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27 January 2016

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Andreas P. Kyriacou[1]**, Leonel Muinelo-Gallo**[2]**, Oriol Roca-Sagalés**[3]

[1] Departament d'Economia, Universitat de Girona, Campus de Montilivi, 17071, Girona, Spain (e-mail: andreas.kyriacou@udg.edu)

[2] Instituto de Economía de la Universidad de la República, Joaquín Requena 1375, Código Postal 11200, Montevideo, Uruguay (email: lmuinelo@iecon.ccee.edu.uy)

[3] Departament d'Economia Aplicada, Universitat Autònoma de Barcelona, Edifici B, Bellaterra 08193, Barcelona, Spain (e-mail: oriol.roca@uab.cat)

ABSTRACT

This article analyses the redistributive efficiency of public spending and taxation in a panel of 28 OECD economies during the period 1995-2010. In order to explore how redistribution is achieved through fiscal policies, a two-stage approach is applied. First, we evaluate the redistributive efficiency of public spending and taxation by using Data Envelopment Analysis (DEA) and obtain considerable variation in redistributive efficiency scores across countries. Second, we use panel regression analysis to identify the determinants of these differences and reveal the crucial role of factors capturing the capacity of public officials to design and implement redistributive policies, and political economy factors potentially affecting the redistributive profile of fiscal policies.

Key words: redistribution, fiscal policy, government efficiency, data envelopment analysis, panel data

JEL codes: E02, E62, H11, H53

Acknowledgements

The authors would like to thank the financial support from ECO2012-31081 (Ministerio de Economía y Competitividad - Spain), 2014 SGR 239 and XREPP (Direcció General de Recerca - Spain), as well as the project "Calidad de gobierno, gasto público social y financiamiento: impacto en la trayectoria de crecimiento económico de países de América Latina, 1950-2011" of the Comisión Sectorial de Investigación Científica – Universidad de la República - Uruguay. Kyriacou and Roca-Sagalés would also like to thank the School of Public Policy and Governance (University of Toronto) for their kind hospitality during July 2015. The authors would also like to thank Nicolás Bonino Gayoso of the Instituto de Economía de la Universidad de la República for DEA computational assistance in an earlier version of this article. The usual disclaimers apply.

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This article analyses the redistributive efficiency of public spending and taxation in a panel of 28 OECD economies during the period 1995-2010. In order to explore how redistribution is achieved through fiscal policies, a two-stage approach is applied. First, we evaluate the redistributive efficiency of public spending and taxation by using Data Envelopment Analysis (DEA) and obtain considerable variation in redistributive efficiency scores across countries. Second, we use panel regression analysis to identify the determinants of these differences and reveal the crucial role of factors capturing the capacity of public officials to design and implement redistributive policies, and political economy factors potentially affecting the redistributive profile of fiscal policies.

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1 Introduction

The fact that income inequality has generally been rising in both advanced and developing economies in recent decades (OECD 2008 and 2011; IMF 2014), coupled with the growing realization that inequality could be harmful for economic growth and development,[1] highlights the need for policies that can reduce inter-personal income differences. In this context, the redistributive potential of fiscal policies, both on the tax and spending sides, can play an important role.

The capacity of countries to deploy fiscal policies to reduce income differences faces important budgetary restrictions. Developing countries tend to have smaller public sectors and thus fewer fiscal resources available to address inequalities (Barreix et al. 2007; Goñi et al. 2011). And some developed countries have experienced an unprecedented increase in public debt in the context of the Great Recession of 2007-09, raising serious concerns about fiscal sustainability. Against this backdrop, many governments have been making substantial fiscal adjustments through a combination of spending cuts and tax hikes to reduce their ratios of debt to Gross Domestic Product (GDP). At the same time, public support for redistributive policies has grown, especially in advanced economies where the crisis has hit hardest (see, IMF 2014).

Because of increasing income inequalities and scarce budgetary resources, attention needs to be paid to the redistributive efficiency of fiscal policies: efficiency allows the attainment of a given level of redistribution at lower levels of spending and taxes, or the attainment of more redistribution at given tax and spending levels.

A range of studies have used Data Envelopment Analysis (DEA) to measure the efficiency of government spending, either total spending or spending in specific policy areas, in attaining a range of socio-economic objectives such as health and education outcomes (see, for example Gupta and Verhoeven 2001 and Afonso et al. 2005). A number of contributions have gone further by, moreover, examining a set of non-discretionary factors that may explain cross country differences in public sector efficiency.[2] Thus, Herrera and Pang (2005), Afonso and St. Aubyn (2006), St. Aubyn et al. (2009), Afonso et al. (2010) and Hauner and Kyobe (2010), use the DEA methodology to calibrate the efficiency of health, education or social spending in the pursuit of specific socio-economic objectives and then explain cross-country differences in government efficiency by way of factors which, they argue, are immutable in the short run.

In this article we focus on how efficient fiscal policies are in terms of redistribution and examine those variables which determine redistributive efficiency. Of course, different fiscal policies can have different objectives such as macroeconomic stability, public good provision, economic growth or redistribution. But regardless of their objective, public spending and tax policies may potentially impact on the distribution of income (see Woo et al. 2013 and IMF 2014 for surveys of empirical work). Our interest here is to apply DEA methodology, to examine the overall impact of fiscal policy on the distribution of income and specifically we aim to consider how efficient total spending and taxation (both over GDP) are in redistributing income. Having done so, we then aim to uncover those factors that might

[1]For economic channels through which inequality might be harmful for long term growth and development see Galor and Zeira (1993), Perotti (1996) and Dahan and Tsiddon (1998); for political-economy explanations, see Alesina and Rodrik (1994), Persson and Tabellini (1994), Benabou (2000 and 2005) and Glaeser et al. (2004). For surveys see Aghion et al. (1999), Halter et al. (2014) or Ostry et al. (2014).

[2] This two-step approach currently prevails in the DEA literature (see, Liu et al. 2013).

explain cross-country differences in the redistributive efficiency of fiscal policy based on panel truncated, OLS and bootstrap truncated regressions.[3]

We analyze the impact of public expenditure and taxes since both affect the distribution of income (see Martinez Vazquez et al. 2012; Wang et al. 2012 and 2014; Muinelo-Gallo and Roca-Sagalés 2013). Moreover, we consider the impact of fiscal policy on two measures of redistribution that exploit the difference between market inequality (before government transfers and taxes) and net income inequality (after government transfers and taxes) – measures that we fully explain below.

Our first stage results, based on the DEA analysis applied to a panel of 28 developed countries for the period 1995-2010, allow us to identify countries with similar spending and tax levels that obtain very different redistributive results signaling important differences in redistributive efficiency across countries. Moreover, our second stage results obtained from panel truncated and OLS regression analysis, points to the crucial role when explaining these differences of factors reflecting on the capacity of public officials to design and implement redistributive policies, as well as political demand and supply factors potentially affecting the redistributive profile of fiscal policies. The paper is structured as follows. After analyzing the redistributive role of fiscal policy in section 2, we explain the empirical methodology and the data in sections 3 and 4, discuss the results in section 5 and then conclude the article.

2 Fiscal policy and redistributive efficiency

Fiscal policy is the primary tool through which governments can affect the distribution and redistribution of income (Lambert 2001). Both tax and spending policies can alter this distribution, both over the short and medium term. The use of regression-based models to study the redistributive impact of fiscal policy has grown in recent years. A range of empirical studies have regressed measures of net income inequality on fiscal policy variables in order to explain their distributive impact. In this sense, it is possible to distinguish between two main groups of contributions. A first group discuss the impact of fiscal policies on income distribution in OECD countries and find a significant negative effect of government spending and taxes on inequality (for example, Muinelo-Gallo and Roca-Sagalés 2013) and an especially strong redistributive effect coming from transfers (OECD 2012) or specifically from public pensions (Huber and Stephens 2006 and Wang et al. 2012 and 2014). A second group of studies evaluates the distributive impact of different fiscal policies implemented in developing countries showing, in general, very weak effects (Chu et al. 2000 and 2004). Overall, these two lines of work show that the distributive impact of fiscal policies is strongly related to the level of economic development and to the specific spending and tax policies adopted.[4]

While this literature provides important insights into the impact of fiscal policies on income distribution, it does not evaluate the efficiency of these policies with regards to redistribution. Afonso et al. (2010) reports significant cross-country differences in the efficiency of social spending in reducing net income inequality. However, in order to evaluate redistributive efficiency, we cannot simply rely on net income inequality for several reasons. First, this variable measures inequality after redistribution has already taken place, and consequently it doesn't provide information on redistribution itself. Second, relying on net income inequality to account for redistributive effort ignores the possibility that the evolution of net inequalities

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[3] The use of panel data has been less frequent in this literature. The exceptions are Hauner and Kyobe (2010), Wolszczak and Parteka (2011) or Grigoli (2014).

