Income inequality and redistribution in post-industrial democracies: demographic, economic and political determinants[1]

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This article analyses the determinants of market income distribution and governmental redistribution. The dependent variables are Luxembourg Income Study data on market income inequality (measured by the Gini index) for households with a head aged 25–59 years and the per cent reduction in the Gini index by taxes and transfers. We test the generalizability of the Goldin–Katz hypothesis that inequality has increased in the USA because the country failed to invest sufficiently in education. The main determinants of market income inequality are (in order of size of the effect) family structure (single mother households), union density, deindustrialization, unemployment, employment levels and education spending. The main determinants of redistribution are (in order of magnitude) left government, family structure, welfare state generosity, unemployment and employment levels. Redistribution rises mainly because needs rise (that is, unemployment and single mother households increase), not because social policy becomes more redistributive.

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Rising inequality in advanced post-industrial societies has attracted increasing scholarly and political attention, generating two major recent reports by the OECD (2008, 2011). There is no doubt that the aggregate inequality in the distribution of income has increased substantially. However, there is also great

cross-national variation in the degree to which inequality has increased, and understanding this variation is crucial for identifying potential policy options to counteract the rise in inequality.[2] The OECD reports have identified a number of potential causes of the increases in inequality that have occurred in all but a few of the countries studied: globalization, changes in household structure, declining union strength, skill-biased technological change and changes in the distributive effects of taxes and transfers.

We shall begin by laying out the patterns and then turn to theoretical expectations. Our focus here is on household income inequality, since household income is decisive for a person's level of living. We are interested both in pre-tax and transfer inequality and in the redistribution effected through the tax and transfer system. We only look at households headed by working age adults. In countries with comprehensive public pension systems, such as the Nordic countries, retirees have little or no market income. Thus, inclusion of the aged in the analysis greatly increases both market income inequality and, by the same token, redistribution effected by the tax and transfer system. These pension systems of course deserve attention as well, and they may begin to contribute to rising inequality once the many retrenching reforms that have been introduced over the past two decades take full effect (Immergut *et al.*, 2006), but they respond to different causal dynamics. As we have shown elsewhere (Huber and Stephens, 2006), as of the beginning of the 21st century, among the groups vulnerable to poverty, the elderly were the group best taken care of by all welfare state regime types.

Table 1 shows the average change by decade in the Gini index of household income inequality and in redistribution. It is based on data from the Luxembourg Income Study (LIS) for 18 post-industrial countries. These data are not available on an annual basis, but rather for different time points for the different countries. The number of observations per country ranges from 3 (Austria and Greece) to 11 (Canada). We estimated the level in 1985 as well as the average change per decade by regressing market income, redistribution and disposable (post-tax and transfer) income on time with 1985 set to zero. The intercept shows the estimated 1985 level for the welfare state regimes. The Supplementary data Appendix figures show the changes in market and disposable income through time by country.[3]

In Table 1 we group the countries by welfare state regime types. Critics have questioned the usefulness of these regime types, but the regimes do account for much cross-national variation in inequality and redistribution. We regressed both pre-tax and transfer household inequality and redistribution on the regime types, and the regime types alone explained 67% of the variation between countries

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[2]In this paper we use inequality to refer to income inequality. We fully realize that there are other crucial dimensions of inequality (e.g. ethnic, gender), but income is a crucial gateway to life chances.

[3]The appendix table and figures are available in online Supplementary data.

Table 1 Trends in inequality by regime

	Estimated 1985 level	Average change per decade	*n*
Pre-tax and transfer inequality			
Nordic	30.9	2.2	24
Continental Europe	33.9	1.3	33
Southern Europe	35.4	2.0	18
Anglo-American countries	37.6	3.4	41
Redistribution			
Nordic	33%	2.4	24
Continental Europe	24%	1.0	34
Southern Europe	13%	2.2	18
Anglo-American countries	21%	1.9	41
Post-tax and transfer inequality			
Nordic	20.5	0.7	24
Continental Europe	25.6	0.6	33
Southern Europe	31.2	0.7	18
Anglo-American countries	29.6	2.0	41

in inequality and 58% of the variation in redistribution (see Tables 2 and 3). The Nordic regime is the most distinctive, showing the strongest coefficients. However, the Supplementary data Appendix tables and graphs show that the changes through time do not map very closely on welfare state regime type. Though all of the liberal welfare states except Ireland experienced large increases in inequality, some countries in all of the other regime types followed the same trajectory (Germany, Norway and Finland).

The trends are clear and confirm that inequality has increased in all welfare state regime types. The increases are strongest in the Anglo-American regimes, with a 3.4 point increase per decade in pre-tax and transfer inequality. But even in the Nordic regimes the increase was 2.2 points per decade, considerably higher than in the Continental regimes, albeit starting at a lower level. We can see that all welfare state regime types intensified their redistributive efforts. The Nordic regimes started from the highest effort level (33% reduction in inequality) and increased their efforts by 2.4% per decade. The Continental and Anglo-American regimes started from lower effort levels (24 and 21%) and intensified their efforts by different degrees: 1% in the former and 1.9% in the latter. The Southern European regimes stand out due to their initially very low level of redistribution but their strong increases, with 2.2% per decade. However, the data for Southern Europe have to be viewed with great caution because of the low number of observations and, more importantly, because half of the observations and two-thirds of the pre-2000 observations are from Italy. Thus, the apparent time trend may actually be tapping the difference between Italy and Spain and Greece. Not surprisingly,

the liberal/Anglo-American regimes experienced the highest increase in post-tax and transfer inequality, with 2 points per decade. The other three regime types saw their post-tax and transfer inequality increase by similar amounts (0.07 or 0.06 per decade), which left the Nordic regimes with the lowest inequality, followed by the Continental regimes, and the Southern European rivaling the Anglo-American regimes for the highest levels of inequality. We now turn to an explanation of these differences between countries and of the changes over time.

