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Income Inequality & Redistributional Spending: An Empirical Investigation of Competing Theories

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Abstract

The link between income inequality and governmental redistribution is still subject to intense research and debate. Starting with the median-voter-hypothesis, a plethora of theoretical models have been developed during the last three decades to identify and explain possible causal relationships. The empirical evidence so far, however, has been mixed. The aim of this paper is to review the existing literature on inequality and redistribution, to explicate the theoretical causal mechanisms identified so far, and to provide a comprehensive and rigorous empirical test that overcomes some of the shortcomings of previous empirical studies. Using panel data on 23 OECD countries over the time period of 1971–2005, we not only look at different spending categories but also at the share gains of different income deciles and the median-to-mean ratio. We find robust evidence that income inequality affects redistribution. However, the precise degree of this relationship differs for different parts of the income distribution.

KEYWORDS: redistribution, income inequality, median voter models, panel data
JEL classification: C23, D33, D72, H11, H53

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1 Introduction

Over the last three decades, a large amount of literature has been devoted to explaining the relationship between redistribution and (income) inequality. Diverse theoretical mechanisms relating redistribution to inequality have been proposed. The forthcoming theoretical results are often derived from median voter models in the vein of Meltzer and Richard (1981), Romer (1975) and Roberts (1977) or one of their extensions. The general conclusion is that redistribution increases with a rising income gap between the median and the mean voter, and so does redistributive government taxation. However, not all models predict that redistribution runs from rich to poor as predicted by the median voter approach. By contrast, focusing on the insurance motives of public transfer spending, Moene and Wallerstein (2001, 2003) predict a negative relation between income inequality and redistribution, implying that redistribution runs from poor to rich. Furthermore, according to the relations derived by other models, redistribution runs from the ends of the income distribution towards the middle class (Stigler (1970), Dixit and Londregan (1998), Epple and Romano (1996)).

From an empirical point of view, there are no clear cut results, either. While some authors find empirical evidence for a positive relationship between redistribution and inequality (Alesina and Rodrik (1994), Persson and Tabellini (1994), Milanovic (2000)), others do not find evidence in support of the median voter model (Perotti (1996), Kenworthy and McCall (2008)). This has led some to believe that a robust empirical relationship does not exist. Many of the existing studies, however, only look at different types of expenditures as dependent variables. Others do not make the effort to look beyond a coarse summary indicator such as the Gini coefficient, thereby failing to take note of the varying dynamics at the lower or higher end of the income ladder. Yet, others only use gross or even disposable income instead of factor income to derive inequality measures. Finally, many results are based on the poor data quality of the inequality measures.

Against this background, the aim of this paper is twofold: First, to survey the main causal mechanisms between inequality and redistribution and to provide an overview of the existing empirical evidence. Second, to provide

a comprehensive empirical test of the main hypotheses with more precise measures of redistribution using the high quality data of the Luxembourg Income Study (LIS).

Analyzing a panel dataset of 23 OECD countries over the time period 1971–2005, we not only look at different spending categories but also at the share gains of different income deciles and the median to mean ratio. We find evidence that income inequality is clearly associated with redistribution. Overall, it clearly emerges that the main driver behind redistribution is not only general inequality as measured by the Gini coefficient, but the ratio of (factor) income between the top income decile and the middle class. Most importantly, we also find evidence that different income deciles benefit from redistribution to different degrees. The most surprising result is that rising inequality actually lowers redistribution towards low income earners, but increases redistribution towards the middle class. This insinuates that Director's Law may be at work here, i.e., redistribution runs from the ends to the middle; however, more empirical tests are needed to confirm this conjecture. In addition, there seems to be a non-linear relationship between inequality and redistribution. Finally, we do not find reliable across-the-board results of the income redistribution that confirm a negative relationship with respect to insurance motives. Our results survive a large number of robustness tests and underline the pivotal role of the middle classes.

The remainder is structured as follows. Section 2 establishes hypotheses by reviewing the main theoretical mechanisms relating inequality to redistribution and presents the empirical evidence. Subsequently, section 3 introduces the econometric framework used in the paper, discusses the results of the empirical analysis and provides robustness checks. Finally, section 4 concludes.

2 From Income Inequality to Redistribution – A Review of the Literature

The aim of this section is to establish hypotheses relating inequality to redistribution. On the one hand, we will illustrate the theoretical mechanisms

of how inequality is transmitted into different levels of redistribution. Yet, on the other hand, we will also survey the empirical literature. In order to clarify the different predictions of the models, this section is structured according to the main results concerning the direction of the redistribution process.[1] It starts with models predicting a redistribution running from the top to the bottom (section 2.1), followed by a reverse relationship (section 2.2) and subsequently presents those models deriving a redistribution from the ends to the middle of the income distribution (section 2.3). Finally, the main hypotheses are summarised in section 2.4.

2.1 Redistribution Runs from the Top to the Bottom of the Income Distribution

The Meltzer-Richard Logic and Some Extensions

One of the perhaps most influential political economy models linking inequality and redistribution goes back to Meltzer and Richard (1981), Romer (1975) and Roberts (1977) and is often referred to as the Meltzer-Richard model. In a general equilibrium model in which the only government activities are taxation and redistribution, they show that the equilibrium tax rate depends on the ratio of median to mean income. Voters whose income exceeds that of the pivotal (median income) voter favor lower taxes and less redistribution, while voters with an income below that of the pivotal voter support higher taxes and more redistribution. Given a lognormal income distribution, an increasing gap between the median and mean income implies increasing inequality and, according to the Meltzer-Richard logic, results in a rise in redistributive taxation. As a consequence, the model purports that an increase in redistribution is linked to a higher median to mean income ratio.

There are several extensions of this basic theoretical setting which are excellently surveyed by Borck (2007). Tridemas and Winer (2005), for example, use a spatial voting framework in which not only the first moment, but all three moments of the distribution of income matter. They show that

[1]For a similar structure with a focus on voting models, see Borck (2007).

the predictions are far less clear-cut in this setup.

The empirical literature dealing with the Meltzer-Richard voting model hypothesis and its extensions offers mixed results. Quite surprisingly, to the best of our knowledge only Gouveia and Masia (1998) directly test the median to mean ratio hypothesis. Using panel data from the US states from 1979-1991, they find little evidence to support the model. Perotti (1996) and Kenworthy and McCall (2008) also do not find supporting evidence. By contrast, using micro-data from the Luxembourg Income Study, Milanovic (2000) finds evidence for the median-voter model. Similar positive results have previously been found by Gouveia and Masia (1998), Alesina and Rodrik (1994) and Persson and Tabellini (1994).

There are several possible explanations for these differences. One reason is that some papers use data for disposable income (i.e., income *after* government redistribution), whereas the Meltzer-Richard model postulates a relationship for factor income, i.e., *before* taxation and redistribution has taken place (see Milanovic (2000) for a critique of this practice). Additionally, it has been rightly criticized that some of the studies use poor proxies for redistribution, such as social security transfers or unemployment benefits in percent of GDP (Bassett, Burkett, and Putterman (1999)). Thus, a misspecification of the actual level of redistribution is results in an endogeneity problem. Moreover, Bénabou (2000) stresses that the empirical support for the Meltzer-Richard model is weak because many authors do not take into account that the political participation increases with income, which means that the decisive voter has an income above the mean. According to this logic, redistribution is lower than it would be without voter abstention. A critique that is closely related to this argument is that one should incorporate the electoral turnout because it is positively related to the extent of government redistribution (most recently Mahler (2006)). Finally, due to party loyality of voters, candidates may choose a moderate redistributive platform in order to achieve other objectives (Harms and Zink (2003)), which again leads to different results than predicted by the median-voter hypothesis.

The (Endogenous) Fiscal Policy Channel

In a model that is closely related to Meltzer-Richard, the transmission mechanism between inequality and redistribution can be derived from the (endogenous) fiscal policy approach of Alesina and Rodrik (1994), Bertola (1993), Perotti (1993) and Persson and Tabellini (1994), and is often referred to when explaining the link between economic growth and inequality. The arguments are similar to the ones above. However, the relationship is now discussed within a new growth framework, as income distribution affects government activities and taxation, which in turn has an impact on growth.

In order to understand the transmission mechanism, consider a simple model where fiscal policy, which is established by majority voting, is a purely redistributive system where income is proportionally taxed and redistributed as a lump-sum to all individuals. As taxation is proportional to income, but the benefits of expenditure accrue equally to all individuals, the tax rate for an individual and the expenditure is inversely proportional to one's taxed income. Since this relation holds for the decisive (median) voter as well, the level of expenditure and taxation on the one hand and the median income on the other are negatively related. This negative relationship between income of the median voter and the level of expenditure and taxation via the political (voting) process is what Perotti (1996) dubs the "political mechanism". The second mechanism describes the "economic mechanism", relating redistributive public expenditure and taxation to growth. Here, the model predicts a negative relationship mainly due to crowding out effects of private savings and investments. In sum, the endogenous fiscal policy approach creates a two-stage process: from higher income inequality to higher redistribution and from distortionary taxation to lower growth.

For our purpose, the political mechanism is of special concern. Generally speaking, the empirical evidence for this is rather mixed: Perotti (1996) as well as Persson and Tabellini (1994) find weak empirical evidence for the effects of income inequality and fiscal policy. Bassett, Burkett, and Putterman (1999) see more evidence for a positive relationship between the income share of the middle quintile and transfers. Tanninen (1999) in turn, does find empirical support for a positive relation between income inequality and

growth.

Intergenerational Mobility

Another transmission mechanism between inequality and redistribution is suggested by the prospect of intergenerational mobility which is sometimes called the Prospect Of Upward Mobility (POUM) hypothesis. It claims that the unwillingness of the poor to support high levels of redistribution is motivated by their hope of becoming part of tomorrow's rich by means of social mobility (Alesina and La Ferrara (2005)). Therefore, this approach predicts a much more subdued relationship between inequality and redistribution than the Meltzer-Richard model. Recently, this hypothesis has been formalized by Bénabou and Ok (2001), who show that it is fully compatible with rational expectations and fundamentally linked to the concavity in the mobility process. However, investigating US data, Bénabou and Ok (2001) cannot find empirical evidence for the POUM hypothesis, suggesting that the POUM effect is probably dominated by the demand for social insurance.

Several other papers have attempted to empirically test the social mobility hypothesis. Gardiner and Hills (1999) find mixed evidence for a UK sample. Using self-assessment measures of upward mobility in OECD countries, Corneo and Grüner (2002) conclude that the desire to obtain higher standards significantly shape individual preferences for redistribution. Moreover, Alesina and La Ferrara (2005) find evidence that the support for redistribution polices is negatively affected by expected future income. More recently, Mayer and Lopoo (2008) find that intergenerational mobility is greater in high spending (US) than in low-spending ones.