[4] For a complete survey of this empirical literature see IMF (2014) and Ostry et al. (2014).

may also be due to changes in market income inequalities which, beyond fiscal policies, may occur because of globalization and technological change as well as other policies such as product and labor market regulation (OECD 2011). Thus, if we were to assess redistributive efficiency based exclusively on net income inequalities, this could lead us to assign changes in inequality exclusively to fiscal policy and ignore the possibility that these changes may also be due to the evolution of market income.

In this article, we take advantage of the recent income inequality database developed by Solt (2009, 2014) that combines information from available surveys to infer comparable series of Gini coefficients for market and net income inequality in an extended sample of countries and years. Specifically we employ Solt's (2014) relative and absolute redistribution measures which are obtained as the difference between the Gini coefficient for market and for net income (absolute redistribution), as well as expressing the prior difference as a proportion of the Gini coefficient for market income (relative redistribution).

Figure 1 about here

In order to illustrate the usefulness of these measures, figure 1 plots both redistributive variables against net income inequality using data from the economies included in our sample. It shows that economies with similar levels of net income inequality have very different levels of relative and absolute redistribution. For instance, Sweden and Slovenia in Group I, present net income Gini values close to 23 but very different levels of relative and absolute redistribution, stemming from the fact that Sweden has achieved greater reductions in market inequality. Specifically, market inequality in Sweden is much higher than that in Slovenia (47 versus 38). So obviously, Sweden has experienced a significantly larger change in the distribution of income than Slovenia. If we were to measure the redistributive impact of fiscal policy based on net income inequality, we could conclude that this is very similar. If instead we employ the relative or absolute redistribution indicator which also accounts for market inequality, we may observe substantial differences in the redistributive effect of fiscal policies. Similar examples include Germany versus Switzerland in Group II and Latvia versus Estonia in Group III.

3 Empirical methodology

In this section we detail the DEA methodology used to empirically evaluate the redistributive efficiency (absolute and relative) of fiscal policy, and then explain the empirical approach used to identify the non-discretionary determinants of this efficiency.

3.1 Data Envelopment Analysis methodology

Data Envelopment Analysis is a linear programming technique which identifies the optimal performance within a sample and computes efficiency scores by taking differences between observed and best practice decision making units (DMUs), in our case countries.

The DEA belongs to a range of nonparametric frontier methods.[5] With DEA, efficiency is defined with respect to a production possibility frontier, which indicates feasible output levels

[5] For more details on DEA techniques and analysis, see, for example, Farrell (1957), Charnes et al. (1978), Thanassoulis (2001), and Coelli et al. (2002).

given the amount of inputs employed. More specifically, economic efficiency is a combination of technical and allocation efficiency. The former indicates the competence with which inputs are transformed into valued outputs and the latter whether input use ensures a minimal cost for the given market prices. The current study is concerned with technical efficiency. Hence, it considers country governments as producers of one output (absolute or relative redistribution) by using two costly inputs: government expenditures and taxes.

The DEA methodology assumes the existence of a production possibilities frontier (an “envelope”) that defines which linear combination of observed input-output bundles are feasible. Assuming that the prices or multipliers $\overline{u_r}$ and $\overline{v_i}$ associated with r outputs (*y*) and j inputs (*x*) are known, the relative efficiency of unit or country i ($i = 1,...,n$) can be expressed as the ratio of the weighted outputs to the weighted inputs: $\frac{\sum_r \overline{u_r} y_{rj}}{\sum_j \overline{v_j} x_{jj}}$ However, as multipliers are unknown, Charnes et al. (1978) introduced a linear programming problem where the weights are not pre-assigned, but generated as a by-product of the statistical estimation process. The dual form of the original model is equivalent to the “output-oriented envelopment” program that aims to maximize the output production of each DMU (country) subject to a given input level. Analytically, the linear programming output-oriented problem to be solved for country *i* is as follows (see Afonso et al. 2013):

$$\begin{cases} \underset{\delta,\lambda}{Máx}\, \delta_i & (1.i) \\ \text{Subject to:} & \\ \delta_i y_i - Y\lambda \le 0 & (1.ii) \\ x_i - X\lambda \ge 0 & (1.iii) \\ n1'\lambda = 1 & (1.iv) \\ \lambda \ge 0 & (1.v) \end{cases}$$

We assume that there are k inputs and m outputs for n countries. For country i, y_i is the column vector of results and x_i is the vector of inputs. We can define X as the input matrix with dimensions ($k * n$), and Y as the output matrix with dimensions ($m * n$).

The “output-efficiency score” represented by δ_i is the optimal solution to this problem (see equation 1.i), a scalar that satisfies $1/\delta_i \le 1$, that measures the distance between country *i* and the efficiency frontier, defined as a linear combination of those observations with best practices in the sample. More specifically, it indicates the proportion in which output y_i needs to increase, for the DMU_i (or country i) to be located on the production possibility frontier. It is important to note that this method considers indicators of relative efficiency within the sample of individuals (in our case, countries) analyzed. If $1/\delta_i < 1$, the country is within the frontier (i.e. it is inefficient), while $\delta_i = 1$ implies that the country is on the efficiency frontier (i.e. efficient).

Equation (1.ii) stands for the "output constraint" indicating that the weighted sum of outputs from all DMUs (countries) in the sample must be greater than or equal to the potential output for DMUi given the "input constraint" shown by equation (1.iii).

The vector λ is a (n*1) vector of constants that measure the weights used to compute the location of an inefficient country if it were to become efficient, and $n1$ is a n-dimensional vector of 1 ones. The restriction $n1'\lambda = 1$ (equation 1.iv) imposes convexity on the frontier. Finally, it's important to mention that this problem is solved for each of the n countries for the purpose of obtaining *n* efficiency indicators.

When performing DEA analysis several decisions must be taken. One concerns the choice between an input or output orientation. Whereas an input-oriented model maintains the current level of output constant and minimizes inputs, an output-oriented model maximizes output given the amount of inputs. We choose the latter model because we are interested in assessing the redistributive efficiency of given levels of public spending and taxation. In other words, the frontier methodology applied in this study takes governments as producers combining two inputs (public spending and taxes) to obtain one output (measured through relative redistribution or absolute redistribution). Governments are considered more efficient if they produce a larger output for given inputs. The DEA methodology translates efficiency into "scores", and based on these scores, one can build ordinal rankings of a country's relative performance (Coelli and Perelman 1999). Another decision is whether to apply constant or variable returns to scale in the production function. The original applications of Charnes (1978) linear programming problem assumes Constant Returns to Scale (CRS), implying that all DMUs are operating at their technically most efficient scale and able to scale the inputs and outputs linearly without increasing or decreasing efficiency. Banker et al. (1984) was the first to incorporate variable returns to scale (VRS) to account for agents not operating at their optimal scale. In this way, the production frontier is kept with the observed efficiency peers only: that is, the DMUs which entail a closer reference for the one DMU under analysis. VRS allows countries to be compared to similar economies. We employ VRS since our inputs are ratio data and, as explained by Hollingsworth et al. (2003), in that case the model with the VRS constraint performs better.

3. 2 Analyzing the non-discretionary factors: a panel data approach

The DEA method assumes that output efficiency is purely the result of "discretionary inputs" and as such ignores the influence of "non-discretionary factors" or environmental variables which may also impact on efficiency. These are considered as non-controllable inputs because they cannot be directly manipulated by the producer but do influence the DEA estimates ($\hat{\delta}$). To account for this, we perform a second stage analysis where the DEA efficiency scores are regressed on a set of possible exogenous factors that might explain redistributive efficiency.[6]

[6] Other techniques imply first correcting the inputs and outputs by the effect of non-discretionary inputs and then applying a new DEA to the adjusted values. Also, there are different approaches to ensure the exogeneity of factors (see Simar and Wilson 2011, for an overview).

Thus, we undertake a parametric regression analysis, by regressing the estimated output efficiency scores $\hat{\delta}$, on a set of possible non-discretionary factors, *Z*:

$$\hat{\delta}_{it} = a + Z_{it}\beta + \varepsilon_{it} \quad (2)$$

Where i refers to the countries in the sample, t represents the time period, a is a constant, β is the vector of parameters assessing the influence of non-discretionary inputs or explanatory variables (Z_{it}) on efficiency, and ε_{it} is a statistical noise.

