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Author(s): Moene, Karl Ove;Wallerstein, Michael, 1951-

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INCOME INEQUALITY AND WELFARE
SPENDING:
A DISAGGREGATED ANALYSIS

Karl Ove Moene and Michael Wallerstein

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Michael Wallerstein is Professor of Political Science and Chairman of the Department of Political Science, Northwestern University and Member of the Scientific Council of the Center for Advanced Study in the Social Sciences, Juan March Institute, Madrid. This paper is based on a seminar that he presented at the Center, on 3 December 2001, entitled: "Insurance or Redistribution: The Impact of Income Inequality on Political Support for Welfare Spending". Karl Ove Moene is Professor of Economics at the University of Oslo.

Abstract

The welfare state is generally viewed as either providing redistribution from rich to poor or as providing publicly-financed insurance. Both views are correct but incomplete. Welfare policies provide both insurance and redistribution in varying amounts, depending on the design of the policy. We explore the political consequences of the mix of redistribution and insurance in the context of studying the impact of income inequality on expenditures in different categories of welfare spending in advanced industrial societies from 1980-1995. We find that spending on pensions, health care, family benefits, poverty alleviation and housing subsidies is largely uncorrelated with income inequality, but the spending on income replacement programs such as unemployment insurance, sickness pay, occupational illness and disability are significantly higher in countries with the most egalitarian income distribution. We show that this pattern is exactly what a theory of political support for welfare policies that embody redistribution and insurance in varying amounts would predict.

1 Introduction

Governments collect and spend around 45 per cent of GDP on average in advanced industrial societies, and about half of government spending goes to fund the variety of expenditures on transfer payments and services that constitute what is commonly called the welfare state. The classical view of welfare spending is that these policies are the outcome of a long political struggle in which workers and their allies used the power of the ballot box to obtain some redress for the inequalities generated by the market.¹ Whether scholars celebrate the growth of the welfare state as a triumph of reform or lament the weakening of market discipline that the growth of the welfare state occasioned, most have viewed welfare policies in redistributive terms.

The widespread view that welfare policies are primarily redistributive, whether the redistribution is between workers and capitalists, as in the social democratic model, or between tax payers and well-defined groups of beneficiaries, such as pensioners, limits understanding of the political bases of support for welfare expenditures. The alternative view is that social insurance policies provide insurance.² Of course, all insurance policies are redistributive in the sense that fire insurance redistributes resources from those lucky enough to never experience a fire in their house to those who have. Nevertheless, fire insurance is not redistributive *ex ante*. We do not expect fire insurance to be more popular among the poor than among the rich.

Both views of the welfare policy, as redistributive policies or as publicly financed insurance policies, are correct but incomplete. Most welfare policies can be best described as the public provision of insurance on redistributive terms. Whether we

understand the political support for welfare policies as being primarily based on the desire for income redistribution or primarily based on the desire for publicly provided insurance, however, has important implications for how we understand variations in support for welfare policy in response to changes in the social environment.

Consider, for example, the relationship between income inequality and support for welfare expenditures. The redistributive view of welfare policy, as formalized in a series of papers by Romer (1975), Roberts (1977), and Meltzer and Richard (1981), implies that higher inequality of market incomes among voters is associated with higher levels of political support for redistributive policies. The basic intuition is that low income earners have more to gain and less to lose from expansions of welfare spending than persons with high incomes. Thus, the poorer the majority of voters relative to the average income, the greater the expected support for welfare expenditures. In the one-dimensional model of voting over welfare spending where the voter with median income is decisive, the key statistic is the ratio of the median income to the mean income. The more skewed the distribution of income or, more precisely, the lower the ratio of the median to the mean income, the higher the level of welfare expenditures desired by a majority of voters. Welfare policy is expected to “lean against the wind” in the sense that the greater the inequality of pre-tax and transfer inequality, the greater the electoral support for government policies that redistribute from rich to poor.³

The conclusion that welfare policy could be expected to “lean against the wind” in democracies has important implications for the connection between inequality and poverty. Markets generate inequality of income and wealth. Redistributive policies, however, can prevent market inequalities from leading to destitution. If electoral competition results in greater redistributive effort, where inequality is higher, democratic institutions may sever the link between inequality and poverty. Cross-national difference

in inequality need not be closely associated with cross-national differences in the incidence of poverty.

If support for welfare expenditures is motivated more by the desire for insurance than for redistribution, however, the relationship between welfare policies and inequality may be more accurately characterized as “bending in the wind” rather than “leaning against the wind.” Richer voters prefer more insurance than poorer voters if the demand for insurance rises with income. The insurance framework does not imply that high-wage workers desire more of every type of insurance than low-wage workers. The demand for insurance depends on risk as well as on income. Low wage workers may express greater support for unemployment insurance than high-wage workers, for example, since the probability of being laid off is higher for low-wage workers. The insurance framework does imply, however, that a worker’s demand for unemployment insurance would rise if the worker’s income increased while the risk of being laid off remained constant. In a comparison of two countries with the same distribution of unemployment risk but different distributions of income, the more skewed the distribution of income, the *lower* the level of insurance desired by the voter with median income.

In this paper, we investigate the impact of income inequality on welfare spending in aggregate and disaggregated into spending on pensions, publicly financed health care, insurance against unanticipated income loss, family benefits, housing subsidies and poverty alleviation. It is generally recognized that the policies that comprise the welfare state are heterogeneous in ways that have important political consequences. Benefits may be narrowly targeted or paid to a large fraction of the population. Benefits may go to the elderly or to families with children. Here we argue that the impact of inequality on support for welfare spending depends on the degree to which social insurance policies provide insurance versus redistribution.

Previous attempts to verify the Romer-Roberts-Meltzer and Richard model of

welfare expenditures have proven to be disappointing. Perotti (1996) found no significant relationship between inequality and social insurance spending in a sample of 50 rich and poor countries. Rodriguez (1998) found no relationship between welfare spending at the state level in the US and inequality while Moffitt, Ribar and Wilhelm (1998) found spending on AFDC to be lower in states where the distribution of income was most unequal. Among OECD countries, Rodriguez (1998) found income inequality to be associated with less, not more, social insurance spending. None of these studies has explored the differences in the impact of inequality on spending in different welfare programs.

In the second section of the paper, we demonstrate that the relationship between income inequality and welfare spending varies by type of welfare expenditure. For the big ticket items of pensions and health care, as well as for smaller items such as family benefits and anti-poverty programs, social insurance expenditures are largely uncorrelated with income inequality. For insurance against the risk of income loss due to layoffs or ill health, however, spending, as a share of GDP is significantly higher in countries where the pre-tax and transfer distribution of income is most egalitarian.

