But, as it is described in the database, this variable takes into account the withholdings instead of the effective taxes and social contributions. Moreover, in a lot of cases the variable comes from a computation and not from the information of the questionnaire. The average tax rate is very different than the one computed with Gladhispania, which is a Spanish microsimulation model for the direct taxation [see Oliver and Spadaro (2003)].

[12] The pensions has risen over the inflation in the period 1994-2001, specially the lower ones, as a consequence of the decision of the Government.

of 1993. Lastly, the "other benefits", with a mean around 600 euros, have a much smaller weight (between a 3% and a 7%).

It has to be stressed that Spanish households are bigger than other households of the EU[13]. There are two reasons that help to explain this phenomenon. In one hand, children take a longer time to live independently of their families. In the other hand, it is common that elder relatives live in the households with the family. As a consequence the ratio of households receiving any benefit (especially the pensions) is slightly above other EU countries.

The aggregation of the data is possible thanks to the variable NUTS, which is included in the database. The acronym is derived from the French name for the scheme, *nomenclature des unités territoriales statistiques*. The standard was developed by Eurostat for referencing the administrative division of countries. It has statistical purposes. There are three levels of NUTS defined. The more aggregate level is NUTS-1 and is what is offered in the ECHP. Spain is divided in seven regions, which correspond from one to four autonomous communities.[14] Table 2 collects some information about the name and composition of each NUTS, and a summary statistic of the income variables in each region. The richest region is Madrid with a mean income over 12,670 annual euros by equivalent adult of disposable income. It is followed by the region of the Northeast (Basque Country, Navarre, La Rioja and Aragon) and the region of the East (Catalonia, Valencia and Balearic Islands) with disposable incomes above 10,000 euros. Below the mean there are regions such as the Center (Castile-Leon, Castile-La Mancha and Extremadura), the South (Andalusia, Murcia, Ceuta and Melilla) and the Canary Islands, all of them with disposable incomes below 8,000 euros. The number of observations of each region is not constant and depends of the size of the region over the total population. The weights provided by the database had been taken into account in order to get the appropriate national and regional incomes.

3.4. Critiques to the aggregate approach

[13] The average hosehold size in the UE-15 is about 2.5 members while in Spain the average raises until 3 persons per private household as Eurostat reports in the late ninethies.

[14] The autonomous communities are enquired in the questionnaire, but unfortunately there is not the information in the database because the sample is not representative of the population at that level. In the year 2000 a wider survey was conducted to ensure the representativeness for each community but those data is only available for that year, preventing us from conducting a longitudinal analysis.

The tax-benefit system reduces the income differences between the individuals (or households) and reduces their income fluctuations. The system is not specifically designed neither to compensate the inter-region inequality nor to smooth regional cycles. So, the measure of the interregional redistribution and the stabilization undervalue the redistribution and stabilization effect of the tax-benefit system. Thus, macroeconomic approach of the measurement of the redistribution and stabilization of the fiscal policy starts from the wrong assumption that the tax-benefit system generates interregional flows when it produces flows among individuals/households. Moreover, the estimation of both functions presents two biases that distort the results: what we call the *aggregation bias* and the bias generated by the degree of the regional heterogeneity.

The biases and its importance may be explained by a simple example. Let us assume an economy with four individuals. Two of them, the rich, have an income 20% above the national average and the other two, the poor, have an income 20% below the average. In addition, let us assume that the tax-benefit system has a redistribution effect of 0.25 given the definition in section 3.1. Thus, the rich have a disposable income 15% above the average and the poor have 15% below it.

Let us see what will happen if the redistribution of the tax-benefit system was analysed form a macroeconomic point of view. Let us assume that the economy is divided in two regions, East and West, with a rich and a poor in each region. The mean income in each region will be equal to the national mean. Then, the estimated redistribution effect at a macroeconomic level will be cero. This extreme example shows how the redistribution effect decreases by the aggregation carried out in the macroeconomic approach because the income differences between the regions and the national mean are smaller than the differences between the individual differences and the national mean. At a macroeconomic level the relative income (defined as the income over the national average) is around one, while at a microeconomic level the relative income is spread in a wider range.[15] The redistribution effect measures in which proportion those differences are reduced when we are moving from primary income to disposable income, consequently aggregation decrease the magnitude of the redistribution.

Now, let us assume a different administrative division. There are two regions, North and South, that are composed by two individuals each one. The two rich are located in the

[15] In the ECHP, the relative primary income of the household goes from cero, in those household where the benefits are the only source of income, to 28, in the richer households.