Following McDonald (2009) and Simar and Wilson (2000, 2007, 2011), the DEA efficiency scores are corner solutions meaning that they are truncated (with truncation at 1) to respect the bounded domain of efficiency scores and their true data generating process. A corner solution variable is continuous and limited from above and/or below, and takes the value of one of the boundaries with a positive probability. The authors argue that truncation reflects the accumulation of observations at 1 stemming from the way the DEA scores are computed. A score of 1 is just an estimated bound for the true (unobserved) efficiency, as even the best producers have room for improvement. Because of this, truncated regression provides consistent estimations in the second stage of our analysis.[7]

In relation to these non-discretionary factors, we include an indicator of government effectiveness, another capturing the importance of the shadow economy, country size (in terms of population), measures of market income and educational inequalities, the degree of ethnic fractionalization, the welfare regime in place and the logarithm of the GDP per capita (we justify the choice of these variables in section 4.3).

4 Data

In this section we elaborate further on the indicators employed to measure redistribution, and discuss the other variables included in the DEA and the subsequent panel regression analysis. We construct a balanced panel of 28 developed economies taking four-year periods from 1995 to 2010, basing our selection of countries and time period on the availability, frequency and quality of the data.[8] We follow the same 28 countries for the all period analyzed (1995 to 2010).

4.1 The DEA output variable: redistribution

Woo et al. (2013) explain the main limitations of the most widely used datasets on income inequality in the last decades namely, the Luxembourg Income Study (LIS) and the World Income Inequality Database (WIID) of the United Nations University (UNU-WIDER 2008): the first dataset suffers from low coverage (in terms of years and countries considered) and

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[7] For some scholars DEA scores are descriptive measures of technical efficiency with respect to an observed best-practice inferred from a sample (Hoff 2007; McDonald 2009; Ramalho et al. 2010).Therefore, the scores can be regressed by Ordinary Least Squares or other Maximum Likelihood specification like any other dependent variable. In any case, this approach and the one used in this article agree on the unsuitability of Tobit regressions, which wrongly take the concentration of DEA scores at 1 as reflecting a censoring mechanism.

[8] See appendix for the list of countries included (Table A.1), for the summary statistics (Table A.2), and for the sources of all the data employed (Table A.3).

reduced comparability across countries and years, while the second one is also hampered by the use of different income definitions.[9]

Considering this context, we take advantage of a recently updated cross-country dataset by Solt (2009 and 2014) that combines data from LIS and UNU-WIDER. This dataset, labeled SWIID, provides information on market and net income inequality in some 174 developing and advanced countries from 1960 to 2013. We restrict ourselves to a more reliable sub-sample of countries for which we have information on redistribution, government spending and taxation and also on the explanatory variables included in the second stage regressions. Specifically, we focus on a sample of 28 OECD countries and the four-year periods starting in 1995 and extending to 2010.[10]

As previously stated, our chosen variables for measuring redistribution are obtained as the difference between the Gini coefficient for market and for net income (absolute measure), and the same difference weighted on the Gini coefficient for market income (relative measure). Some scholars have measured redistribution in absolute terms taking just the difference between both Gini indicators (Kenworthy and Pontusson 2005, Wang et al. 2014 and 2012, Thewissen 2014), while others consider redistribution in relative terms arguing that the percentage reduction in inequality captured by the relative redistribution measure is a better reflection of redistributive effort (Bradley et al. 2003; Mahler and Jesuit 2006; Iversen and Soskice 2011; Huber and Stephens 2014). For the purpose of measuring the redistributive efficiency of fiscal policy we have used alternatively both measures as the output DEA variable, and obtained two different set of efficiency scores, which we use in the second stage regressions.

4.2 The input variables of the DEA

We include two input variables in the DEA namely, total public spending and total taxes, both as a percentage of GDP and taken from the Eurostat and OECD Statistics. It is important to remark that while the spending variable covers almost the totality of non-financial public expenditure, the tax variable represents a clearly lower percentage of total fiscal revenues because it does not include non-tax revenues.

Figures 2 and 3 about here

Figures 2 and 3 illustrate the relationship between both aggregate fiscal measures and relative and absolute redistribution respectively for our extended sample of 28 countries and show a clear positive relationship in both cases. This is as expected since, on the one hand, public expenditure includes a variety of social expenditures with distributive implications (cash transfers like pensions or in-kind transfers in the form of health and education spending) and, on the other hand, countries with higher tax burdens tend to have a more progressive tax structure. Of course, these figures are silent on the crucial issue of the redistributive efficiency of fiscal policies.

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[9] For different definitions of income concepts, see Lustig and Higgins (2012).

[10] More details on Solt's database may be found at: http://myweb.uiowa.edu/fsolt/swiid/swiid.html. Babones and Alvarez-Rivadulla (2007) explain some of the advantages of SWIID database while Jenkins (2014) provides a comparative analysis between the WIID and SWIID databases. It is important to note that for those few countries and years for which data is available for both data bases, the market and net income inequality measures employed in this article are very similar.

4.3 The non-discretionary variables for the regression analysis

We account for a range of non-discretionary factors that might explain redistributive efficiency differences across countries. One set of factors relates to what Afonso et al. (2010) call, “public sector technology” or, in other words, the restrictions faced by public officials who must design and implement redistributive policies. In this sense we include a variable from the World Governance Indicators labeled “Government Effectiveness” that describes “the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies” (Kaufmann et al. 2010, p. 4).[11] The basic argument is that an inefficient public administration implies poor design and implementation of policies (Rajkumar and Swaroom 2008) and consequently, we would expect countries with less competent bureaucracies to redistribute less for a given volume of resources employed towards this aim. Another variable potentially undermining the capacity of public officials to redistribute efficiently is the importance of the underground economy. A flourishing shadow economy may cause severe difficulties for politicians and public administrators, because official indicators (related to unemployment rate, income, etc.) may be distorted, and consequently fiscal policies based on erroneous indicators are likely to be ineffective (Schneider and Enste 2000). Moreover we account for population size (in logs) on the strength of the argument that larger countries may be more difficult to govern (Aristotle 1932; Treisman 2002).

Another set of factors affecting redistributive efficiency broadly stems from the structure of public spending and taxation. For a given volume of resources spent or taxed, the redistributive impact will depend on the specific tax and spending policies employed. Previous work has revealed that different spending and tax policies have different redistributive effects (measured in terms of either absolute or relative redistribution): for example, Wang et al. (2012, 2014) emphasize the redistributive impact of income tax and pensions and survivors benefits as well as social assistance in the form of disability and unemployment benefits while Huber and Stephens (2014) put the emphasis on unemployment benefits and transfers to single mother households.

From this perspective, we account for factors on both the demand and supply side of the political market for redistribution that may affect the distributive profile of spending and taxation. Thus, we control for market income inequalities because of the expectation that in democratic and more unequal societies the median voter will be relatively poorer and will demand more redistributive tax and transfer policies (Meltzer and Richards 1981; Milanovic 2000 and 2010; Ostry et al. 2014). Moreover, we control for ethnic heterogeneity since it has been argued that it may make agreement over tax and public spending decisions more difficult to reach because people may not be willing to transfer resources to people from “other” ethnicities (Alesina et al. 1999; Alesina and Glaeser 2004). Finally, we attempt to account for the possibility that, faced with demands for redistribution in the context of democratic states, wealthy elites employ their economic and political influence to undermine redistributive action by the state (Gupta et al. 2002; Rodríguez 2004; Acemoglu and Robinson 2008; Acemoglu et al. 2015). To account for elite influence, Acemoglu and co-authors employ a variable that measures land inequality. Unfortunately, this measure is not available for many of the countries included in our sample. Instead, we turn to educational inequalities under the

[11] We also employ a variable from the International Country Risk Guide (ICRG) database as developed by the Political Risk Services Group that measures the quality of the bureaucracy. Our results are robust to the use of this alternative measure. These, and all the results mentioned in the article but not reported, are available upon request.

assumption that an unequal distribution in education may be indicative of elite influence. Of course, education inequalities are likely to influence market inequalities, but the fact that we also include the latter in the regressions allows us to control for this potentially confounding effect.

