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Social Spending Generosity and Income Inequality: A Dynamic Panel Approach

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"Social Spending Generosity and Income Inequality: A Dynamic Panel Approach"

Judith Niehues[‡]

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Abstract

This paper explores if more generous social spending polices in fact lead to less income inequality, or if redistributive outcomes are offset by behavioral disincentive effects. To account for the inherent endogeneity of social policies with regard to inequality levels, I apply the System GMM estimator and use the presumably random incidence of certain diseases as instruments for social spending levels. The regression results suggest that more social spending effectively reduces inequality levels. The result is robust with respect to the instrument count and different data restrictions. Looking at the structure of benefits, particularly unemployment benefits and public pensions are responsible for the inequality reducing impact. More targeted benefits, however, do not significantly redue income inequality. Rather, their positive effect on pre-government incom inequality hints at substantial disinctive effects.

JEL Codes: D31, D60, H20

Keywords: Social Benefits, Redistribution, Income Inequality, System GMM

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1 Introduction

The relationship between redistributive policies and income inequality has generated much debate among social scientists and policy makers. Particularly the equity efficiency trade-off is fundamental in the public finance literature and state interventions are often considered as efficiency decreasing. Market forces alone, however, do not necessarily bring about a desirable distribution of income with regard to equity aspects. This is seen as a justification for government intervention and it is widely accepted that public policies can play a key role in redistributing income. However, while there is supposedly no doubt that all nations would ceteris paribus prefer less income inequality among their citizens, they differ dramatically in the extent to which they reach this goal. Therefore, understanding the differences in the design of fiscal and social policies and their corresponding distributive outcomes is of crucial importance not only to public economics but also to other social sciences.

Using a dynamic panel approach with European countries and a time period from 1993 until 2007, this paper studies the question whether a more generous welfare state is indeed *causally* related to more equality in the distribution of incomes. Beside the overall effect of social spending, this study also asks which kind of benefits are most effective in reducing income inequality by looking at the specific structure and characteristics of benefits. Particularly, the theoretical framework of the analysis elaborates in how far inequality reducing first-round effects might be offset by negative behavioral responses which are induced by redistributive social policies. As a consequence, the total effect on income inequality is ambigous. While the most extensive part of the empirical analysis looks at the determinants of post-government income inequality (i.e. the overall effect), behavioral second-order effects are identified by using next-period pre-government income inequality as dependent variable.

Generally, my approach can be regarded as part of the large body of literature that tries to identify the determinants of income inequality in cross-national comparison (see Atkinson and Brandolini (2004) for a survey). One of the most tested theories of the evolution of income inequality is the well-known Kuznets-hypothesis (Kuznets (1955)) which predicts an inverted-U relationship between inequality and the level of economic development (see among others: Galor and Tsiddon (1996); Barro (2000), Li et al. (2000)). Further studies focus on other macroeconomic factors such as globalization (Edwards (1997), Alderson and Nielsen (2002), Dreher and

Gaston (2008)), inflation (Bulir and Gulde (1995), Galli and van der Hoeven (2001)) or financial development (Clarke et al. (2006)) to explain variations in income inequality across countries.

The effect of *institutional* factors on income inequality has been analyzed less. This is certainly due to the inherent endogeneity of policies with respect to inequality levels. As social policies might be thought of as a mechanism to reduce income inequality, they might also be determined by inequality levels. This raises the problem of *reverse causality*. Recently, a couple of studies have become available which focus on the impact of labor market institutions on income inequality, using instrumental variable approaches to handle endogeneity issues. For example, Checchi and García-Peñalosa (2008, 2010) develop a formal model of how the labor share, union density and unemployment benefits influence income inequality. Using three-stage least squares they find that labor market institutions indeed reduce income inequality but that this effect is associated with higher unemployment rates. Calderón and Chong (2009) apply the System GMM-IV approach and find that both *de jure* and *de facto* labor market regulations tend to improve the equality of incomes. They also evaluated the effect of separate regulations and reveal distinct effects. In the context of fiscal policies, Duncan and Peter (2008) analyze the effect of the structural progressivity of income taxes on inequality in observed and true incomes. They use a two-stage least squares approach with weighted averages of tax/progressivity measures in neighboring countries as instruments for their fiscal policy variable.

Although the majority of studies of inequality determinants also controls for the impact of social spending, to the best of my knowledge the effect of social policies as key explanatory variable of income inequality has not yet been analyzed. Also, none of these studies has accounted for the endogeneity of social policies with respect to income inequality. Thus, in line with Dreher and Gaston (2008) and Calderón and Chong (2009) I apply the System GMM estimator which is capable of dealing with the issue of reverse causality in a dynamic panel design to evaluate the impact of social policies on income inequality. Instead of only relying on internal instruments, however, I also use the presumably random incidence of certain diseases to instrument for the possible endogeneity of redistributive policies.

The regression results suggest that a larger redistributive budget is strongly related with lower income inequality levels. The effect also remains robust when using differing numbers of instruments and data restrictions, supporting a *causal effect* of social spending levels on income inequality. Looking at the structure of

benefits, particularly the age-related and unemployment benefits are responsible for the inequality reducing impact. More targeted benefits, however, do not significantly reduce income inequality. Rather, the positive effect on pre-government income inequality hints at the importance of possible disincentive effects associated with means-testing.

The setup of the paper is organised as follows: In Section 2 I introduce the theoretical considerations underlying the analysis. Section 3 describes the data and methodology. Section 4 presents the regression results and Section 5 concludes by summarizing the main findings.

2 Theoretical Framework

In the following, I will outline some mechanisms which relate the welfare state to income inequality, where the term 'welfare state' is used shorthand for the total of social benefits provided by the state. The objective, however, is not to provide a complete theoretical picture of all possible effects of policies which influence inequality but to highlight some major mechanisms to develop testable hypotheses. The focus of this study is certainly the empirical exploration of the impact of social spending on income inequality.