2.2 Redistribution Runs from the Bottom to the Top

Insurance Motives

Moene and Wallerstein (2001, 2003) extend the Meltzer-Richard model by incorporating the fact that welfare expenditures (especially unemployment benefits, sickness pay) are not only redistributional but also provide insurance against income loss. They argue that, with increasing income, the demand

for insurance rises while the demand for redistribution decreases. As a consequence, the increase of the income gap between median and mean income (i.e., a rise in inequality) has two counteracting effects: when the median voter's income falls, the demand for insurance decreases while the desire for redistribution increases. Assuming that relative risk aversion is large enough, the voter will demand less insurance, which attests to a negative relationship between inequality and spending on programmes that have a strong insurance character.

Moene and Wallerstein (2001, 2003) test their theoretical framework and find empirical evidence that higher levels of inequality in pre-tax earnings are associated with lower levels of spending on policies that insure against income loss of working persons.

Imperfect Asset Markets

Bénabou (2000) primarily attempts to uncover why countries with similar preferences and technologies and equally democratic political systems have different systems of social insurance, fiscal redistribution and education finance. He develops a stochastic growth model in which the economy is populated by overlapping-generations and where heterogeneous agents vote over redistributive (fiscal or educational) policies.

Given the fact that asset markets, i.e., insurance and credit markets, are imperfect, there are redistributional policies (like social insurance) which have a positive net effect on output growth or ex ante welfare. This implies that redistribution, at least over some range, decreases with inequality. The intuition behind it is that in fairly homogenous societies, there is a wide consensus on efficient redistribution, whereas in unequal societies there is a strong opposition. Moreover, imperfect asset markets imply that lower redistribution causes an increase in inequality of future incomes due to wealth constraints on investment in human or physical capital. This results in a more persistent inequality. Furthermore, the model predicts a U-shaped relationship between inequality and redistribution in the short run and a negative correlation in the long-run.

Using a cross-section analysis for the time period 1981–1998, de Mello

and Tiongson (2006) do indeed find positive evidence that countries with a higher inequality redistribute less. Moreover, their results also indicate a U-shaped relationship between inequality and redistribution as predicted by the model.

2.3 Redistribution Runs from the Ends to the Middle

Coexistence of Public and Private Provision of Goods

The provision of some goods is characterized by a coexistence of public and private provision. In this setup, which is often referred to as a dual-provision of goods, the tax revenues are used to fund public goods, while households are simultaneously free to opt out of publicly provided goods in favor of a private alternative. Reasonable examples are education or public insurance, such as health or unemployment insurance.

The coexistence of public and private provision of goods has (unexpected) consequences concerning the preferences of the households. Using education policy as an example, Epple and Romano (1996) use a voting model to show that high income-households prefer a lower public school expenditure (and less taxation) because they care for private provision. Low-income households prefer a low expenditure for education as well, because they are less willing to substitute this public good for other goods, i.e. they prefer consumption and less taxation over public education provision. By contrast, middle-income households call for public schools so that they prefer higher public education spending. As a consequence, an equilibrium is characterized by a middle-income coalition preferring a higher public school expenditure versus a coalition of high- and low-income households preferring a lower expenditure. Assuming that the decisive voter is part of the middle class, the public spending leads to a redistribution which favors the middle class at the expense of both the rich and the poor. This setup is sometimes dubbed "Directors Law" (Stigler (1970)) or "ends-against-the-middle" conflict.

The Impact of Public Values and Ideology

Public values and ideologies are also expected to influence the relationship between inequality and redistribution. In the electoral competition model of Dixit and Londregan (1998), voters and parties care about inequality in addition to their private concerns for consumption or votes. Assuming that rich and poor voters prefer left and right politics while the middle class is not strongly attached to one party, they show that the middle class thrives in redistributive politics. Thus, party platforms reflect middle-class ideology. their transfer policies favor the middle class at the expense of the rich and the poor, which again points to the existence of the Director's law.

In contrast, extending the Meltzer-Richard setup by introducing unselfish voters with public values, Galasso (2003) comes to a different conclusion. In brief, he models voters who not only care for their own well-being, but who also oppose inequality in society. Under this assumption, the relevance of the middle class is reduced. Thus, a rise in inequality between the poor and the middle class does not necessarily decrease redistribution because of the additional (voting) support for redistribution by the fair agents (of the middle class).

2.4 Formulation of Hypotheses

Against the background of the theoretical mechanisms presented in the previous subsections, the following hypotheses are derived:
Redistribution runs from the top to the bottom:
H1: Redistribution rises with increasing inequality, i.e., with decreasing median income (Perotti (1996)).
H2: Given lognormal income distributions, redistribution increases with a rising median to mean income ratio (Meltzer and Richard (1981)).
Redistribution runs from the bottom to the top:
H3: Due to the insurance character of public spending (e.g., unemployment and health insurance), increasing inequality leads to a decreasein public spending (Moene and Wallerstein (2001, 2003)).
H4: In the short run, there is a non-linear U-shaped relationship between inequality and redistribution. In the long run, rising inequality is associated

with less redistribution (Bénabou (2000)).

Redistribution runs (from the ends) to the middle:

H5: The middle class benefits the most from redistribution, i.e., redistribution runs from the ends towards the middle class (Stigler (1970)).

3 Empirical Analysis

In order to test the impact of different measures of income inequality on redistributional spending, we use an unbalanced panel of up to 23 OECD countries covering the time period 1971-2005.[2] The inequality measures and some of the indicators of government redistribution are taken from the Luxembourg Income Study. There are only few alternative sources for comprehensive inequality datasets such as UNU-Wider's world income inequality database (UNU-WIDER (2005)) or the University of Texas Inequality Project. However, the LIS guarantees the highest data quality. It does not collect microdata, but rather harmonizes the national household income microdatasets, thereby ensuring the highest degree of internal consistency (for more detailed information about the unique contributions of LIS, see Atkinson (2004), Förster and Vleminckx (2004)).

The LIS publishes new country data approximately every 5 years so that we are able to generate seven 5-year averages beginning in 1971-1975 up to 2001-2005. We follow the approach of Carter (2006) and allocate the LIS data to the nearest/closest end of the five-year period.[3] The use of 5-year averages helps remove business cycle effects and enables us to examine medium- to

[2]The countries are (available time periods in brackets): Australia (1981, 1985, 1989, 1994, 2001, 2003), Austria (1994, 2000), Belgium (1985, 1992, 1997), Canada (1975, 1981, 1987, 1991, 1994, 2000), Czech Republic (1992, 1996), Denmark (1987, 1992, 1995, 2000, 2004), Finland (1987, 1991, 1995, 2000, 2004), France (1979, 1984, 1989, 1994), Germany (1978, 1981, 1984, 1989, 1994, 2000), Greece (1995), Hungary (1991, 1994), Ireland (1987, 1990 (interpolated), 1995), Italy (1986, 1991, 1995), Luxembourg (1985, 1991, 1994, 2000, 2004), The Netherlands (1983, 1987, 1991, 1994, 1999), Norway (1979, 1986, 1991, 1995, 2000), Poland (1986, 1992, 1995, 1999), Slovak Republic (1992, 1996), Spain (1980, 1985 (interpolated), 1990, 1995), Sweden (1975, 1981, 1987, 1992, 1995, 2000), Switzerland (1982, 1985 (interpolated), 1992, 1995 (interpolated), 2000), UK (1974, 1979, 1986, 1991, 1995, 1999), USA (1974, 1979, 1986, 1991, 1994, 2000, 2004).

[3]To make this clearer, we allocate the LIS data for Australia in 1981 (1989) to the year

long-term relationships. Given our research focus this constitutes an advantage, since we doubt that annual changes of income inequality automatically influence the extent of redistribution. First, there is bound to be a lag in recognition, i.e., before households/voters actually notice that their *relative* income position has changed. Second, elections do not take place annually, so there might not be an immediate outlet for voters to express possible changes in their preferences for government policies.[4] Finally, choosing 5-year averages has the additional advantage of increasing the comparability to the existing literature, since many studies also follow these lines (e.g., most recently by Carter (2006); Voitchovsky (2005)).

3.1 Variables and Definitions

We examine at a wide range of indicators of government redistribution. Detailed definitions and sources for all dependent and independent variables are provided in Table 1 of the appendix. In addition, Table 2 provides summary statistics, while Tables 3 and 4 offer the pairwise correlation results. As will become apparent in the course of this analysis, the results are strongly dependent on which aspect of governmental redistribution is actually under consideration. Different indicators measure quite different things, so that the theoretical mechanism linking it to inequality should differ as well.

There are, broadly speaking, two types of redistribution indicators. On the one hand, there are those that measure the amount that governments spend to reduce inequality, such as social spending in per cent of GDP. On the other hand there are those that directly attempt to gauge the difference between factor and disposable income in different income percentiles. The majority of existing studies have taken the first route (e.g. Moene and Wallerstein (2003); Schwabish, Smeeding, and Osberg (2004)), but there are also a few who have opted for the latter concept (e.g. Milanovic (2000); Iversen and Soskice (2006)). We examine both types of indicators to obtain a more complete picture and to determine to what extent the different find-

1980 (1990) and then calculate the 5-year averages from 1971-1975 up to 2001-2005.

[4]Evidently, there are other, more direct ways to influence public policy, such as lobbying and exerting interest group pressure. However, even if this is successful, it usually requires a considerable amount of time in a democracy to enact change.

ings in literature can be attributed to actual differences in how redistribution is conceptualized.

In terms of spending indicators, we first test whether the size of the respective government is sensitive to inequality by looking at overall government expenditures (**Gov. Exp.**). Then we proceed by examining different measures of social expenditures, starting with the broadest one, social expenditures (**Social Exp.**), which include all kinds of public social expenditure, such as cash and in-kind transfers, social services, tax breaks with a social purpose, etc. An alternative measure to these spending variables is the social transfer ratio (**Soctrans Ratio**), which is the average ratio of social transfers to total disposable income[5]. This indicator has the advantage of measuring social transfers not at the aggregate budget level, but rather at the individual level.

In addition, we also observe unemployment expenditures (**Unemp. Exp.**), which captures cash expenditures compensating for unemployment and health expenditures (**Health Exp.**) and thus measures the overall public spending on health care. Our intention is to test whether inequality also has the same impact on these types of social spending. As explicated in the literature review, Moene and Wallerstein (2001, 2003) argue that voters' may react quite differently to changes in inequality, depending on whether one considers programmes with a strong insurance character (e.g., unemployment and health) or purely redistributional ones such as social assistance.