North, while the two poor live in the South. In this case, the estimation of the redistributive effect is equal to 0.25 either at a microeconomic level or at a macroeconomic level. The average income in the North is 20% above the national mean, while the disposable income is just 15% above. In the same way, in the South the average income is 20% below the average, but the difference in the disposable income is 15% after the taxes and benefits. Then, the comparison of the results with the previous ones, when the population was divided between East and West, shows a different degree of redistribution (under the same tax-benefit system) depending on the magnitude of differences in the regional relative income.

The same biases arise in the measurement of the stabilization effect. The previous example is true when income is replaced by the differences in the income growth (see section 3.2 for details about the definition of the stabilization effect).

Both biases cause that the results obtained with the macroeconomic approach cannot be comparable when the level of aggregation differs. Consequently, international comparisons are hard to interpret because the aggregation level is different in each country. Moreover, as it is shown with the example, the results underestimate the redistribution function when there are a small regional income differences between the regions. Or similarly, the results underestimate the stabilization function when there are a similar dynamics between the regions; even though, the tax-benefit system is very redistributive at individual level. On the other hand, there are important difficulties comparing studies for the same country at different points in time because the tax-benefit system reforms are confused with the impact of the changes in the income inequality levels or the income variations at a regional level.

From a theoretical point of view, the way to avoid both biases would be measuring the redistribution and stabilization function using microeconomic data. In addition, this approach corresponds with the interpersonal nature of the fiscal flows through the tax-benefit system. However, serious empirical problems arise when the microeconomic data is used. In the measurement of the redistribution, there are households whose only source of income is benefits, and consequently, their primary income is cero. In such cases, it has been impossible to compute the distance between the household income and the national value as the logarithm of the ratio Y_i/Y_N (the logarithm goes to $-\infty$).

The problem has been solved by computing the difference as $\frac{Y_i - Y_N}{Y_N}$. Now, when the income is cero the deviation from the national level has a lower bound in –1.

Nevertheless, in the stabilization the problem intensifies and it cannot be solved changing the formula as before. The explanation is the following. There are households whose primary income is cero in one period, but not in the following period or *vice versa*. The reason is the following: there are people who change their status. They move from employment to retirement or unemployment. Or reversely, they find a job and stop receiving benefits. In such cases the variation computed as, $\Delta \log\left(\frac{Y_i}{Y_N}\right)$, goes from $-\infty$ to $+\infty$. The solution has been to add a small amount of money (0.01 euros) to avoid the problem with the incomes which are equal to cero. However, the temporal variations of the relative income ($\Delta X_{i,t}$) are very large in some cases, and consequently, the stabilization estimation is not comparable. The benefits received by a household may change dramatically from one period to another, while at a regional level are much more stable.[16]

4. Results

The analysis uses annual Spanish data from more than 7,000 households between 1994 and 2001. It has focus on the measurement of the redistribution and stabilization function of the benefit system using microeconomic data and the same data aggregated by regions. The results are detailed in tables 3 and 4.

4.1. Redistribution

The results show that the redistribution between households (through the benefits) is 0.44. Then, a household with an income 20% below the average ends with a disposable income 11.2% below the mean. The desegregation of the benefits reveals that the redistribution capacity is due almost exclusively through the pensions, with a magnitude of 0.416. While the income inequality reduction of the subsidies is only 0.04 and the

[16] Such observations can be classified as outliers from an econometric point of view. But from an economic point of view, they represent the cases where greater stabilization takes place and they cannot be ignored. For these reason, it is not convenient to drop them from the analysis.

other benefits is hardly 0.007[17]. The effect of the pensions is greater basically because its amount is greater and there are a bigger proportion of households which perceive it, as it is reflected in table 1.

These results are higher than those obtained by other studies using the same methodology but with aggregate data. There are two potential explanations that can explain this divergence: what we called the *aggregation bias* and the database itself. In order to distinguish between both effects the data has been aggregate (as it has been described in section 3.3.). And following the same methodology, the redistribution effect has been re-estimated using as unit of analysis the Spanish regions (defined by the level NUTS-1). The results show a strong reduction of the redistribution effect of the benefits. Now, the redistribution is 0.28, that is, a region with a primary income 20% below the mean ends with a disposable income 14.4% below the national average of disposable income (due to the benefits). As it happened at microeconomic level, the pensions still has the greater redistributive effect (0.246), followed by subsides (0.036); while the rest of the benefits ("other benefits") has a small impact on redistribution (0.004).

To sum up, the results show how the *aggregation bias* downwards the redistribution effect. However, the macroeconomic approach reports greater redistribution effects than in Capó (2008). He adopted the same methodology and estimates the redistribution using the regional accounting (SEC-05). He reported a redistribution effect of the benefits between the autonomous communities of 0.14. Then, the use of a different database and a different aggregate level also helps to explain the different results of the previous studies.