1.   Literature and hypotheses

Pre-tax and transfer household income is heavily shaped by income from work, which in turn depends on the number of employed household members and on their earnings capacity. At the macro-level, this means that employment and unemployment levels and wage dispersion in the economy shape inequality in household income.[4] We expect countries with high levels of wage dispersion to have high levels of pre-tax and transfer household income inequality, and we expect an increase in wage dispersion over time to result in an increase in household income inequality. Wage dispersion in turn is heavily shaped by a number of factors, such as supply and demand of skills (see below) and a country's system of labour relations and political power distributions (Wallerstein, 1999; Rueda and Pontusson, 2000; Pontusson *et al.*, 2002). Based on this literature, we expect union density, wage coordination and left political strength to shape wage dispersion and indirectly affect pre-tax and transfer inequality.

However, as Kenworthy and Pontusson (2005) point out, trends in wage dispersion and household income inequality show considerable divergence in some countries. They explain this divergence with differential access to employment for members of low-income households. Higher overall employment levels reduce inequality. Employment levels just indicate activity, not full-time work and so the measure includes people in part-time work. If overall employment levels are high, it is more likely that people with marginal skills find employment, at least part-time. Unemployed people have no pre-tax and transfer income and so we expect higher levels of unemployment to result in higher levels of household income inequality, both between countries and over time.

The transition from the industrial to the knowledge economy has affected the structure of employment. Industrial employment has declined in all advanced post-industrial countries, though to different degrees. We expect this decline to increase income inequality because industry offered more comparatively well-paying jobs for unskilled and semi-skilled workers than the expanding service sector does,

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[4]Income from capital and private transfers are important additional sources, but the former is concentrated at the top and heavily underreported and the latter is of low magnitude and so our analysis focuses on changes in income from work.

particularly in private services. A perfect measure of wage dispersion should absorb this effect, but since no measure captures the exact shape of wage dispersion, we expect to see an effect of industrial employment on inequality. Our measure of the 90/10 ratio (see below) is not affected by what happens in the middle of the income distribution; so it would not catch the effect of job losses at the 60th percentile and a move downward of these workers to the 30th percentile, a likely consequence of a shift from semi-skilled industrial to service employment. Accordingly, the greater the loss of industrial employment, the steeper we expect the rise in inequality to be.

Goldin and Katz (2008) argue that wage inequality has increased in the USA since 1980 because technological change has increased the demand for high levels of education and the supply has not kept up in this period, in contrast to the first three quarters of the 20th century when educational expansion exceeded or at least kept up with technological change. One might plausibly extend this argument to other countries, and accordingly we expect to see differences in pre-tax and transfer household income inequality between countries where investment in the educational levels of the work force has increased more or less. One might expect the education effect to work primarily through wage dispersion. However, income from work includes income from self-employment as well and so if skill-biased technological change rewards highly skilled self-employed people, we expect to see an effect of investment in educational levels even if we include wage dispersion in the equation.

Following Nickell (2004), we hypothesize that the dispersion of education and skills will affect wage dispersion and therefore market household income inequality. In a cross-national analysis of the OECD wage dispersion data, Nickell shows that the ratio of the 95th to the 5th percentile test scores in the International Adult Literacy Survey is the single best predictor of wage inequality, better than union density and bargaining centralization, which earlier work had shown to be strongly related to wage inequality (Wallerstein, 1999). Nickell's empirical analysis can be seen as support for Goldin and Katz's (2008, p. 329) extension of their argument to comparative cases.

A second set of factors that influences the distribution of household income is household composition, particularly the presence of single parent households. Such households are less likely to have a full-time worker, not to speak of multiple earners and thus more likely to have low incomes. Accordingly, we expect a higher level of single-parent families to result in higher levels of household income inequality (Bradley et al., 2003; Kenworthy and Pontusson, 2005; OECD, 2008).

Turning to determinants of redistribution, we have to start with the recognition that, once welfare state programmes are in place, increased need will result in increased redistribution, unless those programmes are cut. For instance, under any given unemployment compensation scheme, increased unemployment will

result in increased redistribution. Therefore, higher levels of unemployment will be associated with more redistribution, and an increase in unemployment will cause an increase in redistribution. The same logic is at work for the presence of single-parent families, as long as there is a mandated minimum of cash support for such families if they fall below a certain income, which is the case in just about all advanced post-industrial democracies. We expect a greater proportion and a greater increase of single-parent households to be associated with higher levels and higher increases in redistribution.

By the same token, lower need should result in less redistribution. Accordingly, if overall employment levels are high, and more people with marginal skills are employed, redistribution should be lower. Thus, redistribution will vary without corresponding changes in policy. Increased redistribution does not indicate redistributive policy change. What it does indicate is the decision to maintain benefit levels in the face of rising need, which in itself is a policy decision driven by political commitments.