These dependent variables are measured in per cent of GDP (**%GDP**) and in per cent of total government expenditure (**%Budget**). The reason why we use both is that, while increasing inequality may only induce a small change if measured in per cent of GDP, this effect is much more pronounced when related to the overall budget. In other words, the policy reaction might be much stronger than can be gauged by simply looking at the GDP-related figures. Note also that there are quite a number of country-years, in which redistributional spending dropped in terms of GDP, while it actually increased in terms of its budget share, and vice versa.

As mentioned above, we also consider indicators that directly measure how redistribution affects individual incomes. We use the difference in the

[5]We use the square root scale to adjust the household income to the household size.

overall income share when comparing factor and disposable income, that is, we compare income before and after redistribution has taken place. In particular, we examine the cumulated share gain of the first decile (**Sharegain10**), deciles 1 and 2 (**Sharegain20**) and 1 to 5 (**Sharegain50**). Whereas the first of these variables includes only the bottom 10 per cent, the last one also includes those whose earnings are at the median income. In addition, we try to capture the share gain of the broadly defined middle class. Hence, we create the variable **Sharegain80-20** which measures the gain in disposable income for people between the 2^{nd} and 8^{th} decile of the income distribution. These indicators are direct measures of redistribution and also capture the impact of tax breaks and allowances, as well as other forms of tax exempts that are not captured by spending variables.

With regard to our independent variables, we are mainly interested in the effects of inequality on redistribution, using several inequality measures from the LIS database. We calculate them using factor income, which, according to the LIS definition, includes cash wages and salaries gross of employee taxes and social contributions, cash property income, as well as earnings from farm- and non-farm self-employment. As an overall indicator of the distribution of income, we use the **Gini** coefficient. However, the Gini coefficient is too coarse to distinguish properly between the dynamics that might take place at the bottom or the top of the income ladder. Hence, we also investigate the inequality between the richest 10 per cent and the middle class, and between the poorest 10 per cent and the middle class. Thus, we calculate the ratios of factor income between the 90th and the 50th percentile (**P90/50**) and between the 50th and the 10th percentile (**P50/10**). Finally, since Meltzer-Richards type of models do not only look at the middle class in broad terms but explicitly identify the median income earner to be pivotal, we use the LIS dataset to calculate the median to mean ratio (**Median Mean Ratio**), which has rarely been tested before. This indicator decreases if the median income shrinks relative to the average income, and it rises if the distance between the median and the average income diminishes.

The control variables are chosen solely on the basis of theoretical considerations and remain the same in all specifications. Of course, we extensively test whether our results are sensitive to our choice of variables. As economic

controls, we employ the real **GDP Growth**, the (standardized) unemployment rate (**Unemployment**) and, to take the impact of population aging into account, we use the ratio of people aged 65 and older to the total population (**Population>65**).

In addition, we also introduce three political control variables that could, according to the literature, affect policy decisions on redistribution. First, there is a sizeable literature identifying the the role of government ideology on redistribution (Hibbs (1977), Hibbs (1987), Persson and Svensson (1989)). One link between partisan politics and redistribution results from the fact that the partisan theory of political competition assumes that right-wing parties represent higher-income voters and that left-wing parties represent lower-income voters. As a consequence, leftist governments are more engaged in redistribution towards the poor than rightist governments.[6] Hence, we employ a variable indicating the left's strength by measuring the share of cabinet seats held by left-wing parties (**Left Government**).

Second, the literature supposes that a political outcome is influenced by the electoral system (for a very influential theoretical model see Austen-Smith (2000)). Similarly to our focus on redistribution, Feld and Schnellenbach (2008) review the literature on the impact of political institutions on income redistribution and provide a comprehensive empirical test. Generally, the result is that under majoritarian (as opposed to proportional) regimes, the competition between parties focuses on some key marginal districts resulting in fewer public goods, less rents for politicians, more district targeted redistribution and a larger government. By contrast, under proportional representation politicians need to win the support of the broad majority, so that proportional regimes tend to have larger governments and a larger share of spending going to broad-based welfare programmes on public goods or welfare policy (Persson and Tabellini (1999), Persson, Roland, and Tabellini (2000)).[7] As a consequence, to account for the potential impact of the elec-

[6] A great number of studies have tested these hypotheses (see for example Cusack (1997), Hicks and Swank (1992)). In general, they have substantiated their claim that the cabinet share of left-wing parties is positively associated with more redistribution. The effect of union power, in contrast, has been empirically less convincing (Bradley, Huber, Moller, Nilsen, and Stephens (2003)).

[7] Empirical evidence strongly supports this hypothesis (see among others Persson, Roland,

toral system (i.e., its degree of proportionality), we use a least squares index which has been proposed by Gallagher (1991) and has also become known as the Gallagher index.[8] The idea behind this index is quite simple: it measures an electoral system's **Disproportionality**, which is conceptualized as the difference between vote and seat shares of each party, weighted by the size of the deviations. Finally, we introduce **Voter Turnout** into our empirical specifications, since it has been argued that a higher turnout is associated with more redistribution (for a very recent empirical test of that proposition, see Mahler (2006)).

3.2 Specification and Estimation

For each of our dependent variables, we run panel regressions ($T = 7$ and $N = 23$),[9] using fixed effects estimations to account for unit heterogeneity. We deal with the problem of panel heteroskedasticity by employing White-Huber robust standard errors. Moreover, we test all specifications for the inclusion of time dummies. We decide on a case-by-case basis whether to introduce them into a regression equation, depending on the significance of the standard Wald test. In addition, we check all specifications for autocorrelation, using the Wooldridge test (Wooldridge (2002)). In cases where the Wooldridge test clearly rejects the null of no first-order autocorrelation, standard errors are specified to be robust not only to heteroskedasticity but also to autocorrelation, using the Bartlett kernel (Newey and West (1987)). Cross-sectional dependence could be another potential problem. Thus, in

and Tabellini (2007) Persson and Tabellini (2004)). Similarly, Feld, Fischer, and Kirchgässner (2008) find empirical evidence for Switzerland, namely that institutions of direct democracy are more efficient in the sense that they spend less for redistribution while simultaneously performing as well as representative democracies in reducing inequality. Moreover, Verardi (2005) demonstrates that inequality decreases with the increasing degree of proportionality of a system.

[8] We decided against using a simple dummy variable, which merely distinguishes between majoritarian and proportional systems because such a measure would be much too crude and would overlook considerable differences that exist within each of the two categories. The Gallagher index is defined in Table 1.

[9] Note that a number of missings for different variables and different country-years effectively reduces the actual number of useable observations.

the robustness test section below, we also report our estimation results for standard errors that are robust to general forms of cross-sectional (spatial) dependence.

The generic set-up of our empirical analysis is a fixed-effects estimation

$$y_{i,t} = \beta_0 + \beta_1 \mathbf{z}_{i,t-1} + \beta_2 \mathbf{x}_{i,t} + \beta_3 \mathbf{w}_{i,t} + \mu_i + \eta_t + u_{i,t}$$

where the subscripts $i = 1, ..., N$ and $t = 1, ..., T$ denote country and year, $\mathbf{z}$ denotes the inequality variable(s), $\mathbf{x}$ and $\mathbf{w}$ are vectors of economic and political variables respectively, while μ_i and η_t stand for the inclusion of country and time dummies (if necessary) and $u_{i,t}$ is the disturbance term.

Note that reverse causality could pose a severe problem in the empirical analysis. Income inequality may affect the amount of redistribution, yet at the same time redistribution has an immediate effect on income. Hence, there is a danger of capturing the influence of redistribution on inequality instead of the other way around. As it is hard to think of suitable exogenous instruments we attempt to solve this problem in the following way. We use Gini coefficients and percentile ratios that are calculated using factor income as defined in the previous sub-section. This is income *before* taxes have been raised and *before* redistribution by the state has taken place. Thus, social spending and taxation should have no direct impact on this type of income (see Milanovic (2000) and Schwabish, Smeeding, and Osberg (2004) for a similar argument). An indirect link, however, cannot be ruled out this way, since individual labor supply decisions are likely to be affected by the welfare state. According to standard theories, a higher degree of generosity of redistributional programmes induces households at the lower end of the income strata to reduce labour supply, thus lowering their factor income relative to higher income groups. To address this issue, we lag our inequality indicators by one period. Finally, in case of a remaining endogeneity problem we employ a two-step system GMM estimation proposed by Blundell and Bond (1998) in the robustness section.

3.3 Results

Table 5 presents the fixed effects estimation results for our first set of spending variables. Neither the Gini coefficient nor the two percentile ratios have a

significant impact on overall government expenditures. This comes as no surprise, since many items in the government budget are not directly related to inequality (e.g. defense, government consumption and investment). Looking at social expenditures does not yield any significant results, either, although this item captures the outlays that should be related to inequality. Using the ratio of social transfers to disposable income as a dependent variable, we do, however, find much more pronounced effects. Gini is of a positive sign and clearly significant, suggesting a positive correlation. This finding is reinforced by looking at P90/50, which is also positive and highly significant. P50/10 remains insignificant at a conventional level, which seems to indicate that the difference between the middle class and the richest 10 per cent is of major importance. This is precisely what the Meltzer-Richard model would predict.

Since we are mainly interested in the interpretation of the inequality variables, we will refrain from discussing the results for the economic and political controls in greater detail. Let us simply note that economic growth remains insignificant throughout, while unemployment has the expected positive and significant impact, except if spending is measured as a budget share. Population aging seems to have a positive albeit small effect on overall government spending. While there is no clear pattern for the political control variables, voter turnout seems to be positively associated with overall expenditures. Surprisingly, the strength of left-wing parties in the government is negatively correlated with social expenditures, while the proportionality of the electoral system is positively related with general expenditures and transfers.

Insert Table 5 here.

In Table 6, we explicate the results for the two spending variables that do not only have a redistributional but mainly an insurance character. It has been argued in literature that insurance programs follow a different logic and that rising inequality could be associated with less spending on these items (Moene and Wallerstein (2001, 2003)). The inequality coefficients on unemployment expenditure are indeed negative throughout, however, they are only clearly significant if expenditures are measured in per cent of the government budget. As expected, the only significant economic variable is the

unemployment rate, which clearly exerts an upward pressure. With respect to health expenditures, we again find a negative relationship. However, only P90/50 is significant at a conventional level.

Insert Table 6 here.