At a first sight, the impact of the welfare state on income inequality seems trivial, since as long as social benefits are somehow redistributive, the first-round effect on the inequality of post-government incomes is by definition negative. This effective redistributive effect is usually measured in micro studies by comparing the inequality of pre-government income inequality with the inequality in post-transfer incomes. Indeed, Immervoll et al. (2005), Whiteford (2008) and Fuest et al. (forthcoming) find substantial redistributive effects of social benefits. Consequently one might expect a negative effect of social benefits on income inequality. However, this standard approach of measuring redistribution is problematic because it neglects the fact that the pre-government distribution of income is not independent of welfare state policies. Social benefits are generally associated with behavioral second-order effects which then influence the distribution of market incomes before government intervention. In fact, the provision of income transfers might influence behaviour in manifold ways with each having differing impacts on income inequality.[1] Here, I

[1]Income transfers may have an impact on private savings and investments, on demographic choices, the unemployment rate, consumption decisions and the formation of human capital (see

will focus on the labor supply related responses induced by social policies and their possible impact on the distribution of incomes.

Generally, all forms of social protection create some disincentives to work. As standard consumer theory suggests, any additional transfer payments shift the recipients' budget constraints which means that recipients have to work less to obtain a given standard of living. Assuming that leisure is a normal good, the positive income effect reduces labor supply. If the design of the benefit involves a benefit reduction as income increases, this will impose an implicit marginal tax rate on additional earnings which also unambiguously decreases labor supply. Supposing that low income earners reduce their labor supply more than high income earners, social benefits will lead to an increase of pre-government income inequality.[2] If benefit levels discourage recipients from taking part in the labor market at all, this leads to an increase in the unemployment rate which in turn also increases pre-government income inequality. Given these considerations I expect a positive effect of social benefits on pre-government income inequality.[3] Thus, taking into account second-order disincentive effects, the redistributive effects of social benefits might be smaller than the micro studies would suggest. In fact, at the macro level the distributional effect of social benefits on post-government income is a priori not clear. The hypothesized effects of the welfare state on pre- and post-government income inequality are also illustrated in Figure 1.

In the previous paragraph, hypotheses of the overall effect of total social spending on income inequality were developed. However, the 'welfare state' is a complex construct which consists of several different social programmes with each having different objectives and thus, different effects on the distribution of pre- and post-government incomes. Most generally, social benefit programmes can be divided into two parts: Social insurance versus social assistance benefits (Danziger et al. (1981), Barr (2004)). Whereas social assistance benefits are generally provided on the basis

Danziger et al. (1981) for further references). In addition, the financing sources of benefits such as taxes and contributions are also associated with their own behavorial responses which are not discussed here.

[2]Generally, it is a robust finding that average labor supply elasticities (taking into account participation elasticities as well as hours of labor supply) strongly decline with income (as pointed out in Røed and Strøm (2002) and also recently found in Aaberge and Colombino (2006)).

[3]The 'redistributive paradoxon' as introduced by Sinn (1995) strengthens the expectation of a positive effect of the welfare state on pre-government income inequality. The underlying argument is that the social security system induces increasing investment in risky assets and moral hazard effects. Therefore, paradoxically, more redistribution may result in more post-tax inequality.

of an income test to help people with low other incomes, the main objective of social insurance benefits is to maintain income in the face of adverse risks (such as unemployment, disability and sickness) or to redistribute across the life-cycle (age-related benefits, family-related benefits).

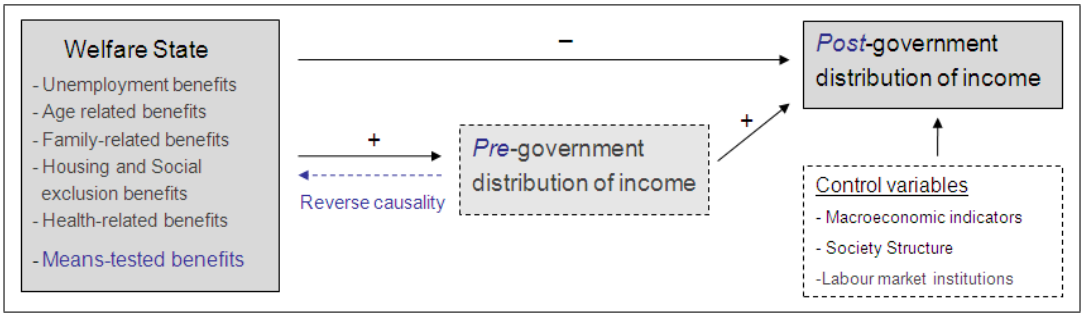

Figure 1: Social Spending Policies and Income Inequality

These different objectives of the different benefit functions imply different expectations about their distributional outcomes.[4] For example, insurance-related benefits such as unemployment, sickness and disability benefits need not necessarily be organised to redistribute from the rich to the poor. In the case of insurance-related benefits one does not have to claim financial need, but eligibility and benefit level depend on past contributions and the event of unemployment, illness or invalidity. If the benefits are completely actuarial and are exclusively designed to maintain status and income, they should have no equalizing effect. However, in most developed countries, the social insurance benefits of low income earners are disproportionally higher than their past contributions. Redistribution also occurs if benefit claims are more common in the low income part of the population, which is often the case. The argumentation in the context of public pensions is similar: Although redistribution is not an inherent part of pensions, most systems apply some redistributive formula which favors the poor. With respect to family-related programmes, they usually imply redistribution (from rich to poor and across the life-cycle) since most families with children are typically in the younger segments of the populations which are characterized by low incomes. Housing benefits, on the other hand, are directly designed to help recipients to meet the cost of housing and eligibility is usually based on a kind of financial need test. Similar as in the case of pure social assistance benefits (such as an minimum income guarantee), their main

[4]The following explanations about expected distributional outcomes of different social benefits mainly draw upon Barr (1992) and Barr (2004).

motive is vertical equity. Consequently, their expected first-round effect on income inequality is particularly high. Housing benefits and minimum income guarantees generally belong to the category of social assistance benefits.