In the third section of the paper, we show that expanding the Romer-Roberts-Meltzer and Richard framework to encompass the provision of insurance in addition to redistribution along the lines suggested by Moene and Wallerstein (2001) can provide an explanation for the differences in the relationship between inequality and the major components of the welfare budget that the data reveal. While the demand for redistribution declines with income, the demand for insurance generally rises with income. Putting these two observations together implies that changes in the income of the median voter relative to the mean has two, counteracting effects. Which effect dominates depends on the relative mix of insurance and redistribution in a sense that can be made rigorous with the

use of a formal model. Applying the model to different welfare programs provides an explanation for three prominent features of the data: (1) For programs consisting of roughly two-thirds of welfare expenditures, there is little or no relationship between spending and pre-tax and transfer income inequality. (2) For the remaining third of welfare spending, levels of spending are highest in countries where the pretax and transfer distribution of income is most egalitarian. (3) For almost no welfare policy is spending significantly higher in countries where inequality is highest.

2 Income Inequality and Social Insurance Expenditures

We begin with a discussion of the data used in the statistical analysis and of the methodological issues that we confronted. We then discuss our results and compare our findings to what others have found. Details regarding data sources and summary statistics for all variables used in the analysis can be found in Appendix 1.

2.1 Description of the Data

According to OECD statistics (OECD 1999), welfare expenditures averaged 23 per cent of GDP and 51 per cent of total government spending in advanced industrial societies between 1980 and 1995. The welfare budget can be divided into three large categories and three smaller categories. Pensions (old age cash benefits) make up 30 per cent of the welfare budget on average. Public spending on health consumes an average of 26 per cent of welfare spending. Policies that provide income support in a wide variety of circumstances (unemployment, disability, sickness, occupational injury, death of a spouse) comprise 31 per cent of social insurance expenditures on average. The remaining 13 per cent of the welfare budget is spent on benefits and services for families with children (9 per cent of welfare expenditures), benefits targeted to low income individuals, refugees and indigenous groups (3 per cent of welfare expenditures) and housing subsidies (1 per cent of welfare expenditures). It is interesting to

note how small the share of spending on policies explicitly dedicated to poverty alleviation. Government spending in what is known as "welfare" in the US, that is programs in which eligibility for benefits is primarily based on low income, average only 0.6 per cent of GDP in advanced industrial societies.

In one-dimensional models of voting over welfare in which voters differ in their income, support for welfare expenditures depends on the ratio of the income of the median voter to the mean income. Unfortunately, data on the ratio of the median to the mean wage is limited. However, the OECD has published data on the ratio of earnings at different percentiles of the distribution of wages and salaries for full-time employees, both men and women, covering most OECD countries from 1980 through 1995 (OECD 1993, 1996). We can use the fact that the distribution of wages and salaries is well-approximated by the lognormal distribution to write the ratio of the median wage to the mean as:

$$\frac{\text{median}}{\text{mean}} = \exp(-\sigma^2/2) \quad (1)$$

where σ^2 is the variance of the log of wages.⁴ The variance of the log of wages, in turn, can be derived from the ratio of wages at any two percentiles of the wage distribution according to the formula

$$\sigma = k_{ij} \ln(w_i/w_j) \quad (2)$$

where w_i is the wage received by a worker at the i th percentile of the wage distribution and w_j is the wage received by a worker at the j th percentile of the wage distribution with $j < i$, and k_{ij} is a positive constant that depends on i and j . Equations (1) and (2) imply that $\ln(w_i/w_j)$ is a good proxy for the ratio of the median income to the mean.

The OECD provides data on the 90/10, 90/50 and 50/10 wage ratios. As equations (1) and (2) indicate, the statistical results should not depend on the wage ratio that is

used. In practice, the lognormal distribution is a good approximation but not a perfect characterization of the actual distribution of wages and all variables are measured with error. Therefore, we used all three available wage ratios in our analysis. To save space, we only report the results using the 90/10 wage ratio but none of our findings are significantly different when the 90/10 wage ratio is replaced by either the 90/50 or the 50/10 wage ratio.

Because wage inequality data is not available on an annual basis for many countries and because we do not think that small annual changes in distribution of income have an immediate political impact, we used the average value of the 90/10 wage ratio for each five year period. That is, to explain social insurance expenditures in, say 1985, we use the average of all measures of the 90/10 wage ratio that are available for the time period 1980-1984. Thus, our data set consists of data on spending in various social insurance programs as a share of GDP in the 18 countries in the years 1985, 1990 and 1995 with measures of wage inequality (and most other control variables) averaged over the time periods, 1980-1984, 1985-89 and 1990-94. We have 50 observations after subtracting the four cases in which there is no measure of wage inequality within the five-year time period.⁵

On average, a worker at the 90th percentile received three times the earnings of a worker at the 10th percentile. The most egalitarian wage distribution in the data set is Norway in 1990-94, where the ratio of earnings at the 90th percentile to earnings at the 10th percentiles was less than two to one. The least egalitarian earnings distribution was achieved by the US in 1985-89, when workers at the 90th percentile received a wage or salary that was 5.5 times the wage received by workers at the 10th percentile.

As control variables, we include the dependent variable lagged one period (5 years), the rate of unemployment, the share of elderly in the population, voter turnout, and a measure of Conservative party participation in government. We discuss each briefly in turn.

Lagged dependent variable: Budgeting is incremental. The best single predictor of next period's welfare budget is the current welfare budget. Indeed, the simple regression of current total social insurance spending on past total social insurance spending (plus a constant) yields an R^2 of 87.7 per cent.⁶ Therefore, we include the lagged dependent variable in the set of regressors.

Unemployment rate: Once the parameters of unemployment insurance are fixed, expenditures on unemployment benefits vary directly with the rate of unemployment. Expenditures on active labor market policies and even disability insurance may also be sensitive to the unemployment rate. Thus, we include the rate of unemployment in the same year as the data on expenditures when analyzing categories of spending that might be sensitive to the unemployment rate.⁷

Share of elderly in the population: Government spending on pensions and health care may be affected by the share of elderly in the population, both because the larger the share of elderly, the greater the need for spending to maintain the elderly in reasonable comfort and because the larger the share of elderly, the larger the share of the electorate with a keen interest in spending on pensions.⁸ We use the average share of elderly in the population in the previous five years (as is appropriate if the elderly share primarily measures the political strength of the elderly) rather than in the same year (as would be appropriate if the elderly share primarily measures need) because the five-year average fits the data better than the same year figure, although the difference in fit is small.

Turnout: Since the electorate is not a representative sample of the adult population as a whole, the level of turnout may affect support for welfare expenditures, as argued by Lijphart (1997) and Franzese (1998). The electorate is both richer and older than the adult population as whole, and the correlation between electoral participation and income is generally weaker than the correlation between electoral participation and age (Franklin

1996). Thus, the strongest impact of a low turnout may be to increase the political influence of the elderly. We include the average turnout in elections to the lower house of parliament (except in the US where we only include presidential elections) in each five year period.

Conservative government: There are two ways to view the impact of economic and demographic variables on the level of welfare expenditures. In the first approach, economic and demographic variables are thought to influence the likelihood that pro-welfare parties win elections and implement their preferred policies. In this case, the party in power is endogenous and should not be included as a control. In the alternative approach, economic and demographic variables are thought to determine the policies associated with the center of the political spectrum, around which the parties compete. In this case, the party in power and the economic and demographic variables have independent effects. We take the second view in this study and include the party in power as a control. Like many others, we find the greatest partisan difference with respect to welfare expenditures is that which separates conservative parties from both center and left parties (Castles 1992, Esping-Andersen 1990).⁹ Therefore, we use the average share of cabinet seats held by conservative parties in each period as our measure of the partisan composition of government.