We proceed by testing whether it makes a difference to look at individual gains in income through redistribution instead of merely looking at certain budget items. We do indeed find significant relationships that surprisingly disclose differences depending on which part of the income ladder we are focussing on. As Table 7 underlines, when only considering the share gain of the poorest 10 per cent of income earners, we find a strong negative impact of inequality as measured by the Gini coefficient, which is quite significant. This finding is borne out by the coefficients for P90/50 and P50/10, although only the former is statistically significant. Hence, it seems that an increase in inequality between the middle class and the richest 10 per cent reduces redistribution to the low income earners. The same picture emerges if we look at Sharegain20, the Gini coefficient and P90/50 are both negative and significant. This pattern changes when considering the share gain of the first 30 percentiles. Now, none of the inequality indicators are significantly different from zero. Yet, when moving further up the income ladder to also include part of the middle class, the sign for Gini turns positive, although it remains insignificant. This sign switch seems to suggest that inequality affects redistribution differently for different income groups. This intuition is confirmed when looking at the results for Sharegain80-20. In this case, Gini is positive and highly significant, insinuating that increasing income inequality raises redistribution towards the (broadly defined) middle class.

Insert Table 7 here.

All these findings are strongly confirmed if we re-run the regressions without lagging the inequality variables. Table 8 presents these results in the upper panel. For reasons of limited space, the table is restricted to showing the coefficients and standard errors for the inequality variables. The estimation strategy as well as economic and political control variables remain

the same as before. The Soctrans Ratio is positively, while Sharegain10 and Sharegain20 are negatively correlated with inequality. Finally, we once again find the sign switch from a negative to a positive coefficient when analyzing the relationship between inequality and the share gain of the middle class.

Insert Table 8 here.

In addition, we test whether the median income earner does in fact play the pivotal role that the standard Meltzer-Richard models ascribe to it. Table 8 exhibits our corresponding results in the second panel. Interestingly, the coefficients are in all specifications far from being significant. This suggests that the difference between median and mean income does not affect the degree of redistribution.

Finally, we also examine the hypothesis of a non-linear relationship between inequality and income disparity, as proposed by Bénabou (2000). The simple and the squared Gini term is highly significant with opposite signs for Soctrans Ratio as well as for the share gain variables. Hence, there seems to indeed be a non-linear relationship. When measuring redistribution by Soctrans Ratio and Sharegain80-20, however, we find once more a positive coefficient for Gini and a negative one for the squared term. This appears to contradict the model by Bénabou (2000) which posits a negative relationship. However, in case of Shargain10 and Sharegain20 we see that it is the other way around and the model seems to be confirmed.

3.4 Robustness Checks

To check the robustness of our results, we run a battery of regressions using various alternative estimators and standard error calculations. First, to test the robustness of our findings against another estimator, we run all regressions using a feasible generalized least-squares method which includes country dummies. Errors are assumed to follow a first-order autoregressive process and the Prais-Winsten method is used to estimate the autocorrelation coefficient. Second, we want to make sure that our results are not driven by the bandwidth we selected for the Bartlett-kernel. Thus, we calculate standard errors using the automatic covariance selection procedure introduced

by Newey and West (1994) making our standard error robust to both heteroskedasticity and serial correlation. Third, we repeat the analysis using standard errors that are robust to heteroskedasticity, serial correlation and general forms of spatial dependence. Our set of countries is a non-random sample of industrialized democracies, which could be subject to common influences affecting our variables of interest. Hence, we estimate standard errors employing a nonparametric covariance matrix estimation procedure as proposed by Driscoll and Kraay (1998). Fourth, we opt for additionally explicating the most important estimation results in detail for a sample that excludes the US using our standard fixed effects estimator. The reason is that the US is a country that can be described as having a comparably high level of inequality and a relatively small welfare state. We want to make sure that these facts do not bias our results. Finally, in the bottom panel of Table 9, we report our findings for the regressions on the whole country sample, but without the unemployment rate as a control variable. The case for leaving unemployment out of the specification could be made on the grounds of it being endogenous to redistribution. In other words, the generosity of welfare benefits should affect labor supply decisions and the labor market in general. Higher spending could lead to lower employment and higher unemployment, which could also bias our estimates for the inequality variables.

Insert Table 9 here.

To save space, Table 9 again only contains the coefficients and standard errors for Gini, P90/50 and P50/10. However, these are estimated using the same set of controls as in the previous regressions. As before, the Gini coefficient and the percentile ratios are estimated in two separate specifications. We only take a subset of what we find to be the most important dependent variables into consideration. A first look at Table (9) reveals that all our findings survive the use of different standard errors and estimators, although the size of the coefficients varies somewhat.[10] Soctrans Ratio and Sharegain80-20

[10]Different coefficient sizes for Newey-West and Driscoll-Kraay result from the fact that the test for the inclusion of time dummies sometimes mandated their inclusion for one of these two but not for the other.

increase with rising inequality measured by Gini and P90/50, while Sharegain10 and Sharegain20 decrease. In addition, P50/10 becomes significant for some dependent variables. But it does not remain significant across all specifications, which is why we do not consider these to be stable results[11]. However, there is a hint that social expenditures in per cent of GDP are negatively related to the income between the lowest income earners and the middle class. Omitting the unemployment rate or all other observations for the US from the sample does not change the results substantively.

Evidently, the countries in our data represent a non-random sample and outliers could severely bias the results. To ensure that our findings are not merely driven by the influence of one or two countries, we conduct a Jackknife test. This implies running regressions for each specification, removing one country at a time to isolate the maximum and minimum values for the coefficients and their significance. Again, we use our basic fixed effects model with heteroskedasticity and autocorrelation consistent standard errors. Table 10 presents the results for this test, explicating once more only the findings for the inequality variables. As before, our main previous conclusions survive rather well and do not encounter any sign switches whilst staying significant for the most part. These findings are remarkable since a Jackknife test constitutes a rather tough benchmark.

Insert Table 10 here.

As mentioned in the beginning of the paper, it is still possible for endogeneity to pose a problem in our empirical analysis. One way to control for this is to use an instrumental variable estimator combined with fixed effects or first-differences. However, there are no reasonable external IV available. Thus, identification will be based on internal instruments using the inequality variables (Gini, P90/50, P50/10), the GDP growth and the unemployment rates as instruments. We include them into a two-step system GMM approach proposed by Blundell and Bond (1998) to see whether our result still hold up. The consistency of the GMM estimators is based on large N.

[11] It has been found before that the Driscoll-Kraay standard errors are somewhat optimistic. Of course, it has to be noted that they rely on large T asymptotics, while in our panel $T < N$.

However, recent Monte Carlo simulations show that, given predetermined explanatory variables, the system GMM estimator has a lower bias and higher efficiency than the first differenced GMM or the fixed effects estimator (Soto (2006)). As the small N renders it impossible to use the full set of instrumental variables since the number of instruments must not exceed the number of countries, we only include the lagged variables in the levels equation and the first differenced variable in the differenced equation. Please note that we checked the robustness of our results by additionally using the second and / or third lag of the variables as instruments. While this increases the number of instruments, it does not, however, substantially change the results. Based on a small panel size, Soto (2006) shows that not using all potentially available instruments does not automatically decrease the reliability of the system GMM estimator. In order to prevent a downward bias of our results, we use the finite-sample correction for the reported standard errors in all of our system GMM estimations as proposed by Windmeijer (2005).

Insert Table 11 here.

The estimates in table 11 confirm our substantive conclusions. Coefficient signs remain the same as above, although significance levels are somewhat reduced, especially with respect to Sharegain10 and Sharegain10.

Finally, we also check whether changing the institutional control variables would make a difference. We introduce Federalism, which indicates whether a country has a federalist structure. In addition, we also substitute our electoral system variable Disproportionality, which is a continuous variable, with the dummy variable Plurality. It indicates whether a country has a majoritarian system or not. We again use our standard fixed effects estimator.

Insert Table 12 here.

The results in Table 12 show that including these alternative institutional variables does not change any of our substantive findings. Even though the institutional variables are sluggish and could thus pose a problem for a fixed effects estimation, we do find some significant results. Notably, Federalism

and Plurality both have a negative and significant impact on redistribution towards the bottom 2 deciles of the income scale. However, for the middle class the relationship is strongly positive. In other words, in more federalist systems with majoritarian electoral systems, rising inequality leads to more redistribution for the middle class, but less redistribution for the lowest 20 per cent of income earners. Since the impact of institutions on redistribution is not our main concern, we do not intend to dwell further on these results. The interactions between institutions and inequality and their impact on redistribution clearly demand further research.

Please note that we additionally test whether changing the income base for our inequality measures from factor to market income[12] would change our findings. Our substantive results, however, prove to be robust to this adjustment of definition. All our substantively interesting coefficients remain significant and of a similar magnitude. Finally, we also test the inclusion of further control variables. We introduce different measures of legislative and government fractionalization (Rae, Herfindahl) as well as an openness indicator to capture possible effects of increased international integration. Furthermore, we create a Maastricht dummy to isolate the effect that the Maastricht convergence process could have had on European Union countries' redistributional spending. Neither variable is significant or changes our substantive conclusions. In sum, the robustness tests strongly substantiate our results.

3.5 Interpretation of the Results

We are now in the position to relate our empirical findings to the hypotheses generated from the existing theoretical literature. The results support the Meltzer-Richards model if broadly interpreted (Hypothesis 1). A higher overall income inequality seems to lead to more redistribution. Note that this conclusion is very much dependent on which indicator of redistribution one employs. Using overall government expenditure or social expenditures does not yield any robust results. Yet this should not induce one to question

[12]Market income includes the same income categories as factor income, but additionally contains public and private pensions.

the validity of the results. Rather, it cautions us that simply using expenditure variables is not a commendable way to capture redistribution. Even a variable such as Social Expenditures is comprised of many different types of programmes, some of which only have an indirect redistributive character (e.g. social services) and are very much path dependent. The empirical literature' reliance on these types of indicators may partly explain the fragile and at times contradictory results. Thus, our analysis clearly highlights the need to use measures such as the ratio of transfers to income or share gains.

With respect to the narrow version of the Meltzer-Richard model, which postulates that it is the relative income position of the median income earner that drives redistribution (Hypothesis 2), the statistical evidence is mixed at best. The fact that P90/50 is positive and significant, while the difference between the middle class and the poorest 10 per cent (P50/10) is not, seems to confirm the Meltzer-Richard rationale. However, a more direct test by using the Median/Mean variable yields statistically insignificant results across all specifications. As our positive and highly significant results for Sharegain80-20 underline, it is the broad middle class that is decisive. Moreover, given the well known empirical phenomenon that voter turnout increases with income, we would expect the median voter to be located more on the right-hand side of the income scale. Therefore, this lack of statistically robust results does not mean, as is often insinuated, that there is no relation between inequality and redistribution. Instead of hunting for the elusive median income voter, one should rather identify the middle class in broader terms.