The hypotheses about the need effects are built on the assumption that certain rights (to unemployment compensation and support for needy single-parent families) are institutionalized. Clearly, the more generous these rights or benefits, the greater is the level of redistribution. Welfare states are complex configurations of lots of programmes and rules, and we expect the overall generosity of social rights as well as the generosity of crucial programmes, such as unemployment compensation, to be associated with more redistribution. In fact, in a previous analysis we found welfare state generosity to be the single most important determinant of redistribution (Bradley *et al.*, 2003).

Overall indicators of the generosity of social rights do not tell us much about the distributive profile of these rights. The most widely used indicators are overall social expenditures and taxes (Bradley *et al.*, 2003) or codings of social rights of an average male production worker (Korpi and Palme, 2003; Allan and Scruggs, 2004). None of these indicators tell us much about benefits for those at the very bottom and towards the upper end of the income distribution. We know that left parties have been more concerned with inequality than other kinds of parties. Accordingly, we expect stronger records of left incumbency to be associated with more redistributive welfare states. Since we cannot measure the distributive profile of the welfare state in its totality, we expect the effect of left incumbency to be visible even if we control for welfare state generosity, as we found in earlier work (Bradley *et al.*, 2003).

Christian democratic parties have been strong builders and defenders of the welfare state as well (van Kersbergen, 1995; Huber and Stephens, 2001). However, they have been much less concerned with inequality than with poverty. In fact, the welfare states built under Christian democratic auspices have been prone to preserving status differences and market inequalities (Esping-Andersen,

1985). In a previous work (Bradley *et al.*, 2003) we found Christian democratic cabinet to have a significant negative effect on reduction in inequality. Thus, we include Christian democratic incumbency in our models, and expect to find the same impact.

When we think about change in inequality over the past three decades, we would not expect to see as strong an effect of incumbency as we see in the overall level of inequality. By 1985, the basic character of the welfare state regimes was in place, and the agenda for the left became one of defending against retrenchment. Still, it is clear that left and right continued to differ in their willingness to impose cuts in benefits and so left incumbency should continue to make a difference in slowing the increase in post-tax and transfer inequality.

Lupu and Pontusson (2011) found that the ratio of 90-50 to 50-10 measures of wage dispersion has a large effect on redistribution, and they found no partisan effects on redistribution. Several factors account for the difference in findings. First, they use a lagged dependent variable or fixed effects (FEs), which are known to depress the significance of other variables, particularly if the initial level of the variable of interest has an impact on the dependent variable (Plumper *et al.*, 2005), which in this case it does because the accumulated level of left government at the beginning of the data series significantly shaped the distributive profile of welfare states. Secondly, they use current not cumulative incumbency. Thirdly, they have unionization in their equation, and—as we have argued elsewhere (Bradley *et al.*, 2003)—left incumbency and union density are highly correlated and thus having them in the same equation introduces coefficient instability.

The two recent OECD (2008 2011) reports on inequality link the increase in household income inequality and wage dispersion to globalization. We are skeptical because in our previous work, we found various measures of globalization were at best weakly related to welfare state effort (Huber and Stephens, 2001) and household income inequality (Bradley *et al.*, 2003).

2.   Data and measurement

The data for our dependent variables come from the LIS database (http://www.lisdatacenter.org/). LIS collects micro-data from individual countries and harmonizes them to make them comparable across countries and over time. The data have been collected in waves, not on an annual basis. The data begin for a few countries as early as 1967, but for most in our sample, the first data point is mid-1980s (LIS Wave II), and for some in our sample only in the 1990s. Therefore, we have different numbers of observations for different countries.

Even though LIS makes great efforts to make data comparable, they have to work with the micro-data from individual countries, and some countries collect different data and even change the type of data they collect over time. Not all countries collect

pre-tax data. In some country years, the market income data are pre-transfer but post-tax and in others only some taxes (either payroll taxes or income taxes) are accounted for. Our initial effort to deal with this problem was to include dummy variables for these observations. Implicitly, this method assumes that taxes affect the market income (and redistribution) by the same amount in all countries. Inspection of the data for the countries revealed that this was not the case. All of the countries with post-tax data except Greece had some observations, in most cases recent ones, which are pre-tax. A comparison of pre- and post-tax observations close in time indicated that in some countries taxes did result in significant redistribution (e.g. Spain) but in others they did not (Italy). To correct for this, we adjusted the market income data for the post-tax observations based on pre-tax observations close in time. For the remaining observations, we did not adjust the data and instead are using methodological dummy variables in the regressions.

LIS publishes inequality data on their website, but those include the elderly. As we explained above, including the elderly exaggerates the redistributive impact of the welfare state in countries with generous public pension systems, because people adjust their savings behaviour and the elderly have virtually no pre-tax and transfer income. Moreover, we are interested in redistribution across income groups rather than across age groups. Therefore, we did our own calculations for the population 25–59 years of age. The pre-tax and transfer Gini is based on market income. This is the total income from wages and salaries, self-employment income, property income and private pension income (insignificant in our analysis because of the age distribution of the households). The post-tax and transfer Gini is based on disposable personal income. This includes all market income, social transfers and direct taxes. Figures for both market income and disposable income were bottom coded at 1% of mean income and top coded at 10 times the median income, adjusted for household size and composition. We used an equivalence scale to adjust the number of persons in a household to take account of economies of scale resulting from sharing household expenses. We chose the commonly used scale of the square root of the number of persons in the household. Redistribution is measured as the proportional reduction in inequality effected by taxes and transfers [((pre-inequality − post-inequality)/pre inequality)*100]. Kenworthy and Pontusson (2005) use the absolute reduction in the Gini after taxes and transfers, but we agree with Iversen and Soskice (2011) that a percentage reduction measure is more accurate to tap redistributive effort. As Iversen and Soskice (2011, p. 7) show, operating under the Meltzer-Richard assumptions of proportional taxation and flat rate benefits, any increase in pre-tax and transfer inequality will result in an increase in redistribution in the absolute measure, in the absence of any policy change.