With respect to the incentive effects related to these different benefit functions, it is certainly possible to identify some expectations about typical behavioral effects. For example, it is generally assumed that extremely high unemployment benefits (replacement rates) provide little financial incentives to work, causing 'unemployment traps' (Barr (2004), p.179; Meyer (2002)) which in turn increase pre-government income inequality. In the context of public pensions and labor supply-related responses, it is discussed if they induce early-retirement (Gruber and Wise (1998); Blundell et al. (2002)).[5] Family-related benefits are often expected to reduce the labor supply of second-earners. In the case of unemployment benefits, however, empirical evidence suggests that labor supply depends more on other characteristics such as the maximum duration of benefits than on the pure level of benefits (Atkinson and Micklewright (1991)). Furthermore, many programmes involve some further eligibility conditions (e.g. working-tax credits, in-work benefits) which may partly offset behavioral disincentive effects (Blundell (2000)). Thus, to develop testable hypotheses of the behavioral effects of different benefit functions, further information on the specific design and financing of the programme is needed. So, the overall effect of different benefit functions on post-government income inequality remains an empirical matter.

From a theoretical viewpoint, the effect of means-tested benefits on pre-government income inequality is less controversial. Means-tested benefits generally involve a reduction in the level of benefits as earnings increase. This leads to implicit marginal tax rates above 100 percent and major labor-supply disincentives (Danziger et al. (1981); Pestieau (2006)). As means-tested benefits are expected to reduce labor supply more for low income earners than for high income earners, pre-government income inequality is expected to increase (Bergh (2005)). Therefore equalizing first-round effects of more targeting are likely to be counteracted by negative behavioral effects on pre-government income inequality.[6] As Atkinson (1995) states *'the case*

[5] Another debate relates to the question whether public pensions reduce private savings (see for example Feldstein (1974)), with negative effects on economic growth and adverse effects on aggregate income inequality.

[6] Korpi and Palme's (1998) considerations of less political support and smaller redistributive budgets in the case of greater low-income targeting also provide arguments for counteracting effects of redistributive effects of means-testing.

for greater targeting is typically based on the assumption of a fixed total budget for the social security ministry ... Account has to be taken of changes in the behaviour of recipients, and the limits to targeting may arise from the adverse incentives created' (p. 224). Accordingly, I expect a clear positive effect of the proportion of means-tested benefits on pre-governement income inequality. The overall effect on post-government income inequality, though, is a priori not clear.

Figure 1 also illustrates the endogeneity problem of social programmes with respect to inequality in the pre-government distribution of incomes. Following the famous median voter theorem, higher inequality levels may also lead to higher redistribution (Meltzer and Richard (1981)). I will deal with this issue of reverse causality in the empirical part of the paper. The Figure also hints at further control variables which are expected to have an influence an on income inequality. The choice of indicators is based on previous analyses of income inequality determinants mentioned above. Basically I will use three sorts of indicators, such as macroeconomic factors, socio-economic society characteristics and indicators for the influence of labor market institutions, which are explained in the next section.

3 Data and Methods

Data

The dependent variable of the main part of the empirical analysis is the *Gini Coefficient* of equivalised disposable income.[7] Disposable income means factor income originally earned at the market minus taxes plus social transfers and which therefore represents the income which finally matters for the individual. The unit of analysis is the individual and to compensate for different household structures and possible economies of scales within households, I use equivalised household incomes for the computation of Gini coefficients. For each person, the equivalised (per-capita) total net income is its household total net income divided by the equivalised household size according to the modified OECD scale.[8] The data for the Gini coefficient is

[7] In case of maximum inequality the standardised Gini coefficient equals one, and it corresponds to zero when all incomes are equal. Concerning the sensitivity on the distribution scale, the Gini coefficient attaches most weight to transfers among mid-level incomes.

[8] The modified OECD scale assigns a weight of 1.0 to the head of household, 0.5 to every household member aged 14 or more and 0.3 to each child aged less than 14. Summing up the individual weights gives the household specific equivalence factor.

based on three different micro data sources. Data for the *income reference period* 1993 until 2000 is based on the ECHP (European Community Household Panel), a household survey with a common conceptual framework conducted in the member states of the EU, co-ordinated by the Statistical Office of the European Communites (Eurostat). The survey basically covers the old EU-15 member states, although data for Austria (1993), Finland (1993, 1994) and Sweden (1993-1995) is missing for the first periods. Gini coefficients for the year 2001 are based on the statistics of the baseline tax benefit systems of EUROMOD, a microsimulation model for European countries.[9] Gini Coefficients from 2003 until 2006 are based on EU-SILC (Statistics on Income and Living Conditions) micro data, which is the successor of ECHP data. The EU-SILC provides harmonised cross-sectional and longitudinal multidimensional micro data on income and social exclusion in European countries. After its start in 2003 with 7 European countries, in the 2004 wave it covered all old EU-15 member states except Germany, Netherlands and the UK (Gini Coefficients for these countries are also taken from the EUROMOD statistics). Since wave 2005, the dataset covers the 25 EU member states (except Malta), plus Norway and Iceland. Overall I have 223[10] observations for the Gini coefficient of post-government income, until 2003 basically covering the EU-15 countries and from 2004 onwards also the new European member states (except Malta, Slovenia, Romania and Bulgaria) plus Norway which is also included in the sample. Unfortunately I have no data for 2002 because there are no comparable data sources for the EU-15 that year. Also, there is an unavoidable disruption in the time series of indicators produced when using different data surveys which has to be kept in mind when interpreting the results.[11] However, this is the best annual data available for EU member states. In fact, the cross-national comparability of the micro data and the time period covered are major contributions of this study.[12] Particularly, the usage of micro data ensures that

[9] EUROMOD statistics on Distribution and Decomposition of Disposable Income, accessed at http://www.iser.essex.ac.uk/research/euromod/statistics/ using EUROMOD version no. D21 (June 2008). For further information on EUROMOD, see e.g. Sutherland (2001), Lietz and Mantovani (2006) and Sutherland (2007).