Our results for public spending categories with an insurance character (unemployment and health expenditures) are mixed. According to Hypothesis 3, we would expect these variables to decrease with rising inequality. We do find significant negative effects of inequality on unemployment spending only if it is measured in percent of the budget. With regard to health spending, we again find negative coefficients for all inequality variables, but only P90/50 is slightly significant. Therefore, although the regressions return the hypothesized negative coefficients, the results do not seem very significant. Since we approach statistical findings rather conservatively, we cannot confirm Moene and Wallerstein's (2001, 2003) results with any great confidence. The jury is still out on this one.

Regarding Hypothesis 4, we are looking for non-linear relationships between inequality and redistribution. Introducing a squared Gini coefficient yields very significant results with the dependent variable being the social transfer ratio and the different share gain indicators. We do indeed find a non-linear relationship as predicted by the model of Bénabou (2000). However, he maintains that the long run relationship between redistribution and inequality would be negative. According to our results, this does not hold true if the left-hand side variable is Soctrans Ratio or Sharegain80-20. Yet with respect to the share gains for the two lowest deciles, we find a negative association. This suggests that up to a certain point, rising inequality increases redistribution towards the middle class. Beyond that, redistribution goes down. For the lowest two income deciles, the causal link works the other way around. Rising income disparity reduces redistribution toward them. But at a certain inequality level, redistribution starts rising again. We calculated the turning points to see at what inequality level the direction of influenced is reversed. In the specifications that have Soctrans ratio or Sharegain80-20 as a dependent variable, the turning point is 0.51.[13]. Note that the sample mean for Gini is 0.45, while the maximum lies at 0.54. Hence, only at comparably high levels of inequality does the impact change and does more inequality actually lead to less redistribution towards the middle class. For Sharegain10 and Sharegain20 we obtained slightly higher turning points, but these estimates are less reliable as the coefficients' significance levels are much lower. These countervailing forces that differ for low income groups and the middle class could indicate that multiple equilibria could be possible not only across countries but also across income groups of the same country. Unfortunately, the implications of this this hypothesis cannot be perfectly discriminated against the ones made by Director's law. Although the underlying causal arguments differ, both predict rising inequality to lead to more redistribution for higher income earners, and to less for those at the lower end of the income strata. This could only be solved by also looking at high income earners, for which the relationship should be negative if Director's law holds, but positive if the Bénabou-model is the 'correct' one.

[13]Note that these estimates are remarkably close to the ones obtained by de Mello and Tiongson (2006)

Analyzing share gains for low income earners as well as the middle class allows us to analyze the validity of Director's Law, which, in a nutshell, maintains that redistribution runs from the ends to the middle (Hypothesis 5). We indeed find strong evidence for this in our data. When overall inequality – as measured by the Gini coefficient – rises, then the lowest 20 per cent of the income ladder actually suffer a reduction in redistribution. The main driving force seems to be the disparity between the highest income earners and the middle classes. If the latter see their relative income fall relative to the highest 10 per cent, they receive more redistribution at the cost of the poorest 2 deciles. Indeed, Director's Law seems to be at work here (Stigler (1970)). However, a final judgement would also demand a closer analysis of the redistributional losses/gains at the very top of the income distribution. Further empirical investigations are therefore needed.

4 Conclusions

The aim of this paper is to survey the existing literature on inequality and redistribution, to identify the theoretical causal mechanisms linking these two, and to provide a comprehensive, rigorous empirical test. We show that a plethora of theoretical models exist that offer different hypotheses about the relationship between income and redistribution. Yet empirical results have been mixed, if not contradictory. This has led some to question the existence of a robust empirical relationship.

Analyzing panel data of 23 OECD countries over the time period of 1971–2005, we find that income inequality is clearly correlated with redistribution. Not only have we looked at different spending categories but also at the share gains of different income deciles. The conclusion clearly emerges that it was not so much general inequality as measured by the Gini coefficient, but the difference in (factor) income between the middle classes and the top income decile that determines the level of redistribution. This seems to constitute the politically relevant disparity in the income distribution. Our conclusions hold true even after using different alternative estimators and running a great number of robustness tests.

The empirical analysis does not find conclusive evidence for the claim

increasing inequality would lead to less government spending on social programmes that are not only redistributive in nature, but also have a strong insurance character. What is more, we find clear evidence for a non-linear relationship between inequality and redistribution, although for the most part the coefficient signs point in the opposite direction than Bénabou (2000) suggested. His result only seems to hold for low income earners. The non-linearity, however, is clearly there, suggesting that at very high levels of inequality the positive association between inequality and redistribution is reversed.

Furthermore, this paper contributes to the existing literature by yielding another important empirical result that offers confirmation for one variant of the Meltzer-Richard model: we find that redistribution is not only mainly driven by the P90/50 income ratio, but that it is also targeted at the middle classes. Resources are redistributed from low income earners, who actually suffer a loss, once the gap of inequality between the middle and the top widens. We show that a definition of the middle class is rather broad here, lying between the second and eighth decile. This indicates that there might be some empirical relevance to Director's Law, which states that income is redistributed from the ends of the income distribution to the middle. Again, this general finding survives our robustness check surprisingly well. Yet, the distributional impact on high income earners necessitates further empirical investigation.

Understanding the driving forces of redistribution and the underlying dynamics of inequality does not only have a theoretical value, but also has practical implications for policy-makers. Our findings constitute strategic lessons to internalized by candidates/parties on an electoral campaign trail. When running on a platform of government redistribution, then it would prove much more effective electorally to emphasize income disparities between the very rich and the middle class than to focus on the plight of those at the bottom of the income ladder. Our findings have shown that the former difference statistically engenders a much stronger redistributive reaction than the latter. By contrast, those parties and candidates running an anti-redistribution campaign might infer from our results that redistribution towards the broad middle is often at the expense of those most in need,

namely the bottom 10 per cent, and therefore benefits the "wrong" people from a poverty relief perspective. All in all, however, we conclude from our analysis that electoral platforms based on redistributive programs should be very successful in times of rising income differences between the broad middle income earners and the very top, given that these measures are aimed at this very middle class.

Although we conduct a lot of testing, even more empirical robustness checks could be imagined. An expansion of the sample to democratic countries from Asia, Latin America and Eastern Europe would be even more preferable. However, the availability of more frequent, high quality income data taken over longer time periods would be even more desirable. The relatively small number of useable observations is a severe limitation in this area of study. In addition, since we conjecture that models predicting distributional consequences in the spirit of Directors Law may indeed offer the empirically most promising explanations, more tests are needed to identify redistributional winners and losers in all segments of the income distribution.

Regardless of the details of our results or possible extensions that could be envisioned, the main finding of our empirical analysis is unambiguous in our view: rising inequality between the middle and top leads to a higher redistribution towards the middle classes, even at the cost of those at the lower end of the income distribution.

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Appendix

Table 1: Description of Variables

Variable	Source	Description
	Dependent Variables	
Gov. Exp.	OECD Economic Outlook	Total government disbursements, % GDP
Soc. Exp.	OECD Economic Outlook	Total public social expenditure, % GDP
Soctrans Ratio	LIS Database	Average ratio of social transfers to disposable income
Unemp Exp.	Armingeon et al. 2006	Cash expenditure compensating for unemployment, % GDP
Health Exp.	OECD Economic Outlook	Public health spending, % GDP,
Sharegain10	LIS Database	Cumulated share gain for 1st decile, disposable income - factor income
Sharegain30	LIS Database	Cumulated share gain up to 3rd decile, disposable income - factor income
Sharegain50	LIS Database	cumulated share gain up to 5th decile, disposable income - factor income
Sharegain80-20	LIS Database	cumulated share gain up to the 8th - 2nd decile, disposable income - factor income
	Variables Measuring Income Inequality	
Gini	LIS Database	GINI coefficient, calculated using factor income
P90/50	LIS Database	Ratio of 90th to 50th income percentile, calculated using factor income
P50/10	LIS Database	Ratio of 50th to 10th income percentile, calculated using factor income
Median Mean Ratio	LIS Database	Median to mean ratio, calculated using factor income
	Economic Control Variables	
GDP Growth	OECD Economic Outlook	Real GDP growth rate, %
Unemployment	OECD Economic Outlook	Standardized unemployment rate, %
Population>65	World Development Ind.	Persons aged 65 and above, % total population
	Political Control Variables	
Voter Turnout	Armingeon et al. 2006	Voter turnout in the recent general election
Left Government	Armingeon et al. 2006	Cabinet share of social-democratic and other left parties in percentage of total cabinet posts
Disproportionality	Armingeon et al. 2006	Gallagher index of disproportionality of electoral system: $disprop = \sqrt{\frac{1}{2}\sum_{i=1}^{m}(v_i - s_i)^2}$, $0 \leq \text{disprop} \leq 100$ with the number of parties $i = 1, ..., m$ v_i – percent of votes obtained by party i, s_i – percent of seats obtained by party i
Federalism	Armingeon et al. 2006	Degree of federalism: 0 = no, 1 = weak, 2 = strong
Plurality	Worldbank, DPI Database	Electoral system: 0 = proportional, 1 = majortitarian

Table 2: Summary Statistics

Variable	Obs.	Mean	Std. Dev.	Min.	Max.
Gov. Exp.	167	45.1693	8.1463	24.0095	68.7193
Soc. Exp., %GDP	92	45.0341	5.7801	32.2883	55.9438
Soctrans Ratio	104	0.1992	0.0661	0.0880	0.3681
Unemp. Exp., %GDP	100	1.5597	1.1340	0.1000	4.8400
Unemp. Exp., %Budget	128	5.5103	1.0763	0.9033	8.3274
Health Exp., %GDP	98	3.2922	2.0649	0.5338	9.7896
Health Exp., %Budget	122	12.2023	2.4554	2.0024	18.0141
Sharegain10	101	3.2565	0.7429	1.8800	5.0740
Sharegain20	101	4.1311	0.8996	2.4080	6.2170
Sharegain30	101	6.9487	1.8727	3.5800	10.8684
Sharegain50	101	8.6090	2.7375	4.1800	16.4744
Gini	101	0.4436	0.0440	0.3639	0.5645
P90/50	101	2.2274	0.2659	1.8523	3.1559
P50/10	101	64.5844	31.8723	5.6408	101.4063
Median/Mean	97	0.8972	0.0580	0.7350	1.0109
GDP Growth	168	2.7041	1.9820	-7.2800	9.6840
Unemployment	172	6.5933	3.7719	0.1771	18.9070
Voter Turnout	152	76.8616	14.2578	40.7600	96.7900
Left Government	150	37.4496	32.9173	0.0000	100.0000
Disproportionality	156	5.8786	4.8856	0.5185	21.8499
Federalism	101	0.6851	0.8833	0.0000	2.0000
Plurality	156	0.5269	0.4983	0.0000	1.0000