Finally, it is worth discussing common controls that we do not include. We do not include measures of union density, union concentration or the centralization of bargaining, since previous studies have identified these variables as being the primary determinants of the inequality of wages and salaries.¹⁰ Our assumption is that the effect of union organization and wage-setting institutions on welfare expenditures is indirect. Unions and wage-setting institutions affect the distribution of income which, in turn, affects the political support for social insurance. The relationship between organization of the labor market and wage

inequality is so close that it is impossible to separate the effect of union strength *per se* from the effect of a more egalitarian wage distribution. It is also difficult to separate the effect of the wage schedule from the effect of the structure of employment, the explanatory variable emphasized by Iversen and Cusack (2000), since the structure of wages has a strong effect on the types of jobs that are created and vice versa.

We also do not include controls for per capita GDP. As many others have found, per capita GDP has little explanatory power when the data set is limited to advanced industrial societies. Finally, we do not include a control for federal systems of government, as suggested by Huber, Ragin and Stephens (1993), since a dummy variable for federal systems never proved to be statistically significant in any of the specifications that we tried.

2.2 Methodological Issues

The model we estimate is

$$y_{i,t} = \alpha + \beta y_{i,t-5} + \gamma \cdot Inequality_{i,t} + \delta' x_{i,t} + u_{i,t} \quad (3)$$

where $y_{i,t}$ is spending as a share of GDP in country i in year t , ($t = 1985, 1990, 1995$), $Inequality_{i,t} \equiv \ln(w_{90}/w_{10})$ using the average value of w_{90}/w_{10} in country i from $t - 5$ to $t - 1$ and $x_{i,t}$ is the vector of control variables. Two methodological issues arise. The first is the question of the exogeneity of our right-hand-side variables. The second concerns likely deviations from the standard assumptions regarding the variances and covariances of the error terms.

Two right-hand-side variables, in particular, might be suspected of being endogenous. Few economists would accept the assumption that the rate of unemployment is exogenous with respect to spending on unemployment benefits. Since we are not concerned in this paper with accurately measuring the impact of the unemployment rate on welfare spending,

the endogeneity of unemployment only matters to the extent that it alters our inferences regarding γ in equation (3). Removing the unemployment rate from the set of controls results in only minor changes in the point estimates of γ and the associated standard errors. Therefore, the potential endogeneity of the unemployment rate does not affect our conclusions regarding inequality and welfare spending.

The other variable that might be endogenous is our central variable, the inequality of wages and salaries. While *Inequality* is calculated on the basis of pre-tax wages, the welfare system may affect the pre-tax wage distribution. The study of wage inequality among advanced industrial societies by Wallerstein (1999), however, found that the predominant determinants of the w_{90}/w_{10} ratio are (i) union density or the coverage of union contracts, (ii) the concentration of the union movement and (iii) the level at which wages are set. Moreover, Wallerstein found that government spending had little effect on the w_{90}/w_{10} ratio after controlling for the institutions that govern the process of wage-setting. These findings provide support for our assumption that pre-tax wage inequality is exogenous with respect to welfare spending. To check the robustness of our results, however, we report the results of IV estimation, using wage-setting institutions as instruments for wage inequality.¹¹

The second problem concerns the implausibility of the assumption that the error terms associated with different countries in the same year are uncorrelated. The Norwegian government may not consider the US a suitable model for its social policy, but the Norwegians pay close attention to the policy choices made in Sweden and vice versa. Instead of the usual assumption that $E(uu') = \sigma^2 I$, a more plausible assumption is to allow for heteroscedasticity and cross-sectional correlation of errors. The current conventional approach in comparative politics is to use OLS to obtain point estimates, since the OLS estimates remain unbiased, but correct the estimated standard errors for heteroscedasticity and cross-sectional correla-

tion (Beck and Katz 1995, Greene 1997). However, with only three time periods, it is nuclear whether the correction improves the standard errors or makes matters worse.

To decide this question, we turned to simulations, described in Appendix 2. The simulations reveal that, the uncorrected estimates of the standard errors perform well, even in the presence of heteroscedasticity and cross-sectional correlations, while the panel-corrected estimates of the standard errors perform poorly with so few time periods. Therefore, we report uncorrected standard errors in the regressions that follow.

2.3 Results

We begin with total welfare spending as a share of GDP. As column 1 in Table 1 reveals, total welfare spending is significantly and negatively related to the inequality of wages and salaries. Spending levels are lower in countries which are more unequal. Total welfare spending is also reduced by conservative parties in government and high levels of voter turnout. The estimated negative effect of turnout on social insurance spending may surprise readers, but it fits with the result of studies of turnout cited earlier that age is highly correlated with voting. Thus, lower turnout may imply an older electorate on average. Both the share of the population who are elderly and the rate of unemployment are positively associated with welfare expenditures as a share of GDP.

However, as discussed above, it is likely that aggregating all welfare programs together may obscure where and in what way inequality matters. In columns 2, 3 and 4, we consider the three main pillars of the welfare state, each one of which consumes roughly 30 per cent of the total welfare spending or 7 per cent of GDP. In column 2, the dependent variable is spending on pensions (old age cash benefits) as a share of GDP. In column 3, the dependent

TABLE 1. The Impact of Inequality on Major Categories of Welfare Spending as a Share of GDP in 18 OECD Countries, 1980-95						
Dependent Variable	1 All Welfare Spending	2 Pensions	3 Health	4 Income Replacement	5 Unemp. Insurance	6 Other Insurance
Lagged Dep. Var.	.749*** (.063)	.905*** (.056)	.777*** (.103)	.728*** (.065)	.582*** (.077)	.759*** (.064)
Inequality (90/10)	-4.50*** (1.50)	-0.31 (0.56)	0.17 (0.51)	-3.32*** (0.94)	-2.16*** (0.48)	-1.37** (0.63)
Right Govt.	-.0190*** (.0073)	-.0051** (.0028)	-.0047** (.0025)	-.0115*** (.0044)	-.0030 (.0026)	-.0070** (.0031)
Turnout	-.0730*** (.0250)	-.0177** (.0097)	-.0165** (.0085)	-.0343** (.0150)	-.0141* (.0086)	-.0182** (.0101)
Percent Elderly	.326** (.170)	.065 (.062)	-.020 (.052)	.116 (.090)		.116** (.063)
Unemp. Rate	.256*** (.082)			.122*** (.050)	.163*** (.031)	-.016 (.032)
adj. R^2	92.3	90.7	61.2	90.4	82.5	90.7
Notes: OLS estimation, standard errors in parenthesis, $n = 50$, *** $p \leq .01$, ** $p \leq .05$, * $p \leq .10$. All regressions include a constant.						

variable is government spending on health care as a share of GDP. Since there is little reason to think that the rate of unemployment matters for spending on pensions or health care, and the estimated coefficient on unemployment is not statistically significant if unemployment is included in either regression, we removed the unemployment rate from the set of controls. It is apparent from columns 2 and 3 that inequality has little impact on spending for either pensions or health. In both cases, the estimated coefficient on inequality is not significantly different from zero.