4.2. Stabilization

As it has been previously recognised, there are households who have an extreme value for the variation of their primary income. The existence of such households, distorts the empirical analysis from an econometric point of view, but not from an economic perspective. When a household moves from cero income to a positive amount or *vice versa*, because their members change their status (when they retire, when they become

[17] The coefficient β_R is very close to one, but it is still significantly different from one. Then, the redistribution effect is small but significant.

unemployment or they find a job) that causes a huge primary income variation (in relation with the disposable income variation), which produces that the measurement of the stabilization through the benefits is rather complicate to interpret and compare. Therefore, the stabilization estimation at a household level offers a stabilization effect close to one, while the effect at regional level is much smaller.

With respect to the smoothing of the regional cycles through the tax-benefit system, the results, which are produced with the aggregation in seven regions (NUTS-1), evidence a stabilization effect of 0.41 in the short run and 0.44 when dynamic is taken into account. Thus, a region which increases its income in a 5% below the average ends with a growth below 3% in terms of its disposable income. By benefits, the pensions are responsible of almost all the stabilization (0.35), followed by the subsidies (0.09) and the "other benefits" (0.02).

The results are above other Spanish studies using a similar methodology. The potential explanations are the followings. First, the present analysis only takes into account the benefits, and several studies argue that the pro-cyclical behaviour of the taxes and social contributions downwards the stabilization effect [see Alberola and Adrubali (1997), Lago (2002) and Capó (2008)]. Moreover, the microeconomic origin of the data may help to explain (at least partially) the results.

5. Conclusions

This paper focuses at the microeconomic level in the evaluation of the redistribution and stabilization function of the Fiscal Policy. All the previous studies have been done using macroeconomic data and considering the redistribution and the stabilization function as a regional phenomenon. However, the tax-benefit system tries to redistribute income between households at microeconomic level. Then, a microeconomic level analysis has been conducted. To do it, it has been necessary to use microeconomic data coming from the ECHP.

Moreover, the macroeconomic approach has two biases when measures redistribution and stabilization function with aggregate data. First, the *aggregation bias*, underestimates the redistribution and stabilization effect because the aggregate data has less heterogeneity than the microeconomic data, and consequently, the income

differences are smaller. Second, the distribution of the population among the regions can bias the results depending on the magnitude of differences in the regional relative income. Then, the international results or the results for a given country with a different aggregation or in a different point in time are not easily comparable, even if they use the same methodology.

Summarizing, the use of microeconomic data seems to be the better option to evaluate how the tax-benefit system reduce income inequalities. It can be done using panel data econometrics (as it has been done in this study) or using the standard microeconomic approach based in the Lorenz Curves, which uses indexes such as the Reynolds-Smolensky to measure the redistribution of a tax-benefit system.

Nevertheless, the macroeconomic approach to measure stabilization function suffers from the same biases previously commented. And the use of microeconomic data has some drawbacks due to the existence of households with a huge primary income variation. Consequently, more work has to be done in order to get a methodology, which captures stabilization, and it allows international comparisons.

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Table 1: Sample Characteristics of the Households

		Gross Income				Disposable income				All benefits		Unemployment Benefits		Retirement Pensions		Other benefits	
Year	n. obs.	mean	standard deviation	min	max	mean	standard deviation	min	max	mean	%	mean	%	mean	%	mean	%
1994	7,142	5,319	5,888	0	75,058	7,571	5,351	0	84,146	3,561	63.2%	1,431	20.1%	4,160	46.4%	519	6.8%
1995	6,449	5,557	5,803	0	60,942	8,003	5,447	0	109,101	3,939	62.1%	1,650	17.8%	4,537	46.7%	570	5.7%
1996	6,130	5,926	6,366	0	84,840	8,484	6,117	0	130,503	4,205	60.8%	1,723	15.1%	4,775	47.4%	624	5.3%
1997	5,714	6,023	6,643	0	74,183	8,714	6,162	0	94,906	4,402	61.1%	1,676	15.0%	5,006	48.0%	635	5.4%
1998	5,439	6,443	6,862	0	87,132	9,209	6,274	0	106,647	4,635	59.7%	1,593	14.2%	5,272	47.7%	587	4.6%
1999	5,295	7,089	7,320	0	97,595	9,953	6,735	0	114,272	4,934	58.0%	1,724	12.0%	5,494	47.9%	676	3.6%
2000	5,047	7,578	7,985	0	117,847	10,558	7,714	0	174,402	5,285	56.4%	1,903	10.2%	5,756	47.5%	1,542*	3.4%
2001	4,950	7,998	8,834	0	203,990	11,152	8,087	0	203,990	5,451	57.9%	1,716	12.4%	6,133	47.6%	625	3.6%

Notes: values are in annual euros per equivalent adult (where the equivalence scale is the squared root of the number of the members of the household). The first column of each benefit is the mean of the benefit conditioned to perceiving the benefit. And, the second column expresses the share of the population who is receiving that benefit.
(*) There is a household who perceives an amount of "other benefits" ten times bigger than any of the other households. However, dropping this household from the sample does not change significantly the results.
Source: ECHP and own calculation.