[10] 96 observations from ECHP, 18 from EUROMOD statistics and 109 observations from EU-SILC micro data. In fact, I only include data points where information on union density is also available to make different specifications more comparable.

[11] In various robustness checks, however, I check in how far this structural break influences the results. Also, I restrict the sample to EU-15 countries and EU-SILC data only. The results are illustrated in the Appendix.

[12] See Atkinson & Brandolini (2001, p. 772) who comment on the pitfalls in the use of secondary inequality data: "Gini coefficients of income inequality may be published for a range of countries,

all Gini coefficients are based on the same income concept.

Variable	Obs	Mean	Std. Dev.	Min	Max
Post-Government Gini Coefficient	223	29.02	4.43	20.48	39.24
Pre-Government Gini Coeffient	80	48.40	3.43	38.80	55.30
Social benefits / GDP	223	23.90	5.03	11.90	32.60
Means-tested / Soc Ben	223	9.08	6.55	0.82	33.12
Unemployment / Soc Ben	223	7.11	4.07	0.90	21.68
Family-related / Soc Ben	223	9.19	3.49	1.89	17.58
Invalidity / Soc Ben	223	9.39	3.31	3.75	19.06
Health and sickness / Soc Ben	223	27.72	4.61	17.53	42.66
Old-age and survivor / Soc Ben	223	43.26	7.92	24.68	64.09
Housing and exclusion / Soc Ben	223	3.33	2.06	0.11	7.78
GDP per capita (in 1000$)	223	31.36	14.30	6.19	78.89
GDP per capita squared (in 1000$)	223	1187.28	1084.45	38.26	6223.79
Dependency ratio	223	49.14	3.33	39.36	59.05
Proportion higher education	223	63.28	18.47	17.80	90.30
Union density	223	37.87	21.26	8.00	85.10

Table 1: Descriptive Statistics

In the second part of the analysis I also use the Gini coefficient of market incomes as dependent variable, meaning incomes before any redistributive government intervention. Unfortunately data on pre-government incomes is only available from 2003 onwards and then only for a limited country sample. Altogether this makes at most 80 observations for the Gini coefficient of pre-government incomes. Still, comparability concerns decrease as the computation of all pre-government Gini coefficients base on a single data source, which is EU-SILC micro data. Throughout the analysis, Gini coefficients are measured on a scale from 0 to 100. Descriptive statistics for the Gini coefficient of pre-government and post-government incomes are illustrated in Table 1.

Following the theoretical framework outlined above, the key explanatory variables of the analysis are indicators for the social spending structure of the welfare state. All data for these variables is taken from the Eurostat database. So I use total social benefits to operationalize the overall spending generosity of the welfare state. Social benefits encompass all expenditures incurred by social protection systems apart from any operating expenditures. However, there are critical views of

but there is no agreed basis of definition. [...] We cannot therefore be sure whether results of comparative or econometric analyses obtained using such data are genuine or a product of data differences."

using such data.[13] In fact, it would be more accurate to use for example net social expenditures which also take into account the impact of taxation and private benefits on social expenditures (see Adema and Ladaique (2009)). Unfortunately, this data is not available for the countries and time period I cover. Throughout the analysis, total social benefits are expressed as proportion of GDP to account for different country sizes. To analyze the impact of different social spending categories on income inequality, I basically rely on the different benefit functions of the core system of the Social Protection Statistics provided by Eurostat. Thus, I look at unemployment, family, health and invalidity-related benefits separately. I add survivors' benefits to the category of old-age-related benefits and combine housing and social exclusion benefits, whereas social exclusion benefits only represent a small residual function in the Eurostat Social Protection Statistics.[14] To measure the degree of low income targeting of welfare states I apply the proportion of means-tested social benefits as percent of total social benefits. Means-tested benefits are social benefits which are explicitly or implicitly conditional on the beneficiary´s income and/or wealth falling below a specific level. Descriptive Statistics for the key explanatory variables are shown in Table 1.

Beside social spending, obviously, there are also a number of further variables which are expected to have an influence on income inequality. The choice of indicators which I will control for in my empirical anaylsis is based on previous studies on income inequality determinants, which are briefly surveyed at the beginning of the paper. Thus, I include three sorts of indicators, such as macroeconometric factors, socio-economic society characteristics and indicators for the influence of labor market institutions. As macroeconomic indicators I use *GDP per capita* (measured in constant international 1000 $) and GDP per capita squared to control for the aggregate income levels of countries. The data for the level of economic development is taken from the World Development Indicators (WDI) from the World Bank Group.

Variables which represent the socio-demographic and -economic structure of the society such as the *dependency ratio* (the proportion of population aged under 15 and over 64 as percent of total population) and the *proportion of the population aged between 25 and 64 which has at least a higher secondary education* are again from

[13] See for example De Deken and Kittel (2007) who critically assess using data on social expenditures as they are available in Eurostat. For further information on methodological issues regarding variables of the spending dimension of social protection schemes see European Commission (1996).

[14] See European Commission (1996) for further information on the definition of different spending categories in the Social Protection Statistics as published by Eurostat.

the Eurostat database.