In contrast, the inequality of wages and salaries has a significant, negative effect on spending on the set of policies that provide income replacement, or insurance against the loss of income as a share of GDP as a result of unemployment, sickness, disability, occupational illness or accidents and the death of a spouse (column 4 of Table 1). The estimated impact of a permanent standard deviation increase of wage inequality of one standard deviation (.25) is to change spending on income replacement programs by $-3.32 \cdot .25 \approx -0.8$ of a percent of GDP in the short run (five years) and by $-3.32 \cdot .25 / (1 - .728) \approx -3.1$ per cent of GDP in the long-run. Since average spending on income replacement is 7.1 per cent of GDP in the sample, this is a large change. To illustrate with an example, the difference between the log of the average 90/10 wage ratio in the UK and Sweden in the early 1990s was .45. This difference in wage inequality is estimated to be associated with a difference of spending on income replacement of $3.32 \cdot .45 / (1 - .728) \approx 5.5$ per cent of GDP in the long run. The actual difference between spending on income replacement as a share of GDP in Sweden and in the United Kingdom was 7.3 percentage points in 1995 (13.2 per cent of GDP in Sweden as opposed to 5.9 per cent of GDP in the UK.). Thus, the difference in wage inequality between the United Kingdom and Sweden explains about 75 per cent of the actual difference in spending on income replacement as a share of GDP in the two countries in 1995.

The category of income replacement programs can be subdivided into policies that provide insurance against the risk of unemployment, that is the sum of spending on unemployment benefits and spending on active labor market policies (2.4 per cent of GDP on average, column 5 of Table 1) and policies that provide insurance against the risks of loss of income because of disability, sickness, occupational illness and injury and death of a spouse (4.7 per cent of GDP on average, column 6 of Table 1). Inequality is most strongly related to

spending on unemployment insurance and active labor market policies, as column 5 shows, but the relationship is significant and negative for both categories of expenditures. It is also worth noting that, in spite of the charge that employers and unions and governments under conditions of high unemployment encourage workers to apply for disability payments, the unemployment rate does not have a significant effect on expenditures on disability insurance as a share of GDP.

Readers might question the specifications presented in Table 1. Perhaps unemployment should be dropped from column 6, since the estimated coefficient has the “wrong,” i.e. unexpected, sign. Perhaps the unemployment rate should be added to column 3, since unemployment may be damaging to health. Perhaps conservative government should be removed from the set of controls on the *a priori* grounds that electoral competition forces all parties to implement the same policies, as in the Downsian model. Rather than consider each possible objection, we investigated the robustness of the results in Table 1 by regressing each of the dependent variables on the lagged dependent variable, wage inequality on every subset of the “questionable” control variables, where the “questionable” control variables are Right Government, Turnout, the Percent Elderly and the Unemployment Rate.¹²

The results are presented in Table 2, where we display the minimum and the maximum value of the estimated coefficient on Inequality (90/10) over all combinations of the questionable controls for each dependent variable. Table 2 shows that the qualitative results in Table 1 with regard to the three large components of the welfare budget are robust. While the effect of uncertainty regarding the correct specification is larger than sampling uncertainty for any given specification, every specification implies that inequality is negatively associated at the .05 significance level with spending on income replacement as a share of GDP. In contrast, inequality is not significantly associated with spending on pensions as a share of

GDP in any specification. In the case of government spending on health care, inequality is not significantly associated with spending as a share of GDP in most specifications.

TABLE 2. The Range of the Coefficient in front of the log of the 90/10 Wage Ratio for all Possible Combinations of the Questionable Controls		
Dependent Variable	Minimum	Maximum
1. All Welfare Spending	-5.52 (1.50)	-2.16 (1.37)
2. Pensions	-0.75 (0.50)	0.32 (0.46)
3. Health	0.10 (0.52)	0.72 (0.44)
4. Income Replacement	-3.46 (0.99)	-1.93 (0.85)
5. Unemployment Support	-1.83 (0.68)	-1.28 (0.57)
6. Other Insurance	-1.71 (0.61)	-0.72 (0.52)
Notes: Each line summarizes the results of 2^q regression equations with $n = 50$ where q is the number of questionable controls. Only the coefficient for Inequality 90/10 is shown with standard errors in parentheses. In lines 1, 4 and 5, the questionable controls are Right Government, Turnout and the Percent Elderly. In lines 2, 3 and 6, the questionable controls are Right Government, Turnout, the Percent Elderly and Unemployment.		

Kristov, Lindert and McClelland (1992) distinguish between the political impact of inequality in the top half of the wage schedule and inequality in the bottom half of the wage schedule. Kristov et al argue that the closer the median is to the poor, that is the smaller the w_{50}/w_{10} wage ratio, the greater the willingness of voters in the middle to support welfare expenditures. In contrast, the closer the median is to the rich, i.e. the smaller the w_{90}/w_{50} ratio, the lower the willingness of voters in the middle to support welfare expenditures. In Table 3, we test the proposition that the 90/50 ratio and the 50/10 ratio have different political effects. The equations that are estimated are identical to the corresponding equation in Table 1, with the log of w_{90}/w_{10} replaced by the log of w_{90}/w_{50} and the log of w_{50}/w_{10} . Only the coefficients on Inequality (90/50) and Inequality (50/10) are displayed. The estimated coefficients on inequality always have the same sign. Moreover, the null hypothesis that the coefficient on $\ln(w_{90}/w_{50})$ and the coefficient on $\ln(w_{50}/w_{10})$ are the same is never rejected. Therefore, our use of $\ln(w_{90}/w_{10}) = \ln(w_{90}/w_{50}) + \ln(w_{50}/w_{10})$ as the measure of inequality in Table 1 is justified.

Table 3. The Impact of the 90/50 Ratio and the 50/10 Ratio on Welfare Expenditures as a Share of GDP				
Dependent Variable	1 All Welfare Spending	2 Income Replacement	3 Unemployment Support	4 Other Insurance
Inequality 90/50	-4.91 (3.37)	-3.60 (2.02)	-1.47 (1.17)	-2.11 (1.36)
Inequality 50/10	-4.19 (2.28)	-3.13 (1.44)	-2.48 (0.77)	-0.91 (0.95)
$F(1, n - k)$	0.20	0.16	0.27	0.29
Notes: The regression equations include all of the controls included in Table 1 for each of the dependent variables, $n = 50$, $k = 8$ for columns 1, 2 and 4, $k = 7$ for column 3. The F statistic tests the null hypothesis that the coefficients on Inequality 90/50 and Inequality 50/10 are identical.				

