The Electoral Foundations of Poverty Relief in Contemporary Democratic Societies*

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Abstract

How do electoral rules affect the poor? This discussion presents an election-motivated account of social policy. Specifically, I present evidence that cross-national differences in antipoverty policy reflect legislators' varying electoral incentives to be responsive to the poor, and that these electoral incentives are determined by each country's electoral geography, or the joint distribution of voters and legislative seats across electoral districts.

This election-motivated account of antipoverty policy breaks with conventional economic explanations, power resources, and cultural accounts of social policy, emphasizing instead the electoral power of a low-income voting block to secure responsive policy. Further, this election-motivated account of anti-poverty policy makes an important departure from other political economic explanations of social policy that rest on sharp distinctions between proportional representation and majoritarian electoral systems, and link proportional electoral rules to more generous social policy: When poverty is highly concentrated, there may be strong electoral incentives for legislators to craft responsive antipoverty policy, even under SMD rules.

1 Introduction

Current explanations of cross-national differences in social policy neglect important features of poverty relief: Antipoverty measures are highly targeted policies that are readily perceived by the beneficiaries and changes in antipoverty policies can be directly attributed to incumbent legislators. Policies that have these features – high target-ability, ready perception, and easy attribution – are especially well-suited for manipulation by election-motivated politicians (see Franzese 2002). If this motivating intuition is correct, and legislators craft antipoverty policy to meet their electoral goals, then cross-national differences in targeted benefits to low-income citizens ought to reflect differences in the electoral strength of low-income citizens: Antipoverty policies ought to be most generous in those countries in which a large share of the legislature owes its seats to the electoral support of low-income voters, and least generous in those countries in which low-income voters are rarely pivotal in the allocation of seats. This discussion develops an election-motivated account of antipoverty policy, and presents empirical evidence that distributions to low-income citizens do, in fact, reflect legislators' electoral incentives to be responsive to the poor.

What structures legislators' electoral incentives to craft responsive antipoverty policy? This discussion suggests that legislators' electoral incentives are determined by electoral geography, or the geographic allocation of (specifically, low-income) voters and legislators across electoral districts. Importantly, electoral geography determines the "electoral power" of a group of voters, or the number of seats that group could elect, if all of its members turned out to vote and all voted for the same party. By emphasizing electoral geography, this election-motivated account of antipoverty policy breaks with conventional economic explanations, power resources, and cultural accounts of social policy. More importantly, this election-motivated account of anti-poverty policy makes an important departure from other political economic explanations of social policy that rest on sharp distinctions between proportional representation (PR) and single-member district (SMD) systems, and link PR electoral rules to more generous progressive redistributive policy: The geographic distribution of poverty becomes crucially important, such that when low-income voters are pivotal in the allocation of a large number of seats, even under SMD electoral rules, legislators may have strong incentives to craft generous antipoverty policy.

Although this discussion uses the somewhat narrow framework provided by antipoverty policy

– policy that benefits a clearly defined group, whose geographic distribution is (relatively) easily measured, and whose preferences may be reasonably inferred – it is motivated by a much more general group-based model of representation, in which electoral geography is crucially important. As is the case with income groups, historical processes govern the geographic distributions other groups, such as racial and ethnic minorities, whose quality of representation is central to our understanding of contemporary democratic politics: Rarely do electoral rules have the straightforward effect anticipated by formal theoretic arguments that assume the perfect segregation or perfect integration of the groups that comprise our societies. By estimating the number of seats a low-income voting block can win in each contemporary developed democracy, this discussion demonstrates the important modifying effect of electoral geography – the joint distribution of voters and seats – on the incentives electoral rules create in each country context. Then, using this measure of electoral power as the key independent variable, this discussion presents an empirical analysis of contemporary cross-national differences in antipoverty policy.