Table 2: Sample Characteristics of the Regions

Region	NUTS1	Autonomous Communities	n. of hh	weight	Gross income		Disposable income	
					Mean	Standard Deviation	Mean	Standard Deviation
Northwest	ES1	Galicia, Asturias, Cantabria	6,627	14%	5,736 €	1,191 €	8,833 €	1,531 €
Northeast	ES2	País Vasco, Navarra, La Rioja and Aragón	7,014	15%	7,594 €	1,390 €	10,331 €	1,644 €
Madrid	ES3	Madrid	4,170	9%	10,218 €	1,635 €	12,670 €	1,988 €
Center	ES4	Castilla y León, Castila-La Mancha, Extremadura	7,393	16%	5,185 €	1,099 €	7,738 €	1,314 €
East	ES5	Cataluña, Valencia, Baleares	10,160	22%	7,412 €	1,298 €	10,160 €	1,564 €
South	ES6	Andalucía, Murcia, Ceuta and Melilla	8,175	18%	5,231 €	938 €	7,555 €	1,041 €
Canary Islands	ES7	Canarias	2,843	6%	5,364 €	1,084 €	7,678 €	1,240 €
Total			46,382	100%	6,677 €	2,105 €	9,281 €	2,266 €

Notes: values are in annual euros per equivalent adult (where the equivalence scale is the squared root of the number of the members of the household). The variable *weight* expresses the weight of each region to build the national average.
Source: ECHP and own calculation.

Table 3: Household redistribution vs. Region redistribution

Dependent variable: percentage of deviation of the Disposable Income from the National average

Explanatory variable: percentage of deviation of the Gross income (= Disposable Income - Benefits)

	Households				Regions			
	All benefits	**Unemployment Benefits**	**Retirement Pensions**	**Other Benefits**	**All benefits**	**Unemployment Benefits**	**Retirement Pensions**	**Other Benefits**
β_R	0.5589	0.9573	0.5836	0.9932	0.7195	0.9643	0.7544	0.9958
	(160.93)	(704.04)	(163.96)	(917.31)	(15.02)	(81.57)	(13.34)	(621.83)
constant	-0.014	-0.001	-0.014	0.000	-0.001	-0.001	0.000	0.000
	(-4.39)	(-1.61)	(-4.49)	(0.16)	(-0.11)	(-0.54)	(-0.03)	(0.43)
Redistribution ($1-\beta_R$)	**0.441**	**0.043**	**0.416**	**0.007**	**0.281**	**0.036**	**0.246**	**0.004**
$N \cdot T$	46166	46163	46163	46163	56	56	56	56
N	8579	8579	8579	8579	7	7	7	7
R^2 adj.	0.7512	0.983	0.7581	0.9899	0.9715	0.9986	0.9617	0.9998

Notes: OLS estimations. t-ratios in parenthesis under the coefficients.

Table 4: Household stabilization vs. Region stabilization

Dependent variable: Δ ln (relative disposable income)

Explanatory variable: Δ ln (relative primary income)

	Households				Regions			
	All benefits	**Unemployment**	**Retirement Pensions**	**Other Benefits**	**All benefits**	**Unemployment Benefits**	**Retirement Pensions**	**Other Benefits**
β_0	0.0488	0.2848	0.049	0.7809	0.5882	0.9062	0.6532	0.9786
	(53.83)	(134.86)	(49.87)	(391.09)	14.25	25.6	18.34	65.98
γ_1	-1.052	-1.055	-1.051	-1.16	-0.5466	-0.8699	-0.5481	-0.9135
	(-206.21)	(-209.94)	(-205.87)	(-241.05)	-3.91	-6.16	-3.91	-6.05
γ_2	0.0479	0.3003	0.046	0.922	0.3052	0.7792	0.3664	0.8892
	(38.71)	(93.45)	(34.2)	(195.81)	3.59	5.58	3.84	5.89
Short term stabilization ($1- \beta_0$)	**0.9512**	**0.7152**	**0.951**	**0.2191**	**0.4118**	**0.0938**	**0.3468**	**0.0214**
Long term stabilization ($1+\gamma_2/\gamma_1$)	**0.9544**	**0.7154**	**0.9562**	**0.205**	**0.4416**	**0.1043**	**0.3315**	**0.0266**
N	36660	36656	36656	36656	49	49	49	49
R^2 adj.	0.574	0.6928	0.5693	0.9111	0.9204	0.9721	0.9484	0.9957

Notes: OLS estimations. t-ratios in parenthesis under the coefficients