Beyond these two sets of factors we also control for GDP per capita (in logs) in an attempt to account for the possibility that wealthier countries may enjoy a higher level of redistributive efficiency for a range of observable (but omitted) or unobservable non-discretionary factors related to development. Moreover, we further pursue the idea that redistributive efficiency depends on the redistributive orientation of spending and taxation by controlling for the welfare-state regime in place (see, Kammer et al. 2012). Specifically, we consider four different types of welfare regimes in our sample of countries according the characteristics of their tax and transfer systems based on the Joumard et al. (2012) classification which uses 19 policy indicators of the size, mix and progressivity of taxes and public expenditure. In short, they classify OECD countries into four groups or regimes, according to their tax and transfer systems. The first regime is characterized by large cash transfers to households (not dominated by old-age pensions) and by high tax to GDP ratios (with a large role for direct taxes).The second one features large cash transfers to households dominated by old-age pensions, and high tax to GDP ratios but with a marginal role of personal income tax. The third system presents relatively small cash transfers and taxes combined with a large role of property and personal income taxes. Finally, the fourth one is characterized by relatively low public spending (and dominated by in-kind services rather than in cash transfers) and consumption taxes play a dominant role in total taxes.[12]

5 Results

5.1 Redistributive efficiency

In table 1 and 2 we present the DEA efficiency scores obtained using two inputs (government expenditure and taxes) and one output, relative and absolute redistribution respectively for the four-year sub-periods.[13] The tables indicate that, in general, the country scores are slightly higher when using relative (as opposed to absolute) redistribution, and moreover country performances do not change radically through time. This said, it is also true that the DEA results differ using both indicators, as we detail next.

Table 1 about here

Focusing first on the DEA using relative redistribution, it is possible to observe from Table 1 that the Czech Republic, Sweden and Australia emerge as the most efficient countries in the sample since they are located very close to the efficient frontier during all the period, but also other Nordic European countries show very high scores (this would be the case of Finland, Norway, Denmark, Latvia and also the Netherlands). Interestingly, two of these countries (Australia and Latvia) are clearly above the average performer but using below average inputs (see, figures 2 and 3). Another set of countries is located on the opposite end (Estonia, Portugal, Italy, Greece and Spain and the United States and Estonia), with Bulgaria being by

[12] The seminal contribution identifying different types of welfare states is, of course, Esping-Andersen (1990).

[13] Efficiency scores have been computed using the DPIN (Decomposing Productivity Index Numbers) 3.0 software by O'Donnell (2010) and the EMS (Efficiency Measurement System) by Scheel (2000). Apart from the score, the DPIN measures "technical change" while EMS permits the identification of outliers.

far the worst performer. Table 1 shows that, on average, countries could have increased their redistributive efficiency by almost 20 percent using the same resources.

Table 2 about here

Table 2 shows the results when employing instead absolute redistribution as the output measure. The results are similar but not identical. Thus, Latvia, Sweden, Finland and Australia, still appear in the group of the most efficient countries, but the Czech Republic and Norway present much lower scores while Hungary and Germany take their place. On the other extreme, Bulgaria continues to be the least efficient country, and is accompanied by the same group of countries as before, with the only exception of Switzerland which now is very far from the efficient frontier.

These differences are explained by the fact that relative redistribution is weighted by initial inequality while absolute redistribution is not. While both indicators are useful to measure redistribution and, by extension, redistributive efficiency, arguably, the relative measure may be more appropriate since it provides a more complete indication of the change in redistribution produced by fiscal policies. To see this, consider the case of two countries with similar public spending and taxation relative to GDP that obtain a net income Gini 18 points below the market Gini. But while the first country goes from 53 to 35 (these numbers approximate the case of United Kingdom), the second country moves from 43 to 25 (Norway). Measuring redistribution in absolute terms would lead us to conclude that they have been equally effective in redistributing income. Employing relative redistribution however indicates that Norway redistributes more than United Kingdom (Norway 0.43, United Kingdom 0.35). In other words, a more unequal country (United Kingdom) will present a lower level of relative redistribution than a more equal country (Norway) even if the two countries implement redistribution policies that result in a similar reduction in income inequality (or absolute redistribution).

The results reported in Tables 1 and 2 suggest that, on the one hand, redistributive efficiency is very low in Bulgaria and relatively low in the Southern European countries and United States, and on the other hand, public spending and taxation redistributes income relatively efficiently in the Nordic and Central European countries as well as Australia.

5.2 Explaining redistributive inefficiencies via non-discretionary factors: a panel data analysis

Table 3 reports the results obtained using panel data truncated regressions of the estimated efficiency scores that appear in Table 1 on the non-discretionary factors presented in section 4.3. The panel regressions are performed with a truncation of the dependent variable (efficiency score) at 1, which excludes the “efficient units” with that score (see Simar and Wilson 2000, 2007, and 2011). For robustness purposes, in table 4 we report the results of OLS panel data.

The results reported in both tables confirm the expected effect of the non-discretionary factors. We find that redistributive efficiency increases with government effectiveness and decreases with shadow economies and population. This is consistent with the expectation that smaller countries with better quality public administrations and with smaller underground economies are better able to design and implement redistributive policies.

Tables 3 and 4 about here

Moreover, we find that market inequalities increase redistributive efficiency while ethnic fractionalization and educational inequalities reduce it. Again, this is in line with the expected effect of these variables on the redistributive orientation of public spending and taxation. Market inequalities imply a demand for more redistributive tax and transfer policies while ethnic heterogeneity implies the opposite. Educational inequality, as a proxy of elite influence, is associated with less redistributive efficiency, something which is consistent with the argument that economic elites in democratic countries may use their economic power to influence the suppliers of public policies with the aim of circumventing redistributive demands stemming from the electorate.

The results reported in columns 3, 4, 7 and 8 of both tables also indicate the relevance of welfare regimes for redistributive efficiency. Taking regime type number 4 as the base category, our findings suggest that redistributive efficiency increases in systems where large cash transfers dominated by old-age pensions, high tax to GDP ratios and a marginal role of personal income tax (regime type 2), while the positive effect is even stronger in regimes characterized by large cash transfers to households not dominated by old-age pensions and by high tax to GDP ratios, with a large role for direct taxes (regime type 1).

As can be seen in Table 4, changing the estimation method, something which implies a larger number of observations because OLS includes the “efficient units” or countries with an efficiency score equal to 1, does not alter our results and confirms the sign, magnitude and significance of the estimated coefficients.

We pursue the robustness of our results further in several ways. In particular, we control for an additional range of factors that can influence the redistributive orientation of fiscal policies. Thus we control for unemployment rates and demographic factors (in the guise of the percentage of population between 0 and 14 year old or above 65 years of age) under the assumption that this will capture public spending on education and pensions. We also control for proportional representation systems and the presence of presidential systems since Persson and Tabellini (2004) have explained that proportional electoral rules may create incentives to increase spending on universalistic redistributive programs while presidential systems should be associated with a reduction in such programs. We do not find any of these variables to have a statistically significant impact on redistributive efficiency, nor do they alter our results[14].

Finally, it is important to consider that because DEA is a data driven approach where the scores are obtained by an implicit data-generating process, it is convenient to analyze the sensitivity of the estimated efficiency scores to sampling variation (bootstrapping). More specifically, Simar and Wilson (2007) also state that DEA efficiency scores present two kinds of biases. One, because they are dependent on each other, so they are serially correlated in an unknown way. The other, because non-discretionary variables might be correlated to the error term through the relationship between non-discretionary inputs and the outputs used to estimate the scores. As both correlations tend to disappear asymptotically, the original estimator is applied to a bootstrap simulated sample by a truncated regression, producing estimates that imitate the sampling distribution of the original estimator and are valid to do inference. Bootstrapping involves repeated simulations of the data generating process (Simar and Wilson 1998 and 2000). Thus, as an additional robustness test, all the efficiency scores obtained in the first stage of our DEA analysis are corrected through this bootstrapping

[14] Results not reported.

procedure.[15] Then, in the second stage or regression analysis, the bias-corrected efficiency scores obtained for each of the four-year means over the period 1995 to 2010, are regressed on the non-discretionary explanatory variables using the truncated regression model. The panel bootstrap regressions are performed with a truncation of the dependent variable (efficiency score) at 1, which excludes the "efficient units". Bootstrapping is performed by taking 1000 withdrawals of residuals from a left-truncated normal distribution, and then re-estimating the truncated regression for each drawing. Employing this bootstrapping procedure does not change our second-stage regression results and confirms the sign and significance of the estimated coefficients.[16]

6 Conclusions

Theoretical and empirical work suggests that income inequality could have a negative impact on economic development. The redistributive potential of fiscal policy, both on the tax and spending sides, can therefore play an important role in both reducing inequalities and raising long-term growth. In the context of increasing income inequalities and scarce budgetary resources experienced by many countries, attention needs to be paid to the efficiency of fiscal policy in redistributing income. Efficiency alleviates budget constraints as it facilitates the attainment of greater levels of redistribution at given levels of spending and taxation. In this paper, we empirically evaluate the redistributive efficiency of aggregate public spending and taxation through the DEA methodology and we then use the efficiency scores obtained to analyze the determinants of cross-country variation in efficiency through panel regression analysis. Because fiscal policies have other objectives, it is important to state that we are not trying to evaluate the efficiency of the public sector beyond redistribution. Moreover it is worth pointing out that one limitation of the analysis undertaken in this article is that it does not capture all the policies that governments can use to redistribute beyond transfer and tax policies. For example, governments can also redistribute through labor regulations (minimum wages, retirement age, and affirmative action and gender policies).