Our independent variables come from the Comparative Welfare States Dataset (Brady *et al.*, 2013, http://www.unc.edu/~jdsteph/index.html). Below we indicate the original sources cited in that data set. We coded left cabinet and Christian democratic cabinet as 1 for each year that these parties were in government alone or as a fraction of their seats in parliament of all governing parties' seats for coalition governments. We use a cumulative measure from 1946 to the year of observation of the LIS survey.

Unemployment is measured as a percentage of the labour force; the original source is OECD. Employment levels and industrial employment are measured as total civilian employment and total industrial employment, respectively, as per cent of the working age population (15–64); the original source is OECD. Wage dispersion is the ratio of earnings at the 90th percentile to earnings at the 10th percentile; also from the OECD. The percentage of children living in single mother households comes from LIS Key Figures.

Unemployment replacement rates are for an average production worker, the average of compensation for a single person and for a couple with a non-working spouse, for the first 6 months (Scruggs, 2013). We measure the overall generosity of the welfare state for the working age population and their children with total social spending minus spending on the aged as a percentage of GDP; the original source is OECD.

Since the advent of new growth theory with its emphasis on human capital, the Barro and Lee (2000) measures of formal education have been used as measures of human capital in most quantitative studies of economic growth. Average years of education is the most commonly used summary measure of human capital stock. Unfortunately, as has been shown by the International Adult Literacy Survey (IALS), average years of education leave much to be desired as a measure of human capital and its distribution among the working age population (OECD/HRDC, 2000).[5] Moreover, it is not significantly related to wage dispersion or market income inequality, whereas the various IALS measures are. We entered average years of education and change in average years of education in our models and neither of them were significant and so we do not present them in the tables. As a result our only measure of human capital is investment in human capital, operationalized as public education spending as a per cent of GDP.

3. Estimation techniques

Hicks (1994, p. 172) notes that 'errors for regression equations estimated from pooled data using OLS [ordinary least squares regression] procedures tend to be

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[5]Earlier versions of this article contained much more lengthy discussions of measures of human capital (available from the authors on request).

(1) temporally autoregressive, (2) cross-sectionally heteroskedastic, and (3) cross-sectionally correlated as well as (4) conceal unit and period effects and (5) reflect some causal heterogeneity across space, time, or both'. Unfortunately, our estimation technique of choice (see, e.g. Huber and Stephens, 2001; Huo *et al.,* 2008) which effectively deals with these problems while preserving the variation across units and through time, Prais Winsten regressions (panel-corrected standard errors and first-order autoregressive corrections), is not appropriate for these data because of the time gaps between the observations within the countries. Following Brady's (2005) analysis of data with a very similar structure, we estimate the determinants of our dependent variables with random effect (RE) estimations. Brady, citing Alderson and Nielsen (1999, p. 616), argues that RE is preferable to FE estimation for these data because FE effectively removes the between-country variation from the data. This is clearly inappropriate for our purposes since we are as interested in the differences between the countries as in the variations through time within countries. However, precisely because it isolates changes through time, it is useful to also examine the results produced by FE estimation. Thus, when an independent variable shows a large effect in RE but none in FE, we can surmise that it is primarily explaining the variation between the cases not variation through time.

Alternatives appropriate to these data which we have employed in earlier work (Bradley *et al.*, 2003; Huber and Stephens, 2006) are OLS with panel-corrected standard errors and robust-cluster variance estimator. The robust-cluster variance estimator is a variant of the Huber-White estimator that remains valid (i.e. provides correct coverage) in the presence of *any* pattern of correlations among errors *within* units, including serial correlation and correlation due to unit-specific components (Rogers, 1993). Thus the robust-cluster standard errors are unaffected by the presence of unmeasured stable country-specific factors causing correlation among errors of observations for the same country, or for that matter any other form of within-unit error correlation. We checked our RE results for robustness by re-estimating the same models with robust cluster and panel-corrected standard error estimations. In all cases, these alternatives yield substantially the same results, though the RE significance levels were often lower than the alternatives, indicating that it is the most conservative of the three estimation techniques.

4.   Results

4.1   *Pre-tax and transfer inequality*

We begin with our analysis of pre-tax and transfer inequality (Table 2). Model 1 shows the results of an RE model. The fit of the model is very good; it explains overall 72% of the variation, 81% of the variation between countries and 66% of