Measures of the influence of labor market institutions are taken from the ICT-WSS Database: Database on International Characteristics of Trade Unions, Wage Setting, State Intervention and Social Pacts in 34 countries between 1960 and 2007. *Union density* presents the net union membership as proportion of wage and salary earners in employment.[15] Finally, I also include a dummy for post-socialist new EU member states since their inequality levels may differ for reasons not captured by the aforementioned control variables. Descriptive Statistics for all control variables included in the analysis are also represented in Table 1.

Method

As has been indicated, this article bases on an unbalanced, pooled cross-sectional time series (CSTS) of at most 183 cases in 24 European countries. To empirically estimate the hypotheses derived in section 2 I will use a reduced form equation such as

$$y_{it} = \alpha y_{i,t-1} + \beta S_{it} + \gamma X_{it} + \mu_i + \mu_t + \varepsilon_{it} \tag{1}$$

with y_{it} as the inequality measure of country i at time point t which is either the Gini coefficient of post-government income or the Gini coefficient of pre-government income.

S_{it} represents the variable of interest, the overall generosity of the welfare state, represented by total social benefits per GDP. X is a vector of control variables as explained in the previous section. Finally u_i presents country-specific effects, u_t period-specific effects and ε_{it} the idiosyncratic error term. The lagged dependent variable is included because income inequality is rather persistent over time. In the presence of country fixed effects, OLS will lead to biased and inconsitent estimates in this dynamic panel setting.[16] Thus my preferred method of estimation is System GMM which was introduced by Blundell and Bond (1998). More specifically, I use the System GMM estimator as implemented by Roodman (2009b) in Stata.

[15] Within robustness checks I also included GDP growth, the inflation and unemployment rate, population growth and different openness indicators as additional control variables. I dropped these variables in the final estimations because they either did not prove to have a significant impact on inequality or due to multicollinearity concerns. However, the inclusion of these addional controls did not substantially change the results.

[16] In fact, OLS will tend to produce an upward bias in the coefficient of the dependent variable, for a fixed effects model, the opposite is true. Thus, a valid specification should produce coefficient estimates for the lagged dependent variable which lie within or near this range of estimates.

In contrast to Difference GMM (Arellano and Bond (1991)) where differences are instrumented with levels, the Blundell-Bond estimator instruments levels with differences. The underlying idea is that in the presence of persistent processes past changes may be more predicitve of current levels than past levels of current changes. Thus the instruments become more relevant. System GMM also allows to include time-invariant variables in the level equation.

In some additional specifications I will allso analyze the impact of specific social programs S^k (such as unemployment benefits, family-related benefits, old-age related benefits and so on) on income inequality. To avoid omitted variable biases I also inlcude a measure of total social benefits less the specific benefits k in question (S_{it}^{1-k}) to simultaneously control for other social benefits:[17]

$$y_{it} = \alpha y_{i,t-1} + \beta S_{it}^{1-k} + \beta S_{it}^{k} + \gamma X_{it} + \mu_i + \mu_t + \varepsilon_{it} \tag{2}$$

The Difference and System GMM regression approaches are particularly useful because they can deal with endogenous regressors and reverse causality. Since I look at the impact of social policies on income inequality, there is no appropriate counterfactual without the social policy in place. In fact, in my particular setting, the long established median voter theorem suggests that higher inequality could also lead to more redistribution (Meltzer and Richard (1981)). Accordingly, inequality levels might also influence the design of redistributive policies. This possible reverse causality implies that the results for the generosity of the welfare state are likely to be biased upwards. Generally, System GMM is intended to build internal instruments for the predetermined dependent and additional endogenous regressor variables. However, to particularly deal with the endogeneity of my social policy variable, I also include external instruments in my estimations. Particularly in the macro context of developed countries appropriate instruments, and therefore an exogenous variation in social spending, are difficult to find. The present paper uses the presumably random incidence of certain diseases to instrument for the possible endogeneity of redistributive policies. Unfortunately comparable data on the incidence of such diseases is rare. Finally I include the number of hospital discharges of multiple sclerosis per 100,000 and the standardized death rates of malignant melanoma of skin and malignat neoplasms of prostate as proxies for the incidence of these

[17] See Calderón and Chong (2009) for a similar approach to analyze the impact of specific labor market regulations on income inequality.

diseases.[18] I assume that they are not systematically related to behavioral effects, income and also income inequality but that the incidence of these diseases is not clear and mainly lies in unsystematic genetic predisposition. On the other hand, an increasing incidence of such diseases is obviously associated with an incrase in health expenditures and can therefore be regarded as an exogenous variation in social spending. Of course, the pure incidence of such dieseases would be more appropriate because the indicators actually used might again be related with the social health system of a particular country. However, such data is not available for a sufficient number of countries. Beside the social spending variables and the lagged dependent variables, I treat all other regressors as strictly exogenous, meaning they instrument themselves.

System GMM involves many specification choices. In my case of a rather unbalanced panel, I use forward orthogonal deviations (Arellano and Bover (1995)) instead of differences to maximize the sample size. Also, I apply the one-step estimator with small sample correction and robust standard errors to account for heteroskedastic error structures. Recently Roodman (2009a) discusses the problem of having too many instruments which might overfit endogenous variables. In fact, System GMM uses all available instruments and the number of instruments increases quartic to the number of time points. In my specific setting of N being only slightly larger than T, this might particularly be an issue. Thus, I test the robustness of the results to severly reducing the instrument count by collapsing instruments and restricting the number of lags used as instruments. In addition, I look at the Difference-in-Hansen test for the instruments of the level equation as recommended by Roodman (2009a). Obviously, another concern in my setting is the structural break in the time series of the underlying micro data for the Gini coefficient. Thus, I conduct several robustness checks by testing for the existence of structural breaks in the full sample and restrict the sample to using EU-SILC data only.