Table 3: Correlation Matrix, Part 1

	Gov. Exp.	Soc. Exp. %GDP	Soc. Exp. %Budget	Soctrans Ratio	Unemp. Exp. %GDP	Unemp. Exp. %Budget	Health Exp. %GDP	Health Exp. %Budget	Share-gain10	Share-gain20	Share-gain30	Share-gain50
Gov. Exp.	1											
Soc. Exp., %GDP	0.1976	1										
Soc. Exp., %Budget	-0.7281	0.5055	1									
Soctrans Ratio	0.7346	0.5466	-0.2532	1								
Unemp. Exp., %GDP	0.5298	0.2072	-0.4399	0.4371	1							
Unemp. Exp., %Budget	0.4002	0.4498	0.0445	0.3677	0.0783	1						
Health Exp., %GDP	0.34	0.1705	-0.3058	0.28	0.9643	-0.0583	1					
Health Exp., %Budget	-0.5156	0.2505	0.6308	-0.2894	-0.5056	0.5671	-0.4019	1				
Sharegain10	0.5114	0.3407	-0.2747	0.3585	0.4545	0.1526	0.3283	-0.2712	1			
Sharegain20	0.6114	0.3877	-0.3217	0.481	0.4908	0.2075	0.3449	-0.3042	0.9808	1		
Sharegain30	0.794	0.4978	-0.3756	0.8407	0.5562	0.3787	0.366	-0.326	0.5904	0.7167	1	
Sharegain50	0.7399	0.4708	-0.3406	0.8544	0.4851	0.4311	0.285	-0.2285	0.3578	0.4941	0.9381	1
Sharegain80-20	0.1152	0.181	-0.0448	0.2703	0.0938	0.3397	-0.0586	0.0884	-0.1502	-0.0546	0.2123	0.2881
Gini	0.2399	0.1962	-0.0335	0.4782	0.1483	0.2926	0.061	0.1105	-0.3796	-0.2369	0.4134	0.618
P90/50	-0.051	0.0207	0.1224	0.1695	-0.1231	0.168	-0.1337	0.2326	-0.5708	-0.4836	0.0681	0.3301
P50/10	0.415	0.3301	-0.2852	0.482	0.5798	0.2391	0.5162	-0.0927	0.2811	0.403	0.5795	0.5212
Median/Mean	0.3026	0.0391	-0.2972	0.1126	0.3917	-0.075	0.3187	-0.3691	0.683	0.6508	0.2593	-0.0094
GDP Growth	-0.2715	-0.2527	0.1387	-0.1973	-0.0969	-0.2063	-0.0346	0.0471	0.0643	0.013	-0.1618	-0.1949
Unemployment	0.1721	-0.1233	-0.2716	0.1608	0.4536	0.0517	0.4752	-0.1341	-0.2778	-0.1956	0.1654	0.2899
Pop>65	-0.2704	-0.1032	0.1577	-0.3421	-0.2987	0.1146	-0.3017	0.3222	-0.5064	-0.5243	-0.3917	-0.2403
Voter Turnout	0.3266	0.0466	-0.3328	0.2728	0.268	0.1786	0.1714	-0.175	0.5995	0.6184	0.4174	0.2325
Left Government	0.1712	0.2193	-0.0718	0.1659	0.054	0.0553	0.0329	-0.1214	0.2704	0.2667	0.1472	0.0767
Disproportionality	-0.2741	-0.1951	-0.0375	-0.1255	-0.1861	-0.0052	-0.1339	0.1859	-0.3539	-0.3569	-0.205	-0.0526
Federalism	-0.5108	-0.135	0.4343	-0.499	-0.4108	0.0303	-0.3143	0.5328	-0.5236	-0.5567	-0.5916	-0.5516
Plurality	-0.5035	-0.135	0.3013	-0.4657	-0.4426	0.0456	-0.3095	0.5186	-0.5507	-0.5855	-0.585	-0.4738

Table 4: Correlation Matrix, Part 2

	Share-gain80-20	Gini	P90/50	P50/10	Median/ Mean	GDP Growth	Unemploy-ment	Pop>65	Voter Turnout	Left Government	Disproportionality	Federa-lism	Plura-lity
Sharegain80-20	1												
Gini	0.3728	1											
P90/50	0.2633	0.8849	1										
P50/10	0.2179	0.463	0.2513	1									
Median/Mean	-0.138	-0.701	-0.9208	-0.0096	1								
GDP Growth	-0.1937	-0.175	-0.1301	-0.103	0.0941	1							
Unemployment Rate	0.1833	0.5888	0.5694	0.4348	-0.4451	0.2048	1						
Pop>65	0.0292	0.2149	0.3725	-0.1893	-0.482	-0.0061	0.0552	1					
Voter Turnout	-0.0566	-0.1919	-0.3824	0.3946	0.5316	-0.065	-0.1696	-0.4792	1				
Left Government	-0.191	-0.1456	-0.2217	0.0157	0.2223	-0.034	-0.0997	-0.2269	0.2523	1			
Disproportionality	0.0202	0.2704	0.4511	-0.0121	-0.4747	0.1227	0.3098	0.1218	-0.2199	-0.1417	1		
Federalism	0.0608	-0.2051	-0.0083	-0.4251	-0.2495	-0.0481	-0.203	0.3958	-0.4417	-0.2775	0.0544	1	
Plurality	-0.0233	0.0515	0.2646	-0.2302	-0.4713	-0.0611	0.0791	0.4036	-0.3698	-0.1128	0.6024	0.6184	1

Table 5: FE Estimation – Government Exp.enditure, Social Exp.enditure, Transfer Ratio

	(1) Gov. Exp. %GDP	(2) Gov. Exp. %GDP	(3) Soc. Exp. %GDP	(4) Soc. Exp. %GDP	(5) Soc. Exp. %Budget	(6) Soc. Exp. %Budget	(7) Soctrans Ratio	(8) Soctrans Ratio
Gini (t-1)	-15.83		1.250		87.03		0.400**	
	(14.47)		(12.73)		(60.41)		(0.192)	
P90/50 (t-1)		-2.816		0.277		7.178		0.0696***
		(2.121)		(2.454)		(11.77)		(0.0233)
P50/10 (t-1)		-0.0250		-0.0339**		-0.123*		0.000266
		(0.0158)		(0.0170)		(0.0646)		(0.000181)
GDP Growth (t)	-0.386	-0.251	0.214	0.380	1.379	2.179	0.000172	-0.000270
	(0.265)	(0.270)	(0.437)	(0.413)	(1.566)	(1.452)	(0.00376)	(0.00381)
Unemployment (t)	1.053***	1.133***	0.490***	0.540***	-0.787	-0.512	0.00716***	0.00678***
	(0.197)	(0.221)	(0.155)	(0.149)	(0.715)	(0.714)	(0.00208)	(0.00204)
Population > 65 (t)	0.000546**	0.000626**	-0.000198	-0.000176	-0.00142	-0.00152	3.21e-06*	3.05e-06
	(0.000246)	(0.000244)	(0.000242)	(0.000240)	(0.000877)	(0.000948)	(1.85e-06)	(2.12e-06)
Voter Turnout (t)	0.291**	0.259*	-0.196	-0.242	-0.803	-0.995	0.00204	0.00232*
	(0.140)	(0.143)	(0.150)	(0.148)	(0.587)	(0.612)	(0.00134)	(0.00137)
Left Government (t)	0.00359	0.000471	-0.0258**	-0.0323***	-0.0898***	-0.118***	-3.96e-05	-4.51e-05
	(0.0122)	(0.0129)	(0.0102)	(0.0101)	(0.0331)	(0.0375)	(0.000125)	(0.000132)
Disproportionality (t)	0.352*	0.356*	-0.0223	-0.0273	-0.746	-0.749	0.00484*	0.00558*
	(0.208)	(0.212)	(0.164)	(0.164)	(0.497)	(0.533)	(0.00280)	(0.00287)
Observations	93	93	70	70	70	70	76	76
No. of countries	22	22	19	19	19	19	19	19
R-squared	0.475	0.487	0.731	0.747	0.660	0.669	0.555	0.527
WT AR(1) (p-value)	2.10e-05	8.26e-07	0.00539	0.00825	0.00481	0.00447	0.0457	0.0251
Wald test TD (p-value)	0.187	0.112	7.31e-07	1.17e-08	0.0384	0.000446	0.494	0.247

Fixed effects estimation coefficients with White-Huber robust or heteroskedasticity and autocorrelation consistent standard errors in parentheses (depending on the Wooldridge test). WT AR(1): Wooldridge test of the H0 hypothesis of no-first-order autocorrelation; Wald test TD: Wald test for the inclusion of time dummies, if p-value<0.1 time dummies are included (coefficients for time dummies are not shown).
*** significant at 1%; ** significant at 5%; * significant at 10%.