Table 2 Determinants of pre-tax and transfer inequality

	REs			FEs	
	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**
Post-tax data	−5.067*	5.402	−3.688[†]	Omitted	Omitted
Mixed	−2.702	−4.48**	1.583	−5.077**	−4.887**
Unemployment	0.199	0.363**		0.178	0.323*
% of children living in single mother households	0.450***	0.467***		0.442***	0.340**
Industrial employment	−0.429***	−0.296*		−0.551**	−0.412*
Education spending	−0.965***	−0.788**		−0.399	−0.804*
Employment as a % of the working age population	−0.116*	−0.136*		−0.036	−0.177*
Wage dispersion	2.034***			0.939	
Union density		−0.099**			−0.202**
Wage coordination		−0.428			0.468
Left cabinet		0.013			−0.024
Continental			−5.414***		
Mediterranean			−1.346		
Nordic			−7.681***		
Constant	45.082***	50.140***	40.136***	42.276***	61.256***
R^2 within	0.66	0.68	0.03	0.68	0.69
R^2 between	0.81	0.68	0.67	0.47	0.42
R^2 overall	0.72***	0.66***	0.38***	0.58***	0.58***
Observations	105	108	117	105	108

[†]At 0.01 level; *significant at 0.05; **0.01 and ***0.001.

variation within countries. Most of the labour market variables are strongly related to market income inequality: overall employment levels and levels of employment in industry depress inequality, whereas wage dispersion increases inequality. Unemployment falls slight short of significance (0.07 level). Household composition also bears out our expectations; the percentage of children living in single mother households significantly increases inequality. Finally, education spending also has a statistically significant effect that depresses inequality. Model 2 substitutes wage dispersion with the three variables that emerged as its determinants in our analysis of the OECD wage dispersion data, union density, wage coordination and left cabinet. Union density is highly significant and unemployment is now significant. We use the variables in Model 2 for our analysis of within welfare state regime differences in order to avoid the complications of a two-stage model which includes wage dispersion. Model 5 shows that all of variables that are significant in the RE specification are significant in the FE specification, increasing the confidence in our results.

These results are entirely compatible with our previous findings (Bradley *et al.*, 2003), but the larger number of observations in the present analysis allows for more variables to reach statistical significance. In the earlier analysis, unemployment and single mothers were significant, whereas industrial employment and education (operationalized as secondary school enrollment) were correctly signed but not significant. We did not have employment levels in the previous analysis. We also did not have wage dispersion in the equation but its antecedents, union density and wage coordination, and they were correctly signed but only union density reached statistical significance, consistent with this analysis.

To compare the magnitude of the effects of these significant independent variables (and not just the significance levels), one can compare the effect of a 2 SD change in the independent variable on the dependent variable (Figure 1). The importance of family structure change is striking. A 2 SD change in the percentage of children living in single mother households results in an increase of over 4 points in the Gini. The next most important variables are labour market variables; a 2 SD change in union density changes the Gini by 4 points, while industrial employment, employment and unemployment change the Gini by around to 2 points each. Education spending changes the Gini by a little less than 2 points.

Model 3 tests the explanatory power of welfare state regime types in order to justify the subsequent analysis in which we examine the determinants of trends in inequality by regime. The reference category is the Anglo-American regime. The results confirm that welfare state regime types are useful heuristic tools; in our model, they account for 67% of the variation between countries. Both the Nordic and the Continental regimes depress inequality in a statistically and substantively significant way compared with the Anglo-American regime. The Nordic regime type has a stronger effect than the Continental one. One can see
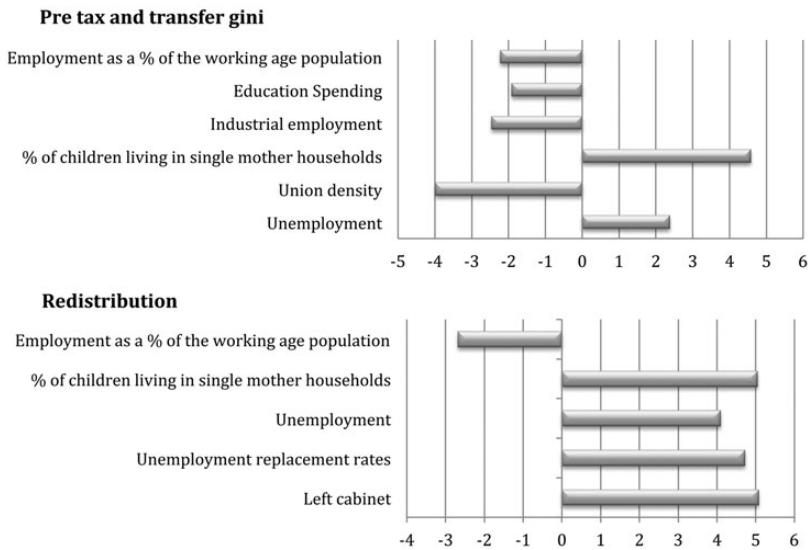
Figure 1 Estimated effect of a 2 SD change in the independent variables on pre-tax and transfer Gini and redistribution.

that, not surprisingly, the regimes do not explain within variation, that is, variations through time.

4.2   Redistribution

We ran our models for redistribution with two different indicators for welfare state generosity (Table 3). Models 1 and 4 use unemployment replacement rates and Models 2 and 5 use total social spending on the non-aged. Unemployment replacement rates have the advantage of being pure policy indicators, not contaminated by need, but the disadvantage of measuring generosity of only one programme, albeit an important one. Social spending on the non-aged is comprehensive but influenced by need; under any given policy, increasing unemployment and increasing numbers of children in single parent households will drive up these expenditures. Thus, it is partly endogenous. As predicted, in Model 1 our need variables have statistically significant effects; unemployment and the percentage of children living in single parent households drive up redistribution, and total employment level reduces it. Generosity of unemployment compensation increases redistribution to a statistically highly significant degree. Left cabinet also has the predicted statistically significant effect, indicating that stronger records of left incumbency shape more redistributive welfare states. The fit of the model is good, with 67% of the variation explained between countries and 60% overall.