Our first stage results – obtained through the DEA methodology and based on a panel of 28OECD developed countries for the period 1995-2010 – reveals important differences in redistributive efficiency across countries. Specifically we identify higher efficiency levels in the Nordic and Central European countries and Australia, while the Southern European countries and the United States display much lower levels of efficiency and consequently a greater scope for improvement. Moreover, our second stage results point to the crucial role when explaining redistributive efficiency differences across countries of factors reflecting on the capacity of governments to design and implement public policies, as well as variables affecting the redistributive profile of fiscal policies stemming from the demand and supply sides of the political market for redistribution.

[15] We employ two thousand bootstrap replications (for similar procedures see, also, Wolszczak-Derlacz and Parteka 2011 and Varabyova and Schreyögg 2013).

[16] Truncated regression allows us to take advantage of the bootstrap procedure and performs well in terms of confidence intervals coverage (see Simar and Wilson 2007). This empirical evidence, as well as the bootstrap Stata codes, are not present here, due to space constraints.

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Appendix

Table A.1 List of countries

Country Code	**Country**
Australia	AUS
Austria	AUT
Belgium	BEL
Bulgaria	BGR
Canada	CAN
Czech Republic	CZE
Denmark	DNK
Estonia	EST
Finland	FIN
France	FRA
Germany	DEU
Greece	GRC
Hungary	HUN
Ireland	IRL
Italy	ITA
Latvia	LVA
The Netherlands	NLD
New Zealand	NZL
Norway	NOR
Poland	POL
Portugal	PRT
Slovakia	SVK
Slovenia	SVN
Spain	ESP
Sweden	SWE
Switzerland	CHE
United Kingdom	GBR
The United States	USA

Table A.2 - Summary statistics

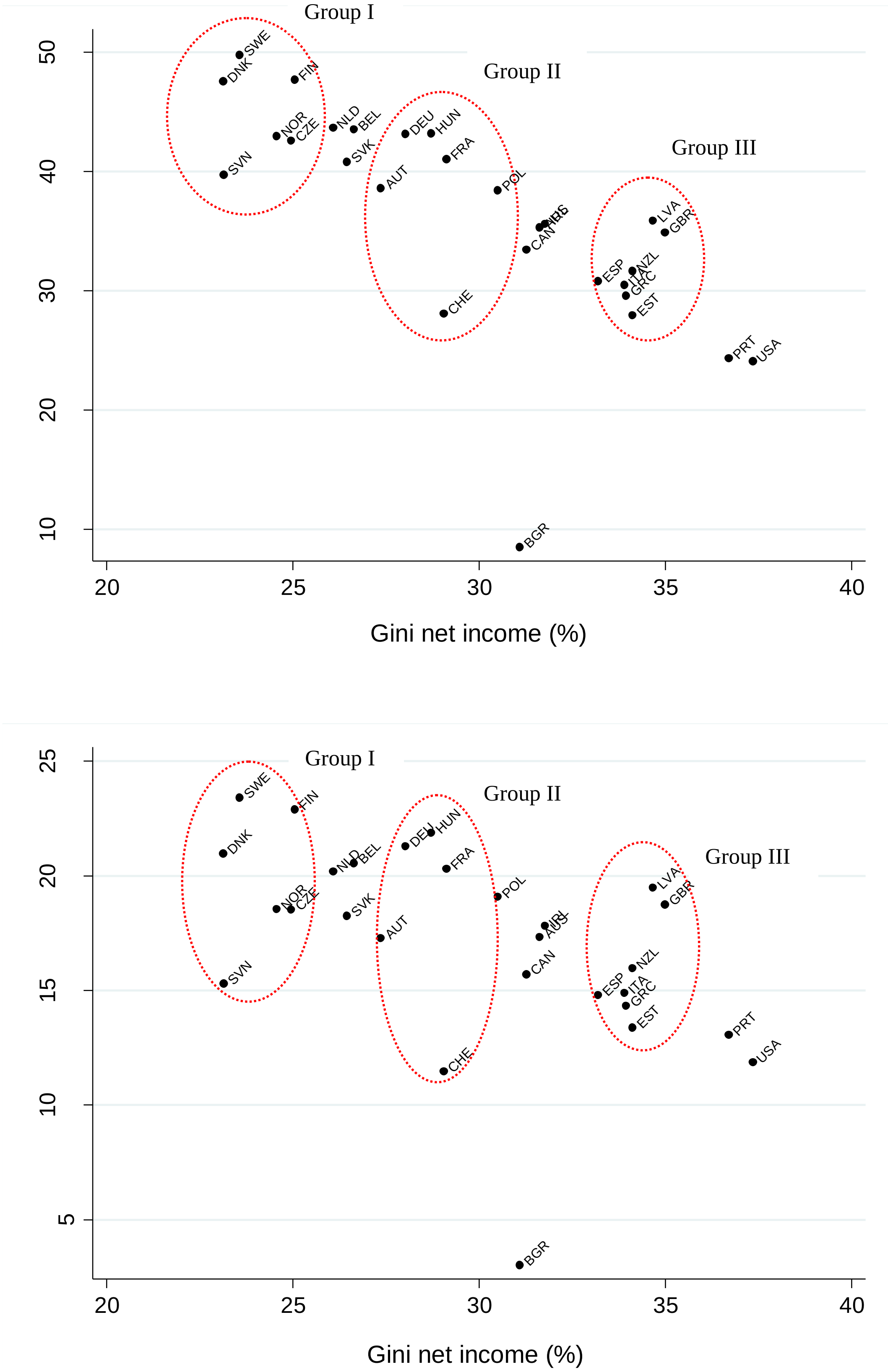
		Mean	Standard deviation	Minimum	Maximum	Observations
Redistribution Efficiency Score (Relative Redistribution)	Overall	0.837	0.182	0.058	1	N = 112
	Between		0.169	0.225	1	n = 28
	Within		0.072	0.524	1	T = 4
Redistribution efficiency Score (Absolute Redistribution)	Overall	0.790	0.192	0.045	1	N = 112
	Between		0.175	0.151	1	n = 28
	Within		0.083	0.422	1	T = 4
Relative Redistribution	Overall	36.196	9.331	2.040	54.358	N = 112
	Between		8.885	8.526	49.769	n = 28
	Within		3.202	22.658	51.386	T = 4
Absolute Redistribution	Overall	17.152	4.670	0.748	26.482	N = 112
	Between		4.262	3.030	23.416	n = 28
	Within		2.033	8.735	27.271	T = 4
Public Expenditure (over GDP)	Overall	36.260	5.886	26.244	48.275	N = 112
	Between		5.847	27.623	47.612	n = 28
	Within		1.176	32.129	41.254	T = 4
Public Taxes (over GDP)	Overall	44.372	6.327	32.600	60.350	N = 112
	Between		5.956	34.751	54.644	n = 28
	Within		2.350	39.141	54.216	T = 4
Education Inequality	Overall	15.240	7.009	2.624	33.198	N = 112
	Between		6.591	6.346	31.592	n = 28
	Within		2.620	8.097	24.690	T = 4
Ethnic Fractionalization	Overall	0.255	0.193	0.047	0.712	N = 112
	Between		0.196	0.047	0.712	n = 28
	Within					T = 4
Gini Market Income	Overall	46.979	4.762	32.152	58.532	N = 112
	Between		4.282	34.129	54.140	n = 28
	Within		2.199	38.616	55.752	T = 4
Gini Net Income	Overall	29.827	4.381	21.937	37.820	N = 112
	Between		4.292	23.130	37.347	n = 28
	Within		1.125	27.143	34.012	T = 4
Government Effectiveness (WGI)	Overall	1.378	0.611	-0.276	2.231	N = 112
	Between		0.605	-0.005	2.120	n = 28
	Within		0.130	0.879	1.743	T = 4
Log of per-capita GDP	Overall	10.094	0.480	8.781	11.042	N = 112
	Between		0.468	9.046	10.974	n = 28
	Within		0.134	9.700	10.430	T = 4
Log of Population	Overall	2.507	1.237	0.294	5.725	N = 112
	Between		1.253	0.313	5.666	n = 28
	Within		0.031	2.420	2.601	T = 4
Shadow Economy	Overall	19.519	6.974	8.100	37.300	N = 112
	Between		7.034	8.512	35.264	n = 28
	Within		0.708	16.955	21.555	T = 4
Welfare Regime_1	Overall	0.321	0.469	0	1	N = 112
	Between		0.476	0	1	n = 28
	Within					T = 4
Welfare Regime_2	Overall	0.301	0.420	0	1	N = 112
	Between		0.456	0	1	n = 28
	Within					T = 4
Welfare Regime_3	Overall	0.250	0.435	0	1	N = 112
	Between		0.441	0	1	n = 28
	Within					T = 4
Welfare Regime_4	Overall	0.143	0.351	0	1	N = 112
	Between		0.356	0	1	n = 28
	Within					T = 4