To check the robustness of the results with respect to the potential endogeneity of the pre-tax wage distribution, we redid the regressions reported in Table 1 using two aspects of wage-setting that Wallerstein (1999) found to be important determinants of the pre-tax wage distribution as instruments for $\ln(w_{90}/w_{10})$. The first instrument is an approximate Herfindahl index of union concentration within the major blue-collar confederations.¹³ The second instrument is a four-category index of the level of wage-setting, measured annually, where the categories are (i) wage-setting at the level of the firm or plant, (ii) wage-setting at the industry level, (iii) wage-setting at the national level without controls on wage bargaining at lower levels and (iv) wage-setting at the national level with controls on wage-bargaining at lower levels.¹⁴ It is important to note that wage-setting at the national level can reflect either government intervention in private-sector wage-setting, as in incomes policies, or collective bargaining by peak associations of unions and employers. A comparison of Tables 1 with Table 4 indicates that estimation by 2SLS produces substantively similar results as estimation by OLS. On the one hand, the association between pre-tax wage inequality and spending on pensions and health care is close to zero. On the other hand, the association between pre-tax wage inequality and spending on programs of insurance against unexpected income loss is strongly negative.

Pensions, health spending and income replacement constitute most, but not all, of the welfare budget. In Table 5, we present an analysis of the remaining part, divided into family benefits and services (2 per cent of GDP on average), and programs targeted to low income individuals, refugees and indigenous groups plus housing subsidies (1 per cent of GDP on average). Column 1 reveals that none of the independent variables are good predictors of spending on family benefits, with the exception of the lagged spending on family benefits.

The second column of Table 5 indicates that conservative parties in government are associated with more spending on housing subsidies and antipoverty programs, which may reflect the preference of conservative parties for narrowly targeted over broadly targeted programs. In addition, countries with high rates of unemployment spend more on benefits targeted to those with low income. In neither category, however, is spending significantly associated with the inequality of wages and salaries.¹⁵

In sum, the inequality of the distribution of wages and salaries has a strong impact on some parts of the welfare budget and not on others. Spending on such programs as health care, pensions and family benefits are largely independent of the inequality of wages and salaries. In contrast, spending on programs that provide income replacement for many of the risks facing working age adults, that is the inability to work because of unemployment, occupational illness or injury, disability and sickness, is significantly more generous in countries with a relatively egalitarian pre-tax distribution of wages and salaries.

3 A Model of Political Support for Social Insurance

It is striking that the central result of the Romer-Roberts-Meltzer and Richard model, that welfare expenditures are an increasing function of income inequality is not supported by spending from any of the major welfare programs among advanced industrial societies. Nevertheless, in this section we show how a straightforward extension of the Romer-Roberts-Meltzer and Richard framework to include the provision of insurance as well as redistribution can account for differential impact of wage inequality on expenditures across different social insurance programs observed in the data.¹⁶

TABLE 5. The Impact of Inequality on Smaller Categories of Welfare Spending as a Share of GDP in 18 OECD Countries, 1980-95		
Dependent Variable	1 Family Benefits	2 Anti-Poverty Programs and Housing Subsidies
Lagged Dependent Variable	.521*** (.102)	.986*** (.075)
Inequality (90/10)	-0.45 (0.63)	-0.24 (0.26)
Right Government	-.0025 (.0029)	.0028** (.0013)
Turnout	.0150* (.0101)	-.0036 (.0044)
Percent Elderly	.068 (.061)	.024 (.025)
Unemployment Rate	.035 (.032)	.048*** (.014)
adj. R^2	63.8	82.7
Notes: OLS estimation, standard errors in parenthesis, $n = 50$, *** $p \leq .01$, ** $p \leq .05$, * $p \leq .10$. All regressions include a constant.		

3.1 Basic assumptions

Consider an electorate composed of self-interested, risk-averse voters who differ in their income when employed but face a common risk of losing their employment in the next period.

In particular, we will rely on the following assumptions:

1. Wages and salaries are distributed lognormally, where σ^2 denotes the variance of the log of wages. Since we will consider changes in inequality (that is, in σ^2), holding the average wage constant, there is no loss of generality in assuming the average wage equals one.
2. All voters receive a known wage from the wage distribution with probability π . There is, however, a non-zero probability, $(1 - \pi)$, that each voter will lose his or her income because of unemployment, injury or illness. To keep the model as simple as possible, the probability of being employed, π , is assumed to be the same for all voters.¹⁷
3. Voters are assumed to be identical in terms of their aversion to risk, as characterized by the coefficient of relative risk aversion, $\mu \equiv -cu''(c)/u'(c)$ where $u(c)$ represents voters' preferences over consumption, c . This assumption implies that voters' preferences can be represented by the utility function:

$$u(c) = \left(\frac{1}{1-\mu} \right) [c^{1-\mu} - 1]$$

In addition, we assume that the demand for insurance rises with income, which implies that $\mu > 1$.¹⁸

4. Social insurance expenditures are financed by a flat tax on wages, $t \in [0, 1]$. In addition, taxation imposes a deadweight cost which we model implicitly by assuming that total tax revenues, T , is given by a twice differentiable function of the tax rate, $\tau(t)$, multi-

plied by average earnings, π (since the fraction π are working and the average wage is one), or $T(t) = \pi\tau(t)$. The function $\tau(t)$ is assumed to satisfy the properties $\tau(0) = 0$ (no taxes are collected when the tax rate is zero), $\tau'(0) = 1$ (there is no deadweight loss at $t = 0$), $\tau''(t) < 0$ (the deadweight cost of taxation rises as the tax rate increases) and $\tau'(t_{\max}) = 0$ for some $t_{\max} < 1$ (there is some tax rate $t_{\max}$ beyond which further increases in the tax rate do not yield increases in tax receipts).

Our political model is very simple. Every voter has single-peaked preferences over the level of spending or, equivalently, the level of taxation that depends on the voter's income. In this case, the political equilibrium is the ideal policy of the voter with median income.

Thus, the first step to examine each voter's ideal policy. A voter with income w prefers the level of expenditures that maximizes his or her expected utility:

$$Eu = \pi u(c_E) + (1 - \pi)u(c_N), \text{ where} \quad (4)$$

$$c_E = (1 - t)w + b_E(w) \quad (5)$$

$$c_N = b_N(w) \quad (6)$$

subject to the budget constraint that

$$\int_0^\infty [\pi b_E(w) + (1 - \pi)b_N(w)] dF(w) = \pi\tau(t) \quad (7)$$

where $F(w)$ is the cumulative density function of the wage distribution. Equation (5) states that disposable income when employed, c_E , is equal to the after-tax wage $(1 - t)w$ plus the benefit received when employed, $b_E(w)$. Equation (6) states that income when not employed, c_N , is equal to the benefit received when not employed, $b_N(w)$. Note that, in general, benefits may depend on earnings for those who are employed or on past earnings for those who are not employed. The budget constraint, equation (7), states that total welfare spending, the

sum of benefits received by the employed and those not employed at each wage level, must equal total tax revenues.

The first-order condition for the voters' maximization problem can be written as

$$H(w, t^*) - \lambda \tau'(t^*) - v'(c_E)w = 0 \quad (8)$$

where t^* is the optimal tax rate and λ is the Lagrangian multiplier associated with the budget constraint. The Lagrangian multiplier can be interpreted as the utility gain from a marginal increase in the per capita welfare budget $T(t)$. Equation (8) states that the gain in expected utility from a marginal increase in the tax rate, $\lambda T'(t) = \lambda \pi \tau'(t)$, just equals the expected utility cost of the tax increase to a voter with income w , $\pi v'(c_E)w$. Equation (8) is not sufficient to characterize the solution, since the Lagrangian multiplier λ depends on the definitions of the benefit functions $b_E(w)$ and $b_N(w)$ that describe different social insurance programs.