[18] Additionally I used the incidence of female breast cancer and the number of hospital discharges of musculoskeletal system and connective tissue diseases from the European health for all database (HFA-DB). However, data is only available for a very restricted sample of countries. The corresponding results are qualitatively the same and can be obtained from the author upon request.

4 Results

Table 2 presents the results of the first part of the empirical analysis of the impact of total welfare spending on post-government income inequality, measured by the Gini coefficient of disposable income. The specification in column (1) uses all available instruments as suggested by the System GMM estimator. As the results reveal, the lagged dependent variable is significantly different from zero at a one percent significance level, emphasizing the persistance of inequality levels over time. Also, the findings in column (1) reveal a negative effect of the overall generosity of the welfare state. The effect is significant at a five percent significance level. With respect to the macroeconomic control variables, the results support a U-shape relationship between GDP per capita and income inequality. Accordingly, in line with comparable studies on developed countries (e.g. Dreher and Gaston (2008)), the findings do not support the Kuznet´s hypothesis of an inverted U-relationship between inequality and the level of economic development. The dependency rate and the proportion of higher education do not show significant effects on income inequality in this specification. Post-socialist EU member states reveal income inequality levels which are on average 3 Gini points lower than in countries without a socialist history. According to this specfication, union density does not seem to have a significant effect on income inequality. As the identification statistics at the bottom of Table 1 suggest, the specification passes the Sargan overidentification test and the Arellano-Bond test of second-order serial correlation in the error terms. However, the perfect Hansen statistic of 1.000 indicates that instrument proliferation might be an issue in this specification with all available instruments.

Thus, in the next estimations I significantly reduce the instrument count by first collapsing the instruments and then using only the collapsed second-lag instruments, as suggested in Roodman (2009b) and Roodman (2009a). Even when severly reducing the number of instruments, the effect of social spending on income inequality remains significant, suggesting that redistributive first-round effects outweigh any negative second-order effects. With respect to the other covariates, the lagged dependent variable loses its significance in these specifications, whereas the intuitive positive effect of the dependency rate now turns signifcant. It should be noted that specification (3) also passes the Difference-in-Hansen test for both, the full instrument set for the level equation as well as those based on the lagged dependent variable, supporting the finding of a *causal* effect from social spending on income

inequality.

Dependent Variable: Gini Coefficient Post-Government Income

VARIABLES	(1) Full instrument count	(2) Collapsed instruments	(3) Collapsed second-lag
Lagged Gini Coefficient	0.650***	0.205	0.338
	(0.088)	(0.165)	(0.219)
Social Benefits / GDP	-0.157**	-0.275**	-0.329**
	(0.062)	(0.102)	(0.124)
GDP pc (in 1000 int $)	-0.150**	-0.324***	-0.290***
	(0.058)	(0.089)	(0.083)
GDP pc squared (in 1000 int $)	0.001*	0.003***	0.002***
	(0.001)	(0.001)	(0.001)
Dependency Rate	0.108	0.239*	0.224*
	(0.076)	(0.119)	(0.118)
Prop Secondary Education	-0.013	-0.048	-0.020
	(0.014)	(0.030)	(0.035)
Post-communist	-3.297**	-5.052**	-5.858***
	(1.213)	(1.901)	(1.977)
Union density	-0.009	-0.038*	-0.029
	(0.013)	(0.019)	(0.019)
Period Effects	✓	✓	✓
Observations	183	183	183
Number of countries	24	24	24
No of instruments	145	49	23
Sargan test	0.186	0.435	0.210
Hansen test	1.000	1.000	0.510
A-B test 2nd-order corr	0.327	0.407	0.358

System GMM estimations with robust standard errors, small sample correction and forward orthogonal deviations. All equations also include external instruments.

*** p<0.01, ** p<0.05, * p<0.1

Table 2: Social Spending Generosity and Post-Government Income Inequality

As indicated above, another concern might be the structural break in the time series of the underlying micro data for the Gini coeffcient. Therefore, Table 5 in the Appendix also reports the results of some data robustness checks. In the first specification, I restrict the sample to EU-15 member states to check the sensitivity of the results with respect to the inclusion of new EU member states. The result of social spending remains negative and significant. Yet, the p-value of the Sargan test does not pass the ten percent level, indicating that the instruments may not be valid in this specification. The second specification in Table 5 only uses EU-SILC micro data. Thus, all observations before 2003 are dropped and the number of

observations decreases to 75. Again, the inequality-reducing effect of social spending is significant. Specification (3) indicates that indeed, inequality levels after the data break in 2002 are on average one Gini point higher. Though, as the interaction effect in the last column shows, this does not significantly influence the effect of social spending on income inequality.[19]

The robustness of the results with respect to the instrument count and different data restrictions strongly supports a negative relationship between social spending and income inequality. Therefore even if social benefits might be associated with negative disincentive effects which are positively correlated with pre-government income inequality, the overall effect on post-government income inequality is negative.

Table 3 reports the effects of different social benefits on post-government income inequality. The estimations basically follow equation (2) and estimate the isolated effects of specific benefits, while simultaneously controlling for the rest of social benefits. The specification of each row is similar to the one in Table 1 column (4), including the additional control variables and period effects. All models pass the Sargan and second-order serial correlation tests. As the results show, only the unemployment-related benefits and the old-age and survivor benefits reveal statistically significant effects on income inequality. Both effects are negative, indicating implicit redistribution formulas in both, unemployment and pension benefits. The effect of family-related benefits is negative but not statistically signficant. On the other hand, the disability benefits and health-related benefits display positive signs, which might give some support that they have other objectives rather than redistribution. Though, both effects are statistically insignificant. Although the first-round effect of housing and social exclusion benefits is expected to be clearly inequality reducing, the overall effect on post-government income inequality is not significant and positive. Thus there is some evidence that negative behavioral effects induced by these social assistance benefits outweigh their inequality decreasing first-round effects. Overall, the results of Table 3 show that different social benefit functions display distinct effects on post-government income inequality. These findings indicate that not the category of social assistance benefits is responsible for the negative effect of social spending on income inequality, but insurance-related benefits such as unemployment and pension benefits.[20]

[19] Table 6 in the Appendix also illustrates the effects of social spending on income inequality when using the OLS and FE estimator. The effects are similar and remain significant.