Table A.3 Data definitions and sources

Variable	*Definition*	*Source*
Gini Market Income	*Gini coefficient based on market income inequality.*	*Solt (2014)*
Gini Net Income	*Gini coefficient based on net income inequality.*	*Solt (2014)*
Relative Redistribution	*Market-income inequality minus net-income inequality, divided by market-income inequality.*	*Solt (2014)*
Absolute Redistribution	*Market-income inequality minus net-income inequality*	*Solt (2014)*
Government Effectiveness (WGI)	*Perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies*	*World Governance Indicators*
GDP per capita	*Real GDP per capita in logs (RGDPCNA, 2005 PPP$).*	*Penn World Table 8.1 database*
Public Expenditure	*Total Expense of general government as a share of GDP*	*Eurostat and OECD Statistics*
Public Taxes	*Public total taxes of general government as a share of GDP*	*Eurostat and OECD Statistics*
Education Inequality	*Gini index of education*	*Castelló and Doménech (2014)*
Ethnic Fractionalization	*The probability that two randomly selected individuals from a population belonged to different groups, computed as one minus the Herfindahl index of ethnolinguistic group shares.*	*Alesina et al. (2003).*
Population	*Population*	*World Development Indicators of World Bank (WDI)*
Welfare Regime	*Tax and transfer system*	*Joumard et al. (2012)*
Shadow Economy	*Includes all market-based legal production of goods and services that are deliberately concealed from public authorities*	*Schneider et al. (2010 and 2013)*

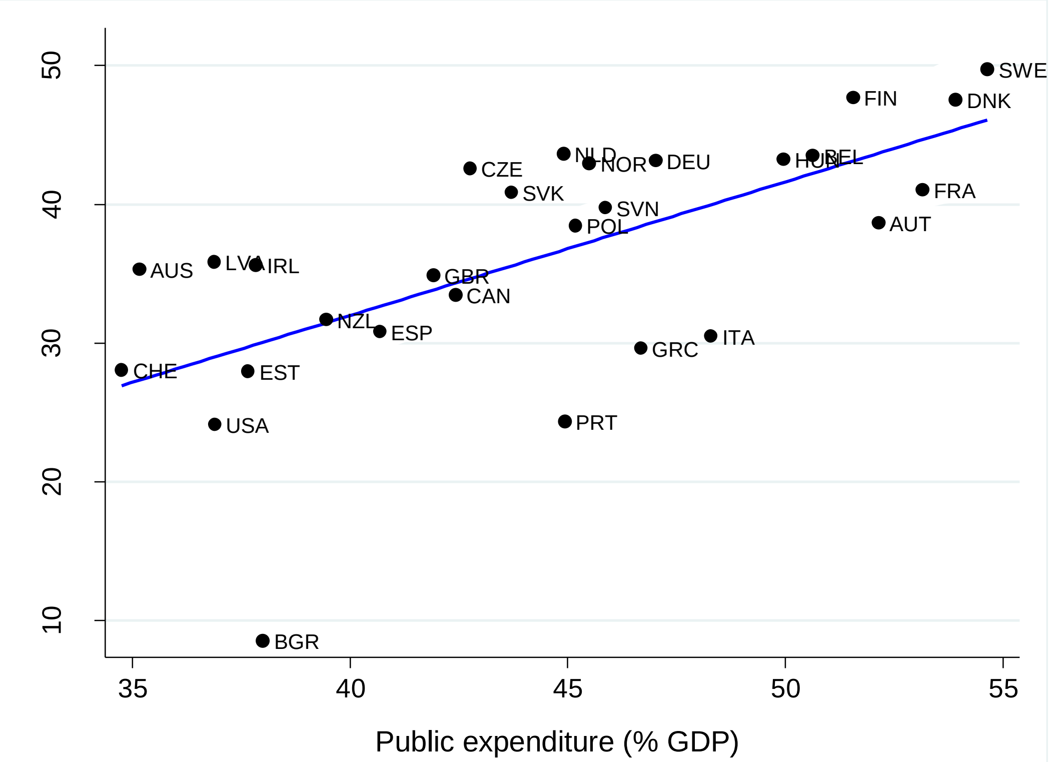
Tables and figures to be embedded in the text

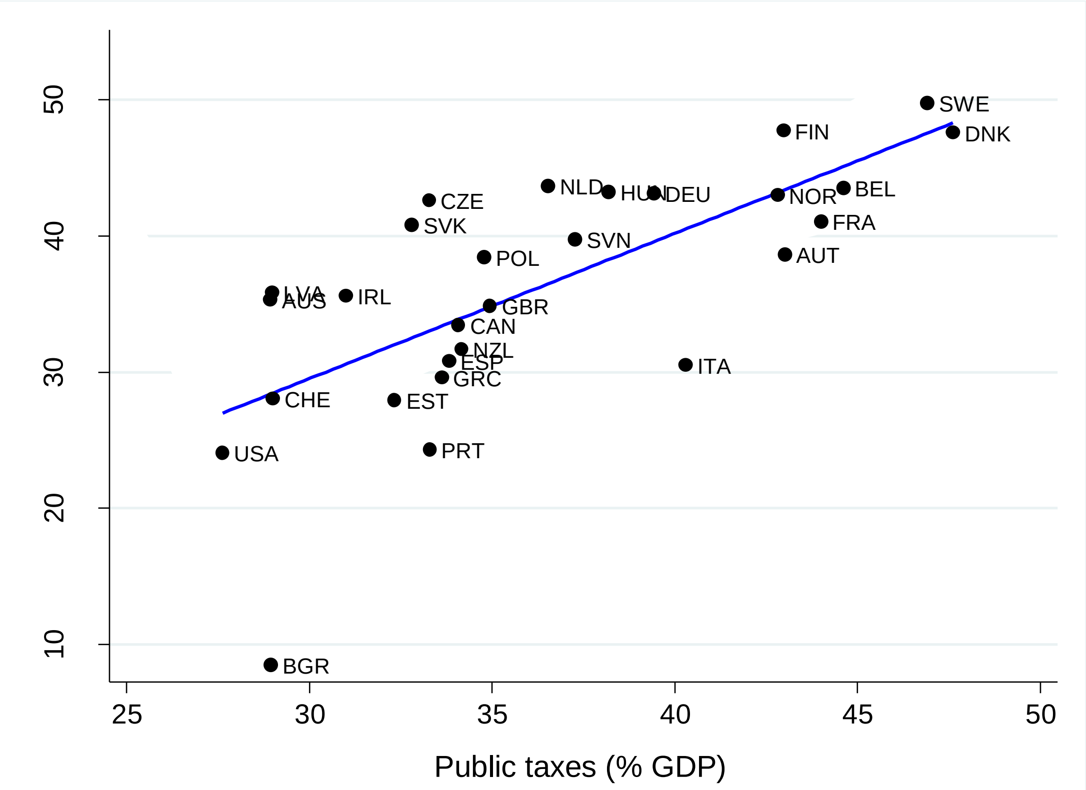
Figure 1 - Redistribution and net income inequality, by country (averages 1995 – 2010)



Source: Own elaboration based on Solt (2014).