Again, our results are in line with those in our earlier analysis. There we found unemployment, single mother households, welfare state generosity and left cabinet to be statistically significant and positively associated with redistribution. We also found Christian democratic incumbency to be negatively associated with redistribution, the same as in our model here with spending on the non-aged.

The substantive effects of the variables in this model are impressive (Figure 1).[6] Again, the percentage of children living in single mother households has the strongest effect among the need variables; a 2 SD change increases redistribution by 5%. Strength of the record of left incumbency shows the same magnitude of effect. A 2 SD change in unemployment and generosity of unemployment replacement rates increases redistribution between 4 and 5%. Finally, a 2 SD change in total employment decreases redistribution between 2 and 3%.

The fit of the model with social spending on the non-aged (Model 2) is much better, with the model explaining a full 90% of the variation between countries and 83% overall. Spending is highly significant, and as one might expect, the two need variables that drive up these expenditures, unemployment and children in single mother households, lose statistical significance in the model. Social democratic cabinet remains statistically significant and positive, but Christian democratic cabinet actually becomes statistically significant and negative. As noted, this confirms our previous results (Bradley *et al.*, 2003) and supports the interpretation that left governments construct generous welfare states with a strongly redistributive character, whereas Christian democratic governments construct generous welfare states that lack a particularly egalitarian bent.

Regressing redistribution on the regime types further confirms the special character of the Nordic regimes, which were predominantly constructed under Social Democratic auspices. Only the Nordic regime type is statistically significant from the Anglo-American regimes in its redistributive effect.

The fit of the FE models is worse than that of the REs, explaining only 27% (Model 4) and 59% (Model 5) of the overall variation, and 42 and 48% of the variation within the countries over time. One of the reasons for the poorer fit is that the cumulative partisanship variables, by their very construction, explain little through time variation. In Model 4, the two need variables and generosity of unemployment benefits are significant. In Model 5, only the spending variable and employment are statistically significant. Thus, increases in generosity of benefits and in spending over time continued to effect more redistribution, as did increases in single mother households, whereas increases in employment levels over time reduced the amount of redistribution needed and effected.

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[6]Figure 1 is based on Model 1 rather than Model 2 because of the endogeneity problem. We contend that Model 1 and Figure 1 better represent the relative contributions of variations in welfare state generosity and need in explaining variations in redistribution.

Table 3 Determinants of redistribution

	REs			FEs	
	Model 1	Model 2	Model 3	Model 4	Model 5
Post-tax data	−13.620***	−8.468***	−8.352**	−13.757***	−7.831*
Mixed	−4.050	4.326	0.518	−2.922	−3.096
Left cabinet	0.215**	0.084*		0.015	−0.037
Christian democratic cabinet	−0.085	−0.283***		0.060^	−0.001
Unemployment	0.626***	−0.221		0.633**	−0.037
% of children living in single mother households	0.461***	0.170		0.557***	0.217
Employment as a % of the working age population	−0.164†	−0.324***		−0.149	−0.239*
Unemployment replacement rates	0.151***			0.140***	
Social spending on non-aged		1.614***			1.230***
Continental			1.751		
Mediterranean			−5.247		
Nordic			12.139**		
Constant	15.005†	23.507**	22.781	14.701	20.895
R^2 within	0.41	0.46	0.06	0.42	0.48
R^2 between	0.67	0.90	0.58	0.34	0.67
R^2 overall	0.60***	0.83***	0.49***	0.27***	0.59***
Observations	111	100	117	111	100

†At 0.1 level; *significant at 0.05; **0.01 and ***0.001, ^significant in opposite hypothesized direction.

To test for direct globalization effects on household income inequality or indirect effects via wage dispersion, we regressed pre-tax and transfer household income inequality and wage dispersion on three measures of globalization: inward direct investment, outward direct investment and trade openness, all as per cent of GDP, controlling for our other independent variables. None of the globalization measures were anywhere close to significant on either dependent variable. We do not show the models with the globalization variables in order to simplify the presentation of the results. We also tested the Lupu and Pontusson hypothesis that the ratio of the 90-50 to the 50-10 measure of wage dispersion, which they call 'skew', has a positive effect on redistribution. Their skew variable was insignificant in all of our models and so we again do not show these equations in order to economize on the presentation.

The initial analysis for this paper included an analysis of the determinants of wage dispersion. We found that the coefficients for union density, wage coordination and left government were significant and large, essentially replicating the findings of earlier studies (Wallerstein, 1999; Rueda and Pontusson, 2000). In our analysis of market income inequality that follows, we first enter wage dispersion in the analysis and then replace it with its three determinants. In a cross-sectional analysis of data from the mid-1990s, we were able to replicate Nickell's analysis which showed that the 95-5 ratio in adult literacy skills as measured by the IALS was a more important determinant of wage inequality than labour market institutions. This supports Goldin and Katz's (2008) contention that skill-biased technological change need not lead to greater inequality if a country invests sufficiently in education.