As noted above, the wage of the median wage-earner is $w_M = \exp(-\sigma^2/2)$ when the mean wage equals one with a lognormal distribution. We can derive the impact of inequality on the political equilibrium by calculating

$$\frac{dt^*}{d\sigma^2} = -\sigma w_M \left(\frac{dt^*}{dw} \right) = \sigma w_M \left[\frac{\partial H(w_M, t^*) / \partial w}{\partial H(w_M, t^*) / \partial t} \right]$$

In all of the specifications of $b_E(w)$ and $b_N(w)$ that we consider, the second-order condition that $\partial H(w_M, t^*) / \partial t < 0$ is satisfied. Therefore, the impact of inequality on social insurance spending is determined by the sign of $\partial H(w_M, t^*) / \partial w$. When $\partial H(w_M, t^*) / \partial w < 0$, higher inequality raises welfare spending. When $\partial H(w_M, t^*) / \partial w > 0$, higher inequality lowers welfare spending.

3.2 Two benchmark cases

Romer, Roberts, and Meltzer and Richard assumed that welfare benefits consists of an equal lump-sum payment to all employed citizens, or $b_N(w) = 0$ and $b_E(w) = b$. The budget constraint implies $b = \tau(t)$. Since the benefit is received by employed workers, the utility gain from a marginal increase in the per capita welfare budget (the Lagrangian multiplier in equation 8) is $\lambda = u'(c_E)$.¹⁹ Therefore, the first-order condition simplifies to

$$H(w_M, t^*) = \tau'(t^*) - w_M = 0$$

where w_M is the ratio of the median income to the mean (since the mean wage is assumed to equal one). It follows immediately that

$$\frac{dt^*}{d\sigma^2} = -\frac{\sigma w_M}{\tau''(t^*)} > 0$$

The political demand for welfare spending rises as inequality increases.

Consider, in contrast, the case in which the lump-sum benefit is given to those who are not employed, or where $b_E(w) = 0$ and $b_N(w) = b$. The budget constraint now implies $b = [\pi/(1 - \pi)]\tau(t)$, since taxes are collected from the fraction π of the population while benefits are paid to the fraction $(1 - \pi)$. With benefits paid to those without earned income, the Lagrangian multiplier in equation (8) becomes $\lambda = u'(c_N)$, which implies

$$H(w_M, t^*) = u'(c_N)\tau'(t^*) - u'(c_E)w_M = 0$$

The impact of inequality on t^* is now given by

$$\text{sgn} \left(\frac{dt^*}{d\sigma^2} \right) = \text{sgn} \left[-\frac{\partial H(w_M, t^*)}{\partial w} \right] = \text{sgn} [u'(c_E)(1 - \mu)] < 0$$

since $\mu > 1$. When the lump-sum payment is made to those without employment, an increase in inequality reduces the demand for welfare spending.²⁰

The two benchmark cases illustrate the two forces at work. When benefits are received in lump-sum fashion by those who are employed, the program is purely redistributive, and greater inequality generates greater support. When benefits are received in lump-sum fashion by those without employment, however, the program provides both insurance and redistribution. In spite of the redistributive character of an insurance policy where benefits are the same for all while contributions rise in a linear fashion with income, the insurance motive dominates in the sense that the demand for spending increases as income rises relative to the mean. In this case, more egalitarian societies support higher levels of welfare spending than less egalitarian societies.

3.3 Insurance against income loss

Neither benchmark is a good approximation for any existing welfare program. A slight modification of the second benchmark, however, yields a reasonable characterization of programs that provide income replacement for those who have lost their earnings due to unforeseen circumstances such as layoffs or ill health. Benefits are targeted to those without earnings, so $b_E(w) = 0$. In general, benefits rise with past earnings, but in a manner that is redistributive, which we write as $b_N(w) = [\xi + (1 - \xi)w]b$ where $\xi \in (0, 1)$. In other words, the policy is assumed to provide an income floor of ξb plus the fraction $(1 - \xi)b$ of past earnings. The budget constraint implies that $b_N(w) = [\pi/(1 - \pi)][\xi + (1 - \xi)w]\tau(t)$. The Lagrangian multiplier in equation (8) becomes $\lambda = u'(c_N)[\xi + (1 - \xi)w]$. Rewriting the first-order condition as

$$H(w_M, t^*) = u'(c_N)[\xi + (1 - \xi)w_M]\tau'(t^*) - u'(c_E)w_M = 0,$$

taking the partial derivative with respect to w and simplifying produces

$$\text{sgn}\left(\frac{dt^*}{d\sigma^2}\right) = \text{sgn}\left[\left(\frac{\xi}{\xi + (1 - \xi)w_M}\right)u'(c_E)(1 - \mu)\right] < 0$$

The predicted impact of inequality on spending for programs that provide insurance against income loss is negative, exactly what the regressions of spending on income replacement programs on inequality reported in Tables 1 and 2 reveal.

3.4 Universalistic programs

Social insurance programs like family benefits and health care are universalistic. The benefit provided is the same at all income levels, and is received whether or not the beneficiary is currently employed. A reasonable characterization of these programs is simply $b_N(w) = b_E(w) = b$. Applying the budget constraint yields $b = \pi\tau(t)$. The utility gain from a marginal increase in $\tau(t)$ is $\lambda = \pi u'(c_E) + (1 - \pi)u'(c_N)$ since the benefit is consumed in both states of the world. Therefore, with a universalistic program, the first-order condition (equation 8) becomes

$$H(w_M, t^*) = [\pi u'(c_E) + (1 - \pi)u'(c_N)] \tau'(t^*) - u'(c_E)w_M = 0,$$

Calculating the partial derivative with respect to w and simplifying yields

$$\text{sgn} \left(\frac{dt^*}{d\sigma^2} \right) = \text{sgn} \{ u'(c_E)(1 - \mu) - u''(c_E)\pi [\tau(t^*) + (1 - t^*)\tau'(t^*)] \}$$

which can be either positive or negative. While the first term inside the outer brackets is negative, the second term is positive. Without more information regarding the value of μ and the function $\tau(t)$, we cannot tell whether $dt^*/d\sigma^2$ is positive or negative. In the case of universalistic programs, the redistributive effect and the insurance effect work against each other such that the relationship between inequality and the political demand for spending is ambiguous, which is reflected in estimated coefficients that are not significantly different from zero when the dependent variable is health spending or family benefits in Tables 1 and 2.

3.5 Other social insurance programs

The last big category of social insurance spending is pensions, which could be represented by $b_N(w) = b_E(w) - [\xi + (1 - \xi)w]b$, since all workers expect to receive pensions, whether currently employed or temporarily without employment, and benefits depend on earnings in a redistributive manner. The results are similar to the case of universalistic lump-sum benefits. It is impossible to tell without more information which of the two counteracting effects, redistribution and insurance, will dominate. The final category of policies that are explicitly targeted for poverty alleviation, policies that comprise a minor part of the welfare budget but an important part of the budgets of very poor households in advanced industrial societies, cannot be examined in a model of self-interested voting. The probability of receiving payments targeted for poverty alleviation are virtually zero for a majority of voters. Support for such policies must be based on factors such as altruism or fear of criminal acts by the desperately poor.