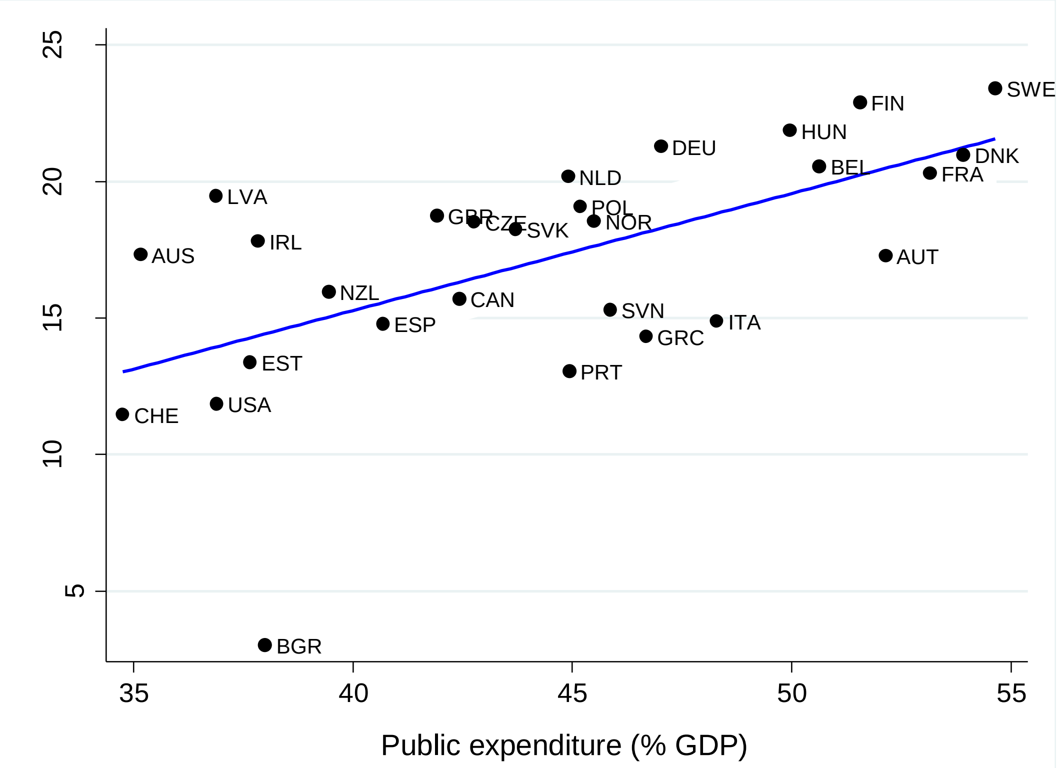
Figure 2 - Public expenditure, taxes and relative redistribution (1995 – 2010 average)

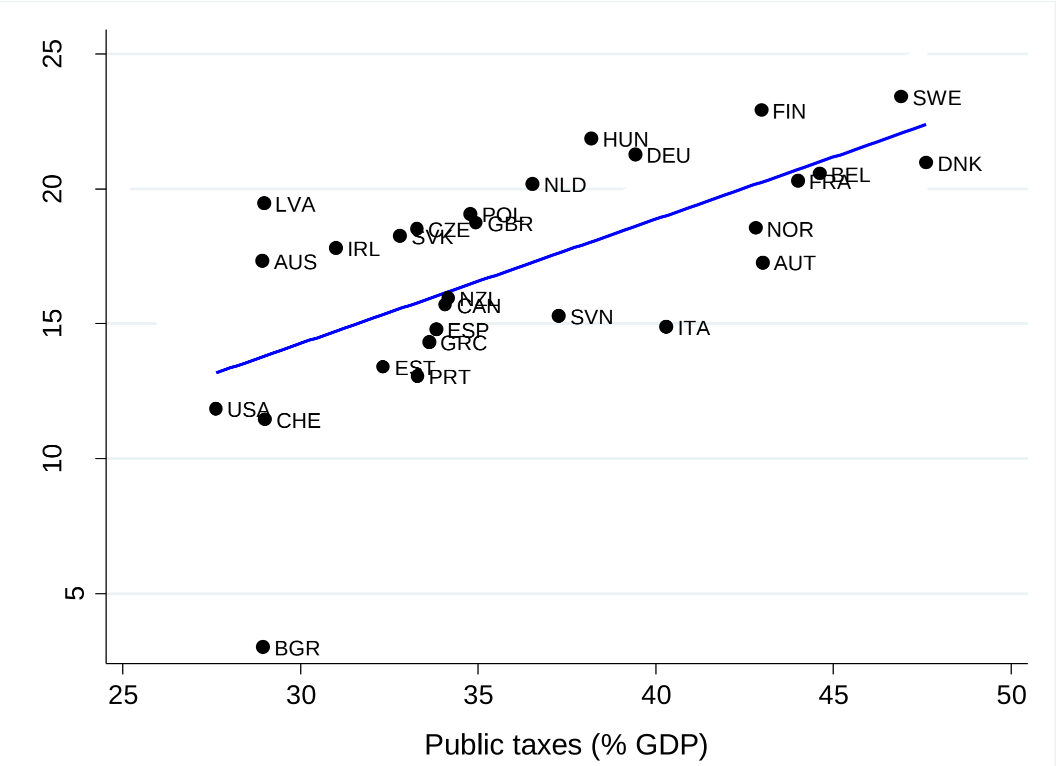




Sources: Own elaboration based on Solt (2014), the Eurostat and OECD Statistics

Figure 3 - Public expenditure, taxes and absolute redistribution (1984 – 2012 average)





Sources: Own elaboration based on Solt (2014), the Eurostat and OECD Statistics

Table 1 – Relative Redistributive efficiency by country (output oriented VRS TE)

	1995-1998		1999-2002		2003-2006		2007-2010		1995-2010	
Country	**Technical efficiency**	**Ranking**	**Technical efficiency**	**Ranking**	**Technical efficiency**	**Ranking**	**Technical efficiency**	**Ranking**	**Average Technical efficiency**	**Ranking**
Australia	1,000	1	1,000	4	0,938	13	1,000	5	**0,985**	**3**
Austria	0,739	19	0,873	16	0,843	19	0,741	24	**0,799**	**19**
Belgium	0,930	8	0,892	14	0,908	15	0,892	14	**0,906**	**13**
Bulgaria	0,058	28	0,350	27	0,386	28	0,106	28	**0,225**	**28**
Canada	0,798	17	0,748	21	0,805	22	0,787	20	**0,785**	**21**
Czech Republic	1,000	1	1,000	1	1,000	1	1,000	1	**1,000**	**1**
Denmark	0,874	14	1,000	1	1,000	1	0,946	10	**0,955**	**8**
Estonia	0,563	26	0,730	23	0,817	20	0,790	19	**0,725**	**23**
Finland	1,000	1	0,995	6	0,982	10	0,942	11	**0,980**	**5**
France	0,785	18	0,877	15	0,873	17	0,849	17	**0,846**	**16**
Germany	0,878	12	0,949	8	0,979	11	0,964	8	**0,943**	**10**
Greece	0,638	24	0,649	25	0,705	26	0,760	22	**0,688**	**24**
Hungary	0,893	11	0,944	10	1,000	1	0,912	12	**0,937**	**12**
Ireland	0,851	15	0,906	11	1,000	8	1,000	1	**0,939**	**11**
Italy	0,579	25	0,645	26	0,705	25	0,694	25	**0,656**	**26**
Latvia	0,937	7	1,000	3	1,000	7	0,964	7	**0,975**	**6**
The Netherlands	0,969	5	1,000	5	0,998	9	0,958	9	**0,981**	**4**
New Zealand	0,738	20	0,853	19	0,883	16	0,690	26	**0,791**	**20**
Norway	0,904	10	0,904	13	1,000	1	1,000	6	**0,952**	**9**
Poland	0,867	14	0,905	12	0,914	14	0,822	18	**0,877**	**15**
Portugal	0,382	27	0,252	28	0,745	24	0,878	16	**0,564**	**27**
Slovakia	0,913	9	0,947	9	1,000	1	1,000	1	**0,965**	**7**
Slovenia	0,849	16	0,872	17	0,948	12	0,895	13	**0,891**	**14**
Spain	0,718	21	0,737	22	0,772	23	0,768	21	**0,749**	**22**
Sweden	1,000	1	0,972	7	1,000	1	1,000	1	**0,993**	**2**
Switzerland	0,665	23	0,799	20	0,865	18	0,883	15	**0,803**	**18**
United Kingdom	0,949	6	0,864	18	0,805	21	0,752	23	**0,843**	**17**
The United States	0,699	22	0,661	24	0,698	27	0,652	27	**0,678**	**25**
Average	**0,792**	--	**0,833**	--	**0,877**	--	**0,844**	--	**0,837**	--