4.3   Changes in need or in policy?

Table 1 shows that redistribution increases through time, something also noted by Kenworthy and Pontusson (2005). They note this might be attributed to growing inequality which triggered policy change, consistent with a Meltzer-Richard view of the world, but that it might also be attributed to growing need. Given the importance of the need variables in our models, we attempted to separate analytically need-driven from policy-driven redistribution. In other words, we want to explore whether the increase in redistribution is due to an increase in need exclusively or also due to a more redistributive policy profile. We estimated need-driven redistribution on the basis of the coefficients from Model 1 in Table 3 for unemployment:

Need-driven redistribution   = (0.626*unemployment)
                                        + (0.461*children in single mother households)

'Policy' redistribution = Total redistribution − need - driven redistribution

Table 4 displays the changes in policy redistribution through time within the regimes, estimated by the same method as in Table 1. What we found is that virtually all of the increase in redistribution over time has been driven by need. Only the Southern European welfare states became significantly more redistributive in their policy profile, albeit starting from an extremely low base. Again we warn the reader that this is probably a product of the fact that most of the early observations are for Italy, which scores very low on the redistribution measure. The calculations for policy redistribution allow us to interpret the results shown in Table 3 more precisely. Comparing Models 1 and 4 with Models 2 and 5, one sees that coefficients for unemployment and children in single mother households are not significant in Models 2 and 5 but are significant in Models 1 and 4 and, according to Figure 1, quite large. This suggests that transfers to the unemployed and single mother households push up social spending on the non-aged and, once that spending is controlled for, those coefficients lose significance (Models 2 and 5).

4.4   Heterogeneity of causes of rising inequality

Table 5 indicates that the causes of the increases in pre-tax and transfer income inequality are not uniform in the different welfare state regime types.[7] Leaving the Southern regime aside because of the problem noted previously of interpreting the figures in Tables 1 and 4 as tapping a time trend, one can see two commonalities in the trends in the independent variables in the other three regimes, increases in the percentage of children in single mother households and decreases in industrial employment.

In the Nordic countries, we also see an increase in unemployment (from an initially low level) and a slight decline in employment (from an initially high level). Youth unemployment is a particular concern in Sweden, for instance. The Nordic regime is the only regime that does not experience large decreases in union density. The increase in education spending in the Nordic countries, starting from a high base, acted as a countervailing factor, lowering inequality. For instance, in Sweden the skill premium fell strongly until the mid-1980s and rose only modestly thereafter (Edin and Holmlund, 1995). In the continental countries, the increasing employment levels acted as countervailing factor.[8] Increases in unemployment also contributed to the increase in inequality there.

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[7]The interpretations in this paragraph are based on the trends shown in Table 3 and most of them are supported by FEs estimations within the regimes, based, of course, on small numbers of observations.

[8]The increase in education spending shown in Table 3 is an artefact of the dates included in the LIS data. The annual data for the past three decades displayed in Table A1 show that education spending actually declined in continental European countries.

Table 4 Trends in 'policy' redistribution by regime

	Estimated 1985 level (%)	Average change per decade	*n*
All countries	15	− 0.2	117
Nordic	24	0.2	24
Continental Europe	16	− 0.5	34
Southern Europe	1	3.6	18
Anglo-American countries	10	0.4	41

In the Anglo-American countries, the increase in the percentage of single mother households is the highest of any of the regimes and the decrease in union density the second highest. In addition, these liberal welfare states stand out in terms of the decline in investment in education. The decreases in education spending were large in all of these countries, except Australia, where the decline was marginal. Thus, our data indicate that the Goldin–Katz argument on the effects of skill-biased change does travel to the other liberal welfare states but not to the other regime types. Card and Lemieux's (2001) findings support this view that in Canada, the UK and the USA, the slowdown in the expansion of education after 1970s raised the education wage premium. The liberal welfare states are losing the 'race between education and technology' by failing to invest in skills.

The heterogeneity of the causes of rising inequality across post-industrial democracies can be further illustrated by examining the countries in which pre-tax and transfer inequality increased the most: Finland, Norway and Germany (all from a low initial level), the UK from an average level but with the greatest increase of any country and the USA from a high initial level (see Figure A1). Industrial employment declined in all of these countries and the percentage of children living in single mother households increased in all of these countries, but to varying degrees. Unemployment increased greatly in Finland and modestly in Norway, and in both countries, increased public education spending acted as a countervailing factor. Germany shows a similar pattern with particular decreases in industrial employment and increases in vulnerable households and unemployment, but without a countervailing increase in education spending. In addition, the decreases in union density were very large in Germany in contrast to Norway and Finland, where union density was essentially stable. In the UK, one finds by far the largest decrease in industrial employment, a very large increase in single mother households, large decreases in education spending and large decreases in union density. Deindustrialization, rising unemployment, declining union density[9] and household change also contributed to the increase in inequality in the USA.

Table 5 Trends in independent variables (pre-inequality)

% Of children in single mother household	Estimated 1985 level	Average change per decade	n
Nordic	11.5	2.4	24
Continental Europe	7.1	2.4	39
Southern Europe	4.0	1.2	19
Anglo-American countries	12.6	2.9	41
Employment			
Nordic	74.0	−1.0	24
Continental Europe	62.6	3.7	39
Southern Europe	51.0	3.6	19
Anglo-American countries	66.0	1.4	41
Education spending			
Nordic	6.8	0.3	24
Continental Europe	5.0	0.2	39
Southern Europe	3.7	0.3	17
Anglo-American countries	5.7	−0.6	40
Industrial employment, % working age population			
Nordic	22.5	−3.3	24
Continental Europe	21.9	−2.5	39
Southern Europe	17.1	−0.3	19
Anglo-American countries	19.7	−2.6	41
Union density			
Nordic	70.9	0.5	25
Continental Europe	31.3	−3.4	34
Southern Europe	35.8	−4.6	16
Anglo-American countries	34.6	−4.2	41
Unemployment			
Nordic	4.4	1.6	24
Continental Europe	6.1	0.4	39
Southern Europe	11.7	−0.4	19
Anglo-American countries	7.3	0.3	41

Data for LIS country years only. See Supplementary data Table A1 for annual data.