4 Conclusion

The empirical relationship between inequality and social insurance spending as a share of GDP in advanced industrial societies differs across policies. For many policies—pensions, health care, family benefits, poverty alleviation—there is little evidence of a systematic relationship. But for a significant set of policies that constitute roughly 30 per cent of the welfare benefit—unemployment insurance, active labor market policies, sickness pay, disability insurance and occupational illness and injury—the relationship is strongly negative. The higher the level of inequality in pre-tax wages and salaries, the lower the level of spending for policies that provide insurance against the risk of income loss for working age persons.

This pattern can be explained by incorporating the fact that welfare policies provide in-

insurance as well as redistribution. The demand for redistribution increases when income falls, but the demand for insurance increases when income rises. Thus an increase in inequality that lowers the income of the median voter relative to the mean generates two counteracting effects. With two counteracting effects, the impact of inequality on support for welfare spending depends on the design of the welfare policy. Inequality lowers support for spending in policies designed such that the insurance effect dominates, that is in policies that provide insurance against the loss of income due to unemployment, sickness, disability, occupational illness or injury or death of a working spouse. In welfare policies where the mix of insurance and redistribution is more tilted in favor of redistribution, the two effects work against each other in such a way that a relationship between income inequality and welfare spending is hard to discern in the data. The fact that we failed to find any category of welfare spending where inequality clearly raises welfare spending can be explained by the absence of welfare policies designed purely to provide redistributive benefits to a majority of voters.

There are other possible explanations of the empirical pattern. It could be that voters are particularly concerned with the disincentive effects of income replacement programs in highly unequal societies, as Moffitt, Ribar and Wilhelm argue (1998). Alternatively, it could be that high levels of wage equality are associated with educational systems that promote the acquisition of sector-specific skills that increase the demand for insurance against job loss, as Iversen and Soskice (2001) suggest. Such alternative explanations are complementary to the explanation provided here. Finding convincing ways to distinguish among these explanations is a task for future work.

Understanding that the political support for welfare programs is based on the demand for insurance in addition to the demand for redistribution provides a simple explanation for the differential impact of inequality on expenditures in different categories of welfare spending.

The negative impact of income inequality on support for spending on important categories of social insurance, in turn, helps explain the strong association of pre-tax and transfer income inequality and the proportion of households whose post-tax and transfer income falls below the poverty line.²¹ Inequality matters for poverty, not because (or not only because) employed workers are paid so little, but because income inequality reduces political support for important categories of social insurance spending.

5 Appendix A: Data Sources

Descriptive statistics for all of the variables used in the data analysis are presented in Table 6. Unemployment support refers to unemployment insurance and active labor market policies. Other insurance refers to disability insurance, sickness pay, occupational illness and accidents, and survivor's insurance. Income replacement refers to unemployment support and other insurance. Family benefits refers to both cash benefits and spending on family services. Anti-poverty programs refers to spending on programs for the low-income, refugees and indigenous groups. Data is for 1985, 1990 and 1995 in the case of social insurance benefits and the rate of unemployment. All of the other variables represent the average value for the periods 1980-84, 1985-89 and 1990-94. The countries included in the data set are Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Sweden, Switzerland, United Kingdom and the United States. The missing data points are Belgium 1980-84, Portugal 1980-84 and Switzerland 1980-89.

The source for spending on social insurance, health care and pensions is OECD (1999). Inequality (i/j) is $\ln(w_i/w_j)$, where w_k represents the labor market earnings of an employee at the k th percentile of the wage and salary distribution. The data on wage inequality is from OECD (1996) and, in the case of the US, OECD (1993). Conservative government is from the Swank data set (Swank 1992), updated using recent issues of Keesings Contemporary Archive. The classification of parties in terms of right versus center and left is based on Castles and Mair (1984) updated with Huber and Inglehart (1995). Turnout refers to turnout in elections in the lower house of parliament, or for president in the United States. The source for turnout is Blais and Dobryznska (1998). The share of elderly in the population, and the rate of unemployment is from OECD (1997). The approximate Herfindahl index of union

concentration and the level of bargaining are from Goklen, Lange and Wallerstein (1999).

The data set is available upon request.

TABLE 6: Summary Statistics

Variable	Mean	S. D.	Minimum	Maximum
Total Welfare Spending/GDP	23.0	6.2	11.3	33.4
Pensions/GDP	6.9	2.2	3.0	11.0
Public Health Spending/GDP	6.0	0.9	4.3	8.1
Income Replacement/GDP	7.1	3.4	1.6	13.2
Unemployment Support/GDP	2.4	1.5	0.3	6.6
Other Insurance/GDP	4.7	2.3	1.2	9.6
Family Benefits/GDP	2.0	1.2	0.4	4.7
Anti-Poverty Programs/GDP	0.6	0.6	0	3.1
Housing Subsidies/GDP	0.3	0.4	0	1.9
Inequality (90/10)	1.06	0.25	0.68	1.70
Inequality (90/50)	0.55	0.12	0.38	0.88
Inequality (50/10)	0.51	0.16	0.27	0.89
Right Government	41.5	36.7	0	100
Turnout	78.5	13.2	40.0	95.6
Percent Elderly	13.5	2.1	9.5	17.7
Unemployment Rate	7.2	3.1	1.7	17.2

6 Appendix B: Simulations

We generated 400 random data sets with the structure

$$\begin{aligned} y &= X\beta + u \\ E(u) &= 0 \\ E(uu') &= V \end{aligned}$$

where V is given by

$$V = \begin{pmatrix} \sigma_1^2 I & \sigma_{1,2} I & \dots & \sigma_{1,15} I \\ \sigma_{1,2} I & \sigma_2^2 I & \dots & \sigma_{2,15} I \\ \vdots & \vdots & \ddots & \vdots \\ \sigma_{1,15} I & \sigma_{2,15} I & \dots & \sigma_{15}^2 I \end{pmatrix}$$

The matrix X was a fixed 3×45 matrix (3 independent variables, 3 time periods, 15 countries) in which the first column was $(1, 1, \dots, 1)'$, the second column was the vector of lagged social insurance spending as a share of GDP and the third column was the data vector *Inequality*(90/10).²² We set $\beta = (5, .95, -2)'$. The components of the vector of error terms, u , were assumed to be normally distributed with the variance-covariance matrix $V = \Sigma \otimes I$ where Σ is a 15×15 cross-sectional variance-covariance matrix, and I is the 3×3 identity matrix. In each run, the diagonal elements of Σ were drawn from a uniform distribution with $\sigma_i^2 \in [0, 10]$. The off-diagonal elements, σ_{ij} ($i \neq j$) were set equal to $\sigma_{ij} = \rho_{ij}\sigma_i\sigma_j$ where the correlation coefficients ρ_{ij} were also drawn from a uniform distribution.²³ In the first 200 runs, we used the bounds $\rho_{ij} \in [-.2, .2]$. In a second 200 runs, we used the bounds $\rho_{ij} \in [0, .4]$. In both cases, we chose the bounds to be as wide as possible and still obtain a positive definite matrix most of the time. With each run that yielded a positive definite matrix, we calculated the 90 per cent confidence intervals for the OLS estimates, using both the OLS

standard errors and the panel-corrected standard errors. The panel corrected standard errors were calculated using the formula $E[(b - \beta)(b - \beta)'] = (X'X)^{-1}(X'\hat{V}X)(X'X)^{-1}$ where b represents the OLS estimates of β and $\hat{V} = \hat{\Sigma} \otimes I$. To calculate the components of $\hat{\Sigma}$, we used the formula $\hat{\sigma}_{ij} = (e_i'e_j)/3$ where e_i is the 3×1 vector of residuals for country i . The results are reported in Table 7.