[20] Using OLS and FE as estimation methods, beside unemployment benefits also family-related

Dependent Variable: Gini Coefficient Post-Government Income

VARIABLES	Coefficient		Std.Dev.	Obs.	Sargan	AB AR(2)
Social Benefits	-0.275	**	0.102	183	0.435	0.407
Unemployment	-0.198	*	0.098	183	0.721	0.385
Family-related	-0.139		0.169	183	0.596	0.409
Invalidity	0.053		0.145	183	0.778	0.465
Health-related	0.032		0.143	183	0.470	0.418
Old-age and survivor	-0.119	**	0.047	183	0.809	0.469
Housing and Exclusion	0.057		0.188	183	0.741	0.428

Full specification of each row includes the same control variables as the estimations in Table (1) Column(4). System GMM estimations with robust standard errors, small sample correction, forward orthogonal deviations and collapsed instruments. All equations also include external instruments.
*** p<0.01, ** p<0.05, * p<0.1

Table 3: Income Inequality and Different Benefit Functions

Within the theoretical framework, I also derived expectations about the effects of social spending and the benefit targeting structure on pre-government income inequality. Therefore, in Table 4 I contrast the results of social spending and the proportion of means-tested benefits on post-government inequality with the corresponding effects on pre-government income inequality. Column (1) is identical with column (4) in Table 1. Following equation (2), in the second specification I include the proportion of means-tested benefits along with the proportion of non-means-tested benefits, to control for the rest of social benefits. Since in specifications (3) and (4) I particularly try to identify second-order behavioral effects which go along with social policies, I include lagged measures of social spending and means-tested benefits.[21] It should be noted that the number of observations is rather small in these specifications with pre-government income inequality as dependent variable, since data is only available for a restricted sample. In fact, estimations are only based on 56 observations in 20 countries.

benefits reveal a significant inequality reducing impact. Public pensions, though, lose its significance in the FE model (see Table 6 in the Appendix).

[21] I should emphasize that the results remain qualitatively the same when including current instead of lagged values for the social spending variables.

Dependent Variable: Gini Coefficient Post- and Pre-Government Income

	(1)	(2)	(3)	(4)
VARIABLES	Post-Government Inequality		Pre-Government Inequality	
Lagged Gini	0.205	0.401**	0.579***	0.194
	(0.165)	(0.159)	(0.200)	(0.155)
(*Lagged*) Social Benefits	-0.275**		*0.130*	
	(0.102)		*(0.085)*	
(*Lagged*) Means-tested / Soc Ben		-0.047		*0.479***
		(0.147)		*(0.175)*
(*Lagged*) Non means-tested		-0.405*		*0.364***
		(0.201)		*(0.140)*
GDP pc (in 1000 int $)	-0.324***	-0.331**	0.317*	-0.058
	(0.089)	(0.140)	(0.171)	(0.264)
GDP pc squared (in 1000 int $)	0.003***	0.003*	-0.003*	0.001
	(0.001)	(0.001)	(0.002)	(0.003)
Dependency Rate	0.239*	-0.026	0.080	0.596***
	(0.119)	(0.184)	(0.160)	(0.180)
Prop Secondary Education	-0.048	-0.001	-0.038	-0.056
	(0.030)	(0.030)	(0.044)	(0.038)
Post-communist	-5.052**	-8.451**	5.087	8.771***
	(1.901)	(3.371)	(3.313)	(2.660)
Union density	-0.038*	-0.011	-0.055*	-0.054*
	(0.019)	(0.019)	(0.027)	(0.031)
Period Effects	✓	✓	✓	✓
Observations	183	183	56	56
Number of countries	24	24	20	20
No of instruments	49	48	37	40
Sargan test	0.435	0.953	0.251	0.099
A-B test 2nd-order corr	0.407	0.350	0.187	0.502

System GMM estimations with robust standard errors, small sample correction and forward orthogonal deviations.
Models (1) and (3) also include external instruments.
*** p<0.01, ** p<0.05, * p<0.1

Table 4: Social Spending and Pre-Government Income Inequality

The results in column (2) suggest that the proportion of means-tested benefits does not have a significant effect on post-government income inequality, although they are particurlarly targeted at low income groups. This finding is line with the previous finding of housing and social exclusion benefits, which make up a large part of means-tested benefits. When looking at the effects on pre-government inequality, the lagged value of social benefits reveals a positive correlation, though the effect is not significant at conventional significance levels. With respect to the lagged value of the proportion of means-tested benefits, I find a comparatively large positive

effect on pre-government inequality which is significant at a five percent level. This strongly corroborates with my hypothessis that a more targeted spending structure is associated with higher pre-government income inequality.[22]

Regarding the other covariates, model (3) gives weak support for the existence of an inverted U-relationship of economic development and pre-government inequality. Yet, this finding vanishes when controlling for the targeting structure of benefits. Furthermore, there is some evidence that a higher dependency rate is associated with more inequality in pre-government incomes. Also, post-socialist countries display significantly larger levels of pre-government income inequality. As expected from theory, stronger labor market instiutions are negatively related to pre-government inequality.