Note: *All results are based on one output (relative redistribution) and two inputs (public expenditure and public taxes).*

Table 2 – Absolute Redistributive efficiency by country (output oriented VRS TE)

	1995-1998		1999-2002		2003-2006		2007-2010		1995-2010	
Country	**Technical efficiency**	**Ranking**	**Technical efficiency**	**Ranking**	**Technical efficiency**	**Ranking**	**Technical efficiency**	**Ranking**	**Average Technical efficiency**	**Ranking**
Australia	1,000	3	0,922	8	0,813	17	1,000	3	**0,934**	**6**
Austria	0,658	21	0,844	16	0,768	19	0,669	25	**0,735**	**18**
Belgium	0,914	8	0,917	9	0,852	15	0,836	14	**0,880**	**10**
Bulgaria	0,045	28	0,218	28	0,244	28	0,096	28	**0,151**	**28**
Canada	0,756	16	0,722	19	0,734	22	0,726	20	**0,735**	**19**
Czech Republic	0,888	10	0,864	14	0,894	9	0,867	13	**0,878**	**12**
Denmark	0,774	15	0,945	7	0,926	7	0,893	9	**0,885**	**9**
Estonia	0,483	26	0,681	21	0,739	21	0,721	23	**0,656**	**23**
Finland	1,000	1	1,000	1	0,936	5	0,910	7	**0,962**	**3**
France	0,784	14	0,908	11	0,866	13	0,899	8	**0,864**	**14**
Germany	0,827	13	0,980	5	0,972	3	0,983	6	**0,941**	**5**
Greece	0,649	22	0,651	24	0,639	26	0,730	19	**0,667**	**22**
Hungary	0,967	5	1,000	3	1,000	1	0,875	12	**0,961**	**4**
Ireland	0,848	11	0,787	18	0,926	6	1,000	1	**0,890**	**8**
Italy	0,559	24	0,654	23	0,698	23	0,686	24	**0,649**	**24**
Latvia	0,957	6	1,000	1	1,000	1	1,000	1	**0,989**	**1**
The Netherlands	0,912	9	0,950	6	0,912	8	0,882	11	**0,914**	**7**
New Zealand	0,683	20	0,850	15	0,879	12	0,654	26	**0,767**	**17**
Norway	0,749	18	0,796	17	0,884	11	0,892	10	**0,830**	**16**
Poland	0,924	7	0,895	12	0,888	10	0,774	17	**0,870**	**13**
Portugal	0,357	27	0,223	27	0,797	18	0,987	5	**0,591**	**27**
Slovakia	0,837	12	0,915	10	0,860	14	0,808	15	**0,855**	**15**
Slovenia	0,626	23	0,671	22	0,740	20	0,721	22	**0,690**	**21**
Spain	0,754	17	0,690	20	0,672	24	0,726	21	**0,711**	**20**
Sweden	0,990	4	0,980	4	0,955	4	1,000	4	**0,981**	**2**
Switzerland	0,507	26	0,591	26	0,664	25	0,735	18	**0,624**	**26**
United Kingdom	1,000	1	0,891	13	0,830	16	0,793	16	**0,879**	**11**
The United States	0,732	19	0,599	25	0,596	27	0,622	27	**0,637**	**25**
Average	**0,756**	--	**0,791**	--	**0,810**	--	**0,803**	--	**0,790**	--

Note: *All results are based on one output (absolute redistribution) and two inputs (public expenditure and public taxes).*

Table 3 –Truncated model results (dependent variable: output efficiency scores)

	Technical Efficiency Scores of Relative Redistribution				Technical Efficiency Scores of Absolute Redistribution			
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Government Effectiveness (WGI)	0.232*** (0.044)	--	0.141*** (0.038)	--	0.180*** (0.032)	--	0.126*** (0.029)	--
Shadow Economy	--	-0.015*** (0.003)	--	-0.008*** (0.003)	--	-0.012*** (0.002)	--	-0.008*** (0.003)
Log of Population	-0.069*** (0.019)	-0.091*** (0.025)	-0.044*** (0.012)	-0.053*** (0.013)	-0.038*** (0.015)	-0.055*** (0.017)	-0.025*** (0.009)	-0.033*** (0.010)
Gini Market	0.023*** (0.005)	0.026*** (0.006)	0. 026*** (0.003)	0.028*** (0.004)	0.031*** (0.004)	0.033*** (0.005)	0.036*** (0.003)	0.037*** (0.003)
Ethnic Fractionalization	-0.375*** (0.124)	-0.327*** (0.138)	-0.191** (0.097)	-0.177* (0.105)	-0.339*** (0.088)	-0.327*** (0.095)	-0.142** (0.067)	-0.148** (0.073)
Education Inequality	-1.526*** (0.336)	-1.420*** (0.390)	-1.965*** (0.272)	-1.916*** (0.309)	-1.195*** (0.234)	-1.025*** (0.260)	-1.562*** (0.183)	-1.434*** (0.211)
Log of per-capita GDP	0.001 (0.023)	0.051** (0.026)	-0.025 (0.017)	0.005 (0.046)	-0.057 (0.045)	-0.012 (0.019)	-0.084*** (0.015)	-0.036 (0.034)
Welfare regime_1	--	--	0.318*** (0.065)	0.354*** (0.078)	--	--	0.267*** (0.050)	0.284*** (0.059)
Welfare regime_2	--	--	0.191*** (0.056)	0.174*** (0.070)	--	--	0.202*** (0.041)	0.155*** (0.052)
Welfare regime_3	--	--	0.006 (0.057)	-0.011 (0.083)	--	--	0.017 (0.044)	-0.017 (0.064)
Log-likelihood	*88.130*	*81.544*	*105.344*	*101.558*	*92.958*	*77.740*	*115.111*	*102.806*
Observations	*89*	*89*	*89*	*89*	*100*	*100*	*100*	*100*

Notes: Standard Errors in parentheses. *, **, *** measures statistical significance at the 10, 5 and 1% levels respectively. All regressions include a constant (not shown).

Table 4 –OLS model results (dependent variable: output efficiency scores)

	Technical Efficiency Scores of Relative Redistribution				Technical Efficiency Scores of Absolute Redistribution			
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Government Effectiveness (WGI)	0.121*** (0.021)	--	0.110*** (0.025)	--	0.135*** (0.020)	--	0.128*** (0.023)	--
Shadow Economy	--	-0.008*** (0.002)	--	-0.008*** (0.002)	--	-0.008*** (0.002)	--	-0.009*** (0.002)
Log of Population	-0.043*** (0.010)	-0.055*** (0.010)	-0.039*** (0.008)	-0.046*** (0.009)	-0.030*** (0.009)	-0.041*** (0.010)	-0.024*** (0.008)	-0.031*** (0.008)
Gini Market	0.016*** (0.002)	0.016*** (0.002)	0. 021*** (0.002)	0.021*** (0.002)	0.026*** (0.002)	0.025*** (0.002)	0.030*** (0.002)	0.030*** (0.002)
Ethnic Fractionalization	-0.190*** (0.059)	-0.191*** (0.061)	-0.064 (0.055)	-0.066 (0.057)	-0.237*** (0.054)	-0.243*** (0.059)	-0.119** (0.051)	-0.127** (0.054)
Education Inequality	-1.134*** (0.167)	-0.991*** (0.171)	-1.491*** (0.150)	-1.294*** (0.160)	-0.953*** (0.154)	-0.801*** (0.165)	-1.257*** (0.138)	-1.045*** (0.151)
Log of per-capita GDP	0.023* (0.012)	0.056*** (0.011)	-0.011 (0.011)	-0.047 (0.048)	-0.033*** (0.011)	0.004 (0.011)	-0.062*** (0.010)	-0.023* (0.012)
Welfare regime_1	--	--	0.206*** (0.066)	0.186*** (0.043)	--	--	0.170*** (0.036)	0.170*** (0.041)
Welfare regime_2	--	--	0.197*** (0.036)	0.134*** (0.043)	--	--	0.153*** (0.033)	0.089** (0.041)
Welfare regime_3	--	--	0.049 (0.038)	-0.008 (0.051)	--	--	0.013 (0.035)	-0.038 (0.049)
Adjusted R-squared	*0.566*	*0.543*	*0.705*	*0.681*	*0.668*	*0.615*	*0.767*	*0.742*
Observations	*112*	*112*	*112*	*112*	*112*	*112*	*112*	*112*

Notes: Standard Errors in parentheses. *, **, *** measures statistical significance at the 10, 5 and 1% levels respectively. All regressions include a constant (not shown).