Table 7. The Percentage of 90 per cent Confidence Intervals that Missed the True Value of the Regression Coefficient		
	1 $\rho_{ij} \in [-.2, .2]$	2 $\rho_{ij} \in [0, .4]$
Number of Simulations	200	200
OLS Standard Errors	9.3	10.5
Panel-Corrected Standard Errors	24.0	23.0
Notes: The simulations were based on the model $y = X\beta + u$ with 15 countries, 3 time periods and 3 fixed regressors where u is a vector of normally distributed random variables with $E(u) = 0$ and $E(uu') = \Sigma \otimes I_3$ as described in the text.		

7 Endnotes

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¹ For recent books that emphasize the centrality of working class mobilization in the growth of the welfare state, see Hicks (1999) and Huber and Stephens (2001).

² The view of welfare policy as the public provision of insurance is an old idea with significant political implications that have not been fully explored in the literature. See Barr (1992) for a survey of the economic arguments in favor of public provision of insurance. Baldwin (1990) is an historical study of the origins of the welfare state that emphasizes its aspect as a publicly financed insurance system. Iversen and Cusack (2000) interpret the welfare state as insurance against the risk of income loss occasioned by the shift of jobs from manufacturing to the service sector while Rodrik (1998) and Garrett (1998) interpret the welfare state as insurance against the risks entailed by increased international economic integration.

³ In general, distributions with greater variance may or may not be more skewed. In the case of the lognormal distribution, the distribution most frequently used to represent the distribution of income, higher inequality implies greater skewness.

⁴ See Aitchison and Brown (1957) for a discussion of the properties of the lognormal distribution and its use as an approximation of the distribution of income.

⁵ The countries in the data set and the missing data points are described in Appendix A.

⁶ The regression equation is

$$y_i = 3.03 + \frac{0.938}{(.050)} y_{i-1} \text{ with } R^2 = 87.7$$

and $n = 50$, where y_t is total welfare expenditures as a share of GDP in period t , and the parentheses under the coefficient contain the associated standard error. Because budgeting is incremental, lagged spending levels directly affects current spending levels. Therefore, adding the lagged dependent variable as a control is superior to the common alternative specification in which the lagged dependent variable is replaced with a country-specific constant when studying spending levels.

⁷ The possible endogeneity of unemployment is discussed below.

⁸ Pampel and Williamson (1989) emphasize the importance of the size of groups receiving welfare benefits as determinants of the level of expenditures.

⁹ The tripartite division of parties into left, center and right follows Castles and Mair (1984). Socialist, Social Democratic and Labor parties (with the exception of the Italian Social Democratic Party) comprise the group of left parties. Center Parties, Farmers Parties, Liberal parties in countries with a Conservative Party on the right, Christian Democratic parties in countries with a Liberal Party on the right and the Democratic Party in the US comprise the group of center parties. Conservative Parties, Liberal Parties in countries where the Liberal Party is the main party on the right and Christian Democratic Parties in countries where the Christian Democratic Party is the main party on the right, plus all small parties further right comprise the group of conservative parties.

¹⁰ The impact of these three variables on the distribution of wages and salaries is analyzed in Wallerstein (1999). For related studies that reach similar conclusions, see Freeman (1988), Blau and Kahn (1996) and Iineda and Pontusson (2000).

¹¹ The validity of wage-setting institutions as instruments depends on the validity of the assumption that wage-setting institutions are exogenous with respect to the level of welfare spending. See Wallerstein and Western (2000) for a recent review of the literature on the

causes of change in wage setting organizations and institutions. Welfare spending does not appear as an independent variable in this literature.

¹² This procedure is given a Bayesian justification in Leamer (1978). We did not consider the unemployment rate to be “questionable” when the dependent variable included unemployment benefits.

¹³ The approximate Herfindahl index is given by the formula

$$\text{App. Herf} \equiv s_1^2 + s_2^2 + s_3^2 + \frac{(1 - s_1 - s_2 - s_3)^2}{n - 3}$$

where s_i represents the share of the membership in the i^{th} largest three unions in the union confederation and n is the total number of unions in the confederation. A weighted average of the Herfindahl indices for each blue-collar confederation was used in the case of countries with multiple blue-collar confederations, with the relative size of the confederations in terms of membership as the weights. This data is available every five years. Linear interpolation was used to fill in the missing years.

¹⁴ See Wallerstein (1999) for details regarding the regressions of wage inequality on union concentration and the level of bargaining. We did not use union density as an instrument for fear that union membership might be influenced by the level of welfare spending.

¹⁵ The estimated coefficient on the lagged dependent variable in column 2 of Table 5 is worryingly close to one. Restricting the coefficient to be farther below one but still within one standard error of the point estimate, say 0.92, yields virtually identical results.

¹⁶ See Moene and Wallerstein (2001) for a fuller elaboration and generalization of the model of this section to include the political choice of policy.

¹⁷ We make this assumption for convenience. It has no effect on the results that follow provided that the median voter’s probability of being laid off does not decline as a result of wage compression that raises the median voter’s wage relative to the mean.

¹⁸ The assumption that the coefficient of risk aversion is constant is made to simplify the mathematical expressions. All of the results hold if the coefficient of relative risk aversion is a non-decreasing function of income. The assumption that $\mu > 1$ is supported by studies of the allocation of household savings (Friend and Blume 1975).

¹⁹ To prove that $\lambda = u'(c_E)$ when $b_N = 0$ and $b_E = \tau(t)$, substitute $b_N = 0$ and $b_E = \tau(t)$ into equation (5) and examine the first-order condition $dEu/dt = 0$. The same method can be used to define λ for every specification of b_N and b_E discussed in the text.

²⁰ The comparative static result for the two benchmark cases holds for any risk-averse utility function with $\mu(c) > 1$. See Moene and Wallerstein (2001).

²¹ Kenworthy (1999) calculates the share of individuals in advanced industrial societies who would be classified as living in poverty in the US, that is living in households with incomes less than 40 per cent of the median household income in the US after converting their household income to US dollars according to purchasing power parity and adjusting for family size. The partial correlation coefficient between share living in poverty and the log of the 90/10 wage ratio is .69, controlling for GDP per capita for the 14 countries where Kenworthy's sample overlaps the sample of this paper.

²² For the simulation, we omitted Switzerland from the data set.

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