5 Conclusion

The purpose of this paper was to analyze if more generous social spending policies are *indeed* associated with lower income inequality levels. Particularly it is elaborated to what extent negative behavioral effects might counteract the redistributive first-round effects of social benefits. According to the theoretical framework, the overall effect of social spending on post-government income inequality is a priori not clear, since social spending policies are expected to have a positive effect on pre-government income inequality. In addition, it is elaborated that different benefit functions have different objectives and might, thus, be related to differing distributional outcomes

One major result of the regression analysis reveals that a larger social budget is strongly related with lower inequality levels in post-governement incomes. This suggests that overall, redistributive first-round effects outweigh any inequality-increasing second-order effects. This negative effect of social spending on income inequality is robust to various specification choices. Particularly, the effect remains statistically significant when severly reducing the instrument count and when using different data specifications, suggesting a *causal effect* of social spending levels on post-government income inequality. With respect to the inequality in pre-government incomes, I cannot identify any statistically signifcant effect of the overall spending generosity of welfare states. Though, the empirical evidence suggests that if there is an effect, it is positive. Looking at the different functions of social benefits, the results reveal that

[22] This finding is also confirmed when using OLS as estimation method. However, the effect becomes insignificant and negative in the FE model (Table 6 in the Appendix).

not all benefits are associated with lower inequality levels. More specifically, the unemployment benefits and public pensions seem to be responsible for the inequality reducing impact.

Regarding the targeting structure of social policies, the empirical results reveal that social protection systems which particularly target at low income groups are not associated with lower inequality levels in post-government incomes. This finding hints at the importance of possible disincentive effects created by low income targeting which counteract equalizing first-round effects. Additional regressions show that a higher proportion of means-tested benefits is *indeed* associated with more inequality in pre-government incomes. This strengthens the argument that more low income targeting comes at the cost of substantial negative second-order effects.

Note, however, that there are limitations to my analysis. First, the analysis only discusses behavioral effects which are related to labor market related decisions. However, social spending policies also affect pre-government incomes other than purely through labor market outcomes. Redistributive policies might also affect the behavior of market actors with regard to investment and saving decisions, geographical mobility and so on. All these effects and their impact on inequality are not discussed. Second, the paper only analyzes the effect of overall benefit levels on income inequality. However, particularly additional characteristics such as the duration of benefits and other eligibility crieria might be responsible for the effects on income inequality. Thus, to make more specific statements about the distributional and behavioral effects of social programmes, more information on the characteristics of these programmes is needed. This information is also important for specific policy recommendations.

Appendix

Dependent Variable: Gini Coefficient Post-Government Income

	(1)	(2)	(3)	(4)
VARIABLES	EU-15	EU-SILC	structural break'	
Lagged Gini Coefficient	0.411***	0.143	0.615***	0.408*
	(0.108)	(0.141)	(0.149)	(0.214)
Social Benefits	-0.227**	-0.468**	-0.200*	-0.273**
	(0.084)	(0.180)	(0.103)	(0.103)
GDP pc (in 1000 int $)	-0.255***	-0.250*	-0.115	-0.126
	(0.061)	(0.128)	(0.075)	(0.098)
GDP pc squared (in 1000 int $)	0.002***	0.002	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Dependency Rate	0.149	0.467*	0.406**	0.602***
	(0.089)	(0.240)	(0.161)	(0.206)
Prop Secondary Education	-0.032	-0.047*	-0.012	-0.028
	(0.027)	(0.027)	(0.026)	(0.035)
Post-communist		-4.906***	-2.041	-3.256
		(1.640)	(1.831)	(2.006)
Union density	-0.020	-0.049*	-0.024	-0.039
	(0.014)	(0.026)	(0.024)	(0.034)
Data			1.033***	5.828
			(0.260)	(3.693)
Data * Social Benefits				-0.173
				(0.130)
Period Effects	✓	✓		
Observations	161	75	183	183
Number of countries	15	24	24	24
No of instruments	48	43	38	39
Sargan test	0.0968	0.753	0.466	0.611
A-B test 2nd-order corr	0.549	0.0601	0.286	0.304

System GMM estimations with robust standard errors, small sample correction, forward orthogonal deviations and collapsed instruments. All equations also include external instruments.
*** p<0.01, ** p<0.05, * p<0.1

Table 5: Data Robustness Checks

Dependent Variable: Gini Coefficient Post-Government Income

VARIABLES	Coefficient		Std.Dev.	R^2	Obs.
Pooled OLS					
Social Benefits	-0.159	***	0.043	0.908	183
Unemployment	-0.096	**	0.037	0.909	183
Family-related	-0.130	**	0.057	0.909	183
Invalidity	-0.062		0.042	0.908	183
Health-related	-0.067		0.049	0.908	183
Old-age and survivor	-0.039	**	0.017	0.909	183
Housing and exclusion	-0.050		0.061	0.908	183
Means-tested	-0.021		(0.033)	0.908	183
Dependent Variable: Gini Coefficient Pre-Government Income					
Lagged Social Benefits	0.059		(0.048)	0.898	56
Lagged Means-tested	0.203	**	(0.090)	0.908	56
Fixed-Effects					
Social Benefits	-0.214	**	0.108	0.336	183
Unemployment	-0.309	***	0.115	0.358	183
Family-related	-0.251	*	0.130	0.346	183
Invalidity	-0.268	*	0.147	0.346	183
Health-related	0.075		0.105	0.360	183
Old-age and survivor	0.101		0.088	0.348	183
Housing and exclusion	-0.235		0.220	0.339	183
Means-tested	-0.039		(0.107)	0.337	183
Dependent Variable: Gini Coefficient Pre-Government Income					
Lagged Social Benefits	-0.052		(0.367)	0.536	56
Lagged Means-tested	-0.211		(0.416)	0.540	56

Full specifications includes the same additional control variables as the previous estimations as well as period effects.
*** p<0.01, ** p<0.05, * p<0.1

Table 6: OLS and FE specifications

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