A final comment is in order with regard to the impact of partisanship on redistribution. In a different analysis, we compared the impact of partisanship on social policy, poverty and redistribution in the pre- and post-1985 period (Huber and Stephens, 2013). In the pre-1985 period, social democratic government was highly significant for every indicator of poverty reduction and for inequality, but

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[9]The USA is striking for the great increase in wage dispersion, with more than double the increase in any other country, registering a 90-10 ratio of 5-1 at the last data point, considerably higher than the next highest country, Canada at 3.7-1. The decline in union density certainly contributed to the increase in wage inequality as did the failure to continue to increase the supply of highly educated workers, the factor highlighted by Goldin and Katz.

in the post-1985 period it had no more direct effects once generosity of the welfare state was controlled for. Social democracy in the pre-1985 period was highly significantly associated with almost all of the welfare state policy indicators, including the generosity of unemployment replacement rates. In the post-1985 period, the strongest social democratic government effects are on education spending, daycare spending, parental leave replacement rates and overall social spending. Social investment policies, specifically increasing public education spending and expanding access to tertiary education had become signature policies of social democratic parties by the late 20th century (Busemeyer, 2009). Thus, social democratic incumbents had built generous and redistributive welfare states in the expansion phase, and when the constraints on the welfare state tightened, they concentrated on social investment and work/family reconciliation, both areas that reduce inequality in the medium and longer run. Our analysis here covers both periods and so we see both an effect of welfare state generosity and investment in education and of social democratic incumbency.

5. Conclusion

The fundamental dynamics driving increasing inequality in advanced industrial societies over the past three decades are to be found in the labour market. However, politics through policy could counteract or compensate for these trends. The Goldin–Katz argument about skill-biased technological change and the failure of the education system to keep up with this change is only part of the story, and it mainly fits the USA and most of the other liberal countries. All of the advanced industrial countries have suffered a process of deindustrialization, which has eliminated comparatively well-paying jobs for people with low skills and contributed to growing pre-tax and transfer inequality. Low skilled workers who lost industrial jobs were pushed into the growing service sector, where low skills only qualify for low wage jobs. High productivity/high wage jobs in services demand high skills. Where countries differ is in their commitment over time to education and thus their capacity to produce the labour force with the skill set to fill these high wage jobs. The Nordic countries stand out in their efforts to improve and expand education, building on a strong base, whereas the Anglo-American countries actually reduced investment in public education.

Two more major changes over time in the labour markets of advanced industrial democracies have been the rise in unemployment and the decline in union density. Clearly, higher levels of unemployment lead to higher levels of pre-tax and transfer inequality. In some countries, higher levels of overall employment have mitigated the trend towards greater household income inequality. Declining union density has allowed an increase in wage dispersion and thus market inequality.

Aside from labour market dynamics, changes in household composition have been the major drivers of changes in pre-tax and transfer household income inequality. The increasing number of single mother households has meant an increasing number of low pre-transfer income households. Again, policy shapes the extent to which the availability of social services makes it possible for single mothers to work, and thus the degree to which single mothers head households that are poor before receiving transfers.

Rising pre-tax and transfer inequality has been accompanied by increasing efforts at redistribution in all welfare state regimes, albeit to different degrees. Very few of the countries and none of the regime types managed to completely neutralize the trends towards greater inequality. Post-tax and transfer inequality also rose, though again to greatly varying degrees—roughly three times more in the Anglo-American than in the Nordic and Continental regimes. Most of the increase in redistribution was triggered by an increase in need (higher unemployment and larger numbers of single mother households), rather than by policy innovation. As many authors have noted, the past three decades have been decades of welfare state retrenchment and defense, with innovations confined to work/family reconciliation and active labour market policies.

Bringing this analysis together with the analysis of partisan effects prior to and after 1985, we can clarify what we believe the overall patterns of partisan effects on inequality and redistribution have been. In that analysis, we provide a comparison of partisan effects in the pre- and post-1985 periods on six measures of social spending, five measures of replacement rates in various programmes and four measures of distributive outcomes. In the era of expansion, we find pervasive left government effects on almost all measures and Christian democratic government effects on a more limited and predictable number of measures. Partisan effects do decline dramatically in the era of retrenchment, but we still do find left government effects on five variables, four of which measure work and family reconciliation and social investment. In contrast, we find no positive effects of Christian democratic government and negative effects on four measures.

In summary, the problem pressure on the welfare state has increased rather dramatically, and even governments committed to stemming the tide of increasing inequality and able to rely on comprehensive welfare states have struggled to counter the trends. Nevertheless, we continue to see political and policy effects: Left governments have been more inclined to maintain benefit levels in the face of increasing need and to intensify investment in human capital. Governments in countries with liberal welfare state regimes in contrast were less inclined to step up their efforts to stem rising inequality, and by cutting expenditures on public education they failed to keep up with the needs of skill-biased technological change.

Supplementary material

Supplementary material is available at *SOCECO Journal* online.

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