Table 6: FE Estimation – Unemployment Exp.enditure and Health Exp.enditure

	(1) Unemp. Exp. %GDP	(2) Unemp. Exp. %GDP	(3) Unemp. Exp. %Budget	(4) Unemp. Exp. %Budget	(5) Health. Exp. %GDP	(6) Health. Exp. %GDP	(7) Health. Exp. %Budget	(8) Health. Exp. %Budget
Gini (t-1)	-0.751		-6.029***		-3.004		-2.147	
	(1.734)		(2.267)		(2.671)		(5.350)	
P90/50 (t-1)		-0.153		-1.109**		-0.966*		-1.715*
		(0.319)		(0.476)		(0.542)		(1.038)
P50/10 (t-1)		-0.00214		-0.00553		-0.00506		-0.00969
		(0.00217)		(0.00403)		(0.00379)		(0.00790)
GDP Growth (t)	0.0315	0.0328	0.0577	0.0709	-0.0863	-0.0590	-0.126	-0.0588
	(0.0523)	(0.0509)	(0.0808)	(0.0807)	(0.0733)	(0.0750)	(0.167)	(0.168)
Unemployment (t)	0.235***	0.240***	0.416***	0.432***	-0.0232	-0.00385	-0.295***	-0.248***
	(0.0173)	(0.0166)	(0.0340)	(0.0363)	(0.0373)	(0.0377)	(0.0747)	(0.0784)
Population > 65 (t)	4.13e-05	4.08e-05	2.57e-05	3.78e-05	0.000138**	0.000158**	0.000234	0.000271*
	(2.99e-05)	(3.02e-05)	(5.12e-05)	(4.99e-05)	(6.66e-05)	(6.27e-05)	(0.000150)	(0.000143)
Voter Turnout (t)	-0.00742	-0.0112	-0.000305	-0.00929	0.0148	0.0102	-0.0484	-0.0563
	(0.0141)	(0.0145)	(0.0220)	(0.0242)	(0.0219)	(0.0220)	(0.0473)	(0.0477)
Left Government (t)	0.00174	0.00148	0.00335	0.00282	-0.00251	-0.00318	-0.00900*	-0.0105*
	(0.00147)	(0.00151)	(0.00240)	(0.00253)	(0.00263)	(0.00275)	(0.00543)	(0.00573)
Disproportionality (t)	-0.0200	-0.0248	-0.0291	-0.0472	-0.0240	-0.0314	-0.167**	-0.182**
	(0.0256)	(0.0255)	(0.0467)	(0.0467)	(0.0336)	(0.0364)	(0.0739)	(0.0771)
Observations	72	72	71	71	90	90	89	89
No. of countries	16	16	16	16	22	22	22	22
R-squared	0.773	0.776	0.552	0.552	0.442	0.463	0.584	0.600
WT AR(1) (p-value)	0.0545	0.0729	0.0237	0.0355	2.99e-06	2.93e-06	2.71e-05	1.21e-05
Wald test TD (p-value)	0.0466	0.0556	0.270	0.401	0.101	0.0900	0.0563	0.0222

Fixed effects estimation coefficients with White-Huber robust or heteroskedasticity and autocorrelation consistent standard errors in parentheses (depending on the Wooldridge test). WT AR(1): Wooldridge test of the H0 hypothesis of no-first-order autocorrelation; Wald test TD: Wald test for the inclusion of time dummies, if p-value<0.1 time dummies are included (coefficients for time dummies are not shown).

*** significant at 1%; ** significant at 5%; * significant at 10%.

Table 7: FE Estimation – Share Gains

	(1) Share-gain10	(2) Share-gain10	(3) Share-gain20	(4) Share-gain20	(5) Share-gain30	(6) Share-gain30	(7) Share-gain50	(8) Share-gain50	(9) Share-gain80-20	(10) Share-gain80-20
Gini (t-1)	-4.385***		-6.811***		-3.872		2.507		19.04***	
	(1.090)		(1.981)		(3.485)		(5.624)		(4.762)	
P90/50 (t-1)		-0.593**		-0.548**		-0.838		-0.634		0.804
		(0.238)		(0.256)		(0.721)		(1.176)		(1.195)
P50/10 (t-1)		-0.00291		-0.00286		0.00131		-0.00409		0.00523
		(0.00183)		(0.00196)		(0.00282)		(0.00524)		(0.00607)
GDP Growth (t)	0.0401	0.0452	0.00971	0.0300	-0.116	-0.116	-0.321**	-0.264*	-0.456***	-0.307*
	(0.0429)	(0.0494)	(0.0555)	(0.0507)	(0.0952)	(0.0939)	(0.146)	(0.152)	(0.132)	(0.162)
Unemployment (t)	-0.0101	-0.00761	0.0264	0.00768	0.158***	0.160***	0.202**	0.237***	0.176**	0.141*
	(0.0259)	(0.0268)	(0.0247)	(0.0269)	(0.0438)	(0.0428)	(0.0820)	(0.0816)	(0.0815)	(0.0850)
Population > 65 (t)	-5.23e-06	-6.04e-06	-2.74e-06	-8.16e-06	-6.71e-05	-4.39e-05	-0.000156*	-0.000140	8.37e-05	-4.02e-05
	(2.19e-05)	(2.57e-05)	(2.93e-05)	(2.69e-05)	(4.47e-05)	(4.51e-05)	(9.36e-05)	(9.76e-05)	(7.97e-05)	(9.85e-05)
Voter Turnout (t)	-0.0143	-0.0173	0.000884	-0.0236	0.0322	0.0356	0.0487	0.0698	-0.0210	0.0653
	(0.0177)	(0.0186)	(0.0214)	(0.0211)	(0.0267)	(0.0276)	(0.0397)	(0.0435)	(0.0459)	(0.0504)
Left Government (t)	0.000314	0.000148	-0.000258	-2.06e-06	-0.00383	-0.00347	-0.00679	-0.00707	0.000777	-0.000848
	(0.00139)	(0.00145)	(0.00118)	(0.00164)	(0.00264)	(0.00259)	(0.00453)	(0.00442)	(0.00482)	(0.00434)
Disproportionality (t)	0.0151	0.00891	0.0225	0.00617	0.0373	0.0380	0.00768	0.00576	0.0534	0.0257
	(0.0317)	(0.0324)	(0.0317)	(0.0351)	(0.0332)	(0.0338)	(0.0633)	(0.0594)	(0.0811)	(0.0779)
Observations	73	73	73	73	73	73	73	73	73	73
No. of countries	18	18	18	18	18	18	18	18	18	18
R-squared	0.227	0.188	0.290	0.138	0.746	0.749	0.773	0.776	0.643	0.657
WT AR(1) (p-value)	0.0850	0.0232	0.00882	0.0329	0.00936	0.0103	0.0683	0.0302	0.149	0.0880
Wald test TD (p-value)	0.258	0.189	0.0562	0.252	0.00246	0.00178	7.68e-06	2.44e-06	0.202	0.0440

Fixed effects estimation coefficients with White-Huber robust or heteroskedasticity and autocorrelation consistent standard errors in parentheses (depending on the Wooldridge test). WT AR(1): Wooldridge test of the H0 hypothesis of no-first-order autocorrelation; Wald test TD: Wald test for the inclusion of time dummies, if p-value<0.1 time dummies are included (coefficients for time dummies are not shown).
*** significant at 1%; ** significant at 5%; * significant at 10%.

Table 8: No Lags, Median-to-Mean-Ratio, Nonlinearities

	(1) Soc.Exp. %GDP	(2) Soctrans Ratio	(3) Health Exp. %GDP	(4) Share-gain10	(5) Share-gain20	(6) Share-gain80-20
No Lags						
Gini (t-1)	-19.54	0.627***	4.691	-10.12***	-9.657***	38.17***
	(19.53)	(0.180)	(5.159)	(1.592)	(1.827)	(3.424)
P90/50 (t-1)	-2.602	0.0678**	0.290	-1.625***	-1.615***	8.152***
	(3.335)	(0.0279)	(0.571)	(0.293)	(0.319)	(0.623)
P50/10 (t-1)	-0.00990	7.11e-05	-0.00299	0.00121	0.00368*	-0.0102**
	(0.0189)	(0.000201)	(0.00527)	(0.00177)	(0.00192)	(0.00447)
Median Mean Ratio						
Median/Mean (t-1)	-11.76	-0.249	0.834	1.761	1.449	2.968
	(13.47)	(0.158)	(2.608)	(1.691)	(1.772)	(7.132)
Non-linear Relationship						
Gini (t-1)	-242.6	4.529***	59.24	-32.28**	-28.62*	171.3***
	(177.5)	(1.467)	(47.23)	(15.01)	(15.02)	(49.02)
$Gini^2$ (t-1)	261.9	-4.480***	-67.37	31.04*	23.85	-169.4***
	(192.7)	(1.570)	(50.85)	(16.24)	(16.02)	(55.89)

Fixed effects estimation coefficients with White-Huber robust or heteroskedasticity and autocorrelation consistent standard errors in parentheses (depending on the Wooldridge test). Time dummies are included, if indicated by a Wald test.
*** significant at 1%; ** significant at 5%; * significant at 10%.

Table 9: Different Estimators and Specifications

	(1) Soc.Exp. %GDP	(2) Soctrans Ratio	(3) Health Exp. %GDP	(4) Share-gain10	(5) Share-gain20	(6) Share-gain80-20
Prais-Winsten						
Gini (t-1)	0.759	0.460***	-3.758	-4.643***	-7.934***	21.34***
	(14.46)	(0.151)	(2.333)	(1.188)	(2.435)	(4.383)
P90/50 (t-1)	0.402	0.0698***	-0.859*	-0.616**	-0.550*	2.834**
	(2.655)	(0.0238)	(0.448)	(0.293)	(0.302)	(1.372)
P50/10 (t-1)	-0.0372*	0.000267	-0.00209	-0.00281	-0.00284	0.00665
	(0.0214)	(0.000192)	(0.00332)	(0.00239)	(0.00258)	(0.00900)
Newey West SE						
Gini (t-1)	1.250	0.462***	-3.004	-4.385***	-6.811***	19.04***
	(14.50)	(0.156)	(3.225)	(1.198)	(1.981)	(3.816)
P90/50 (t-1)	0.277	0.0696***	-0.0918	-0.593**	-0.768***	0.804
	(2.728)	(0.0258)	(0.438)	(0.264)	(0.278)	(1.195)
P50/10 (t-1)	-0.0339**	0.000266	-0.000791	-0.00291	-0.00456**	0.00523
	(0.0160)	(0.000200)	(0.00372)	(0.00203)	(0.00189)	(0.00607)
Driscoll-Kraay SE						
Gini (t-1)	1.250	0.400**	-3.004	-5.532***	-6.811***	13.63***
	(8.207)	(0.179)	(1.780)	(1.598)	(1.713)	(4.406)
P90/50 (t-1)	0.277	0.0516*	-0.966***	-0.601**	-0.768***	0.804*
	(0.817)	(0.0276)	(0.212)	(0.254)	(0.254)	(0.430)
P50/10 (t-1)	-0.0339***	1.00e-04	-0.00506	-0.00406**	-0.00456**	0.00523
	(0.00993)	(0.000117)	(0.00372)	(0.00161)	(0.00183)	(0.00451)
FE, Dropping Unemployment						
Gini (t-1)	6.652	0.599***	-3.370	-4.574***	-6.327***	15.99***
	(12.68)	(0.166)	(2.682)	(1.157)	(2.026)	(5.675)
P90/50 (t-1)	1.518	0.0920***	-0.979*	-0.622**	-0.519*	1.356
	(2.521)	(0.0269)	(0.521)	(0.254)	(0.275)	(1.148)
P50/10 (t-1)	-0.0255	0.000425**	-0.00515	-0.00304*	-0.00273	0.00768
	(0.0176)	(0.000184)	(0.00389)	(0.00176)	(0.00188)	(0.00625)
FE, Sample excluding USA						
Gini (t-1)	2.046	0.484***	-2.343	-4.235***	-4.059***	19.30***
	(12.89)	(0.152)	(2.438)	(1.191)	(1.328)	(4.955)
P90/50 (t-1)	0.581	0.0696***	-0.769	-0.584**	-0.547*	2.754*
	(2.551)	(0.0233)	(0.503)	(0.264)	(0.286)	(1.445)
P50/10 (t-1)	-0.0351*	0.000266	-0.00114	-0.00362*	-0.00338	0.0119
	(0.0186)	(0.000181)	(0.00319)	(0.00191)	(0.00207)	(0.00904)

Results for economic and political control variables are not shown. Control variables are the same as above. Prais-Winsten: Prais-Winsten regression with first-order autocorrelation adjusted error term including country dummies; FE: fixed effects estimations as above. Newey-West: fixed effects estimation with automatic bandwidth selection procedure as suggested by Newey and West (1994). Driscoll-Kraay SE: fixed effects estimation with Driscoll-Kraay standard errors (Driscoll and Kraay (1998)). Throughout time dummies are included, if indicated by the Wald test.

*** significant at 1%; ** significant at 5%; * significant at 10%.

Table 10: Jackknife Test

	Social Exp. % GDP		Soctrans Ratio		Health Exp. %GDP	
	min	max	min	max	min	max
Gini (t-1)	-16.87	7.968	0.321*	0.481***	-5.971**	-1.058
	(15.20)	(14.39)	(0.189)	(0.186)	(2.818)	(2.698)
P90/50 (t-1)	-1.346	3.044	0.0339	0.0687**	-1.451**	-0.511
	(2.806)	(2.544)	(0.0324)	(0.0300)	(0.647)	(0.411)
P50/10 (t-1)	-0.0427***	-0.0249	-3.79e-05	0.000393**	-0.00700*	-0.00114
	(0.0160)	(0.0214)	(0.000182)	(0.000184)	(0.00405)	(0.00319)
	Sharegain10		Sharegain20		Sharegain80-20	
	min	max	min	max	min	max
Gini (t-1)	-6.076***	-3.357*	-7.676***	-4.209**	8.970	16.48***
	(1.873)	(1.754)	(2.072)	(1.717)	(5.645)	(5.851)
P90/50 (t-1)	-0.695**	-0.452*	-0.829***	-0.590**	0.177	1.473
	(0.307)	(0.254)	(0.322)	(0.251)	(1.322)	(1.488)
P50/10 (t-1)	-0.00510***	-0.00337*	-0.00562***	-0.00389*	0.00147	0.0110*
	(0.00214)	(0.00188)	(0.00187)	(0.00205)	(0.00614)	(0.00574)

Fixed effects estimation coefficients with White-Huber robust or heteroskedasticity and autocorrelation consistent standard errors in parentheses (depending on the Wooldridge test). Time dummies are included, if indicated by a Wald test.
*** significant at 1%; ** significant at 5%; * significant at 10%.

Table 11: Two-step system GMM Estimation

	(1) Soctrans Ratio	(2) Soctrans Ratio	(3) Health Exp. %GDP	(4) Health Exp. %GDP	(5) Share-gain10	(6) Share-gain10	(7) Share-gain20	(8) Share-gain20	(9) Share-gain80-20	(10) Share-gain80-20
Gini (t-1)	1.030		-4.300		-4.450		-0.604		40.52**	
	(0.682)		(11.48)		(4.551)		(5.392)		(17.21)	
P90/50 (t-1)		0.177**		-0.556		-1.170*		-0.749		7.033*
		(0.0692)		(1.235)		(0.623)		(0.658)		(3.789)
P50/10 (t-1)		0.000659**		0.00587		-0.000433		0.00178		-0.00813
		(0.000334)		(0.00870)		(0.00325)		(0.00343)		(0.00985)
GDP Growth (t)	-0.0142*	-0.0176***	-0.0873	-0.116	0.0634	0.0875	0.0194	0.0356	-0.583**	-0.462**
	(0.00774)	(0.00406)	(0.133)	(0.0947)	(0.0446)	(0.0630)	(0.0569)	(0.0682)	(0.249)	(0.214)
Unemployment (t)	-0.00243	-0.00401	0.0278	0.0329	0.0293	0.0514	0.0517	0.0581	0.0242	-0.00630
	(0.00321)	(0.00579)	(0.108)	(0.116)	(0.0359)	(0.0385)	(0.0493)	(0.0428)	(0.224)	(0.310)
Population > 65 (t)	-3.32e-06**	-4.38e-06***	4.43e-05**	6.17e-05*	-1.95e-05	-1.52e-05	-3.00e-05**	-2.39e-05**	1.50e-05	-1.47e-05
	(1.57e-06)	(1.06e-06)	(2.25e-05)	(3.18e-05)	(1.20e-05)	(9.82e-06)	(1.49e-05)	(1.16e-05)	(4.80e-05)	(6.19e-05)
Voter Turnout (t)	0.000582	-8.77e-05	0.0331**	0.0286	0.0189**	0.0153**	0.0230**	0.0202**	0.00412	0.0299
	(0.00121)	(0.000911)	(0.0131)	(0.0184)	(0.00836)	(0.00659)	(0.0103)	(0.00795)	(0.0287)	(0.0490)
Left Government (t)	1.00e-04	9.97e-05	-9.77e-05	4.51e-05	0.00104	0.00138	0.00164	0.00197	-0.00252	-0.00499
	(0.000150)	(0.000197)	(0.00247)	(0.00275)	(0.00159)	(0.00171)	(0.00181)	(0.00176)	(0.00506)	(0.00450)
Disproportionality (t)	-0.000587	-0.00240	0.0265	0.0208	-0.0397	-0.0346	-0.0586*	-0.0507*	0.0165	-0.0245
	(0.00197)	(0.00167)	(0.0449)	(0.0466)	(0.0302)	(0.0268)	(0.0315)	(0.0295)	(0.104)	(0.0969)
Observations	80	80	91	91	77	77	77	77	77	77
No. of countries	23	23	23	23	22	22	22	22	22	22
No. of instruments	18	14	12	14	12	14	12	14	12	14
AR(2) (p-value)	0.535	0.140	0.242	0.295	0.766	0.616	0.619	0.381	0.514	0.701
Hansen (p-value)	0.411	0.772	0.409	0.208	0.732	0.996	0.619	0.966	0.466	0.485

Two-step system GMM estimations as proposed by Blundell and Bond (1998). Endogenous variables are the inequality variables (L.Gini, L.P90/50, L.P50/10), the real GDP and the unemployment rate. The number of lags is limited to one-period lags for both the level and the differenced equation. Standard errors are adjusted according to Windmeijer (2005). *** significant at 1%; ** significant at 5%; * significant at 10%.

Table 12: FE Estimation – Alternative Institutional Variables

	(1) Soctrans Ratio	(2) Soctrans Ratio	(3) Health Exp. %GDP	(4) Health Exp. %GDP	(5) Share-gain10	(6) Share-gain10	(7) Share-gain20	(8) Share-gain20	(9) Share-gain80-20	(10) Share-gain80-20
Gini (t-1)	0.485**		-3.545		-5.465**		-6.433**		21.23***	
	(0.216)		(3.071)		(2.193)		(2.411)		(6.099)	
P90/50 (t-1)		0.0800*		-1.213*		-0.741**		-0.885**		1.954
		(0.0443)		(0.660)		(0.359)		(0.408)		(1.808)
P50/10 (t-1)		7.35e-05		-0.00381		-0.00422**		-0.00442*		0.000415
		(0.000226)		(0.00368)		(0.00199)		(0.00226)		(0.00846)
GDP Growth (t)	0.00159	0.00414	-0.158	-0.151	-0.0602	-0.0674	-0.0705	-0.0815	-0.402**	-0.272
	(0.00622)	(0.00562)	(0.130)	(0.130)	(0.0564)	(0.0538)	(0.0611)	(0.0597)	(0.180)	(0.172)
Unemployment (t)	0.00835***	0.00942***	-0.0338	-0.00479	-0.00397	0.00970	0.00873	0.0229	0.165	0.124
	(0.00279)	(0.00218)	(0.0510)	(0.0530)	(0.0262)	(0.0273)	(0.0274)	(0.0302)	(0.107)	(0.112)
Population > 65 (t)	1.11e-06	8.60e-07	0.000154**	0.000197***	-2.36e-05	6.28e-06	-3.51e-05	-1.26e-06	8.95e-05	-4.92e-05
	(1.99e-06)	(3.05e-06)	(6.36e-05)	(6.49e-05)	(3.18e-05)	(3.66e-05)	(3.62e-05)	(4.34e-05)	(7.81e-05)	(0.000149)
Federalism (t)	-0.00147	0.00108	-0.0950	-0.0305	-0.524***	-0.518***	-0.633***	-0.628***	0.785**	1.057*
	(0.00848)	(0.00899)	(0.145)	(0.131)	(0.147)	(0.149)	(0.151)	(0.159)	(0.369)	(0.589)
Plurality (t)	0.0169	0.0217	-1.095***	-1.110***	-3.068***	-3.348***	-3.178***	-3.481***	3.905***	4.234***
	(0.0150)	(0.0173)	(0.306)	(0.322)	(0.397)	(0.331)	(0.409)	(0.339)	(0.737)	(1.311)
Observations	61	61	60	60	61	60	61	60	61	61
No. of countries	15	15	15	15	16	15	16	15	16	16
R-squared	0.528	0.495	0.406	0.431	0.501	0.490	0.481	0.458	0.680	0.682
WT AR(1) (p-value)	0.0119	0.000510	1.52e-06	2.67e-06	0.320	0.0991	0.167	0.0220	0.307	0.230
Wald test TD (p-value)	0.672	0.614	0.0906	0.0972	0.0595	0.0240	0.0209	0.00444	0.162	0.108

Fixed effects estimation coefficients with White-Huber robust or heteroskedasticity and autocorrelation consistent standard errors in parentheses (depending on the Wooldridge test). WT AR(1): Wooldridge test of the null hypothesis of no-first-order autocorrelation; Wald test TD: Wald test for the inclusion of time dummies, if p-value<0.1 time dummies are included (coefficients for time dummies are not shown).
*** significant at 1%; ** significant at 5%; * significant at 10%.

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