2 Electoral Rules and Social Spending

Most earlier accounts of the relationship redistributive policy emphasize a stark division between PR or multi-member district (MMD) electoral rules and single-member district (SMD) rules.[1] From one perspective, by limiting the number of parties competing in elections, SMD rules favor the representation of middle- and high-income voters (Iversen & Soskice 2006). As a consequence, redistributive policy will be more generous on MMD rules than under SMD electoral rules.[2]

Both of these perspectives, however, miss the important modifying effect of electoral geography – specifically, the joint geographic distributions of citizens of different types and seats – on the effect of electoral rules in structuring legislators' policy-making incentives.[3] Notice, for example, that while Duverger's Law generally holds in district-level electoral competition in SMD systems, national-

[1] The expression "single-member district" distinguishes those electoral districts that elect only one legislator from others that elect more than one legislator.

[2] Alternatively, because the geographic basis of representation under SMD rules, legislators elected in SMD systems have fewer incentives to cultivate broadly-based coalitions of support, and instead provide geographically-targeted benefits (e.g. Milesi-Ferretti, Perotti & Rostagno 2002, Persson & Tabellini 2003, Persson & Tabellini 2000).

[3] Previous analysis explicitly assumes either complete segregation of voter types (e.g. Persson & Tabellini 2000) or an even geographic distribution where all types of voters are evenly distributed throughout the country (e.g. Milesi-Ferretti, Perotti & Rostagno 2002).

level party competition is typically multi-party competition, even under SMD rules.[4] Current explanations for this pattern of national-multi-party systems and district two-party competition in SMD systems draw attention to the moderating role of social cleavages (Cox 1997, Ordeshook & Shvetsova 1994) or opportunities for representation in other branches of government (i.e., presidentialism, Amorim & Cox 1997; federalism, Chhibber & Kollman 1997). However, Sartori (1976), Rae (1971), Riker (1982), and others (e.g. Kim & Ohn 1992) emphasize, instead, the role of electoral geography: "Geographic distributions of vote for the insurgent party and its rivals are of critical importance in determining whether or not it gains access to representation," and this importance of electoral geography increases as district magnitude decreases (Rae 1971, 165).

If national multi-party systems are frequently observed SMD electoral competition, but our formal models typically assume two-party competition and an uniform electoral geography, what are we missing? More importantly, what are the implications of electoral geography – the joint geographic distributions of votes and seats – for social policy? Leaving questions about the implications of electoral geography for the partisan representation of low-income voters – and the structure of party systems, more generally – to future research, this discussion establishes the empirical relationship between electoral geography and antipoverty policy. Here, I draw attention to two important variables: the electoral strength of a low-income voting block (i.e., the number of seats low-income voters could elect if all turned out to vote, and all voted the same way), and targeted transfers to low-income citizens. As will become clear shortly, both of these variables take different values across countries, with differences often cutting against the conventional wisdom. The next two sections are devoted to issues of measurement; the penultimate section explores the empirical relationship between electoral geography and the effectiveness of antipoverty policy in a broadly comparative analysis.

3 Measuring the Electoral Power of Low-Income Voters

How many seats could a low-income voting bloc elect, if all low-income voters turned out to vote, and they all voted the same way? There are two steps involved in measuring the electoral power

[4] Duverger's Law states that "the simple-majority single-ballot system favors the two-party system" (Duverger 1954, 217).

of a low-income voting bloc in contemporary developed democracies:[5]

1. Using LIS and sometimes other data resources, I estimate the proportion of low-income voters in each electoral district, within each country. (As in the analytic examples, "low-income" refers to those who comprise the lowest third of the national market income distribution.)

2. Using these proportions of low-income voters in each district, seats are allocated according to current electoral rules of each country.

This section of the discussion describes each of these steps, leaving more technical information for Appendix A.

3.1 Estimating the Geographic Distribution of Income

Three different strategies are used to estimate the proportion of each lower house electoral district that is composed of low-income households:

(A) Whenever possible, LIS data are used directly (e.g., Finland). That is, when the LIS data report each respondent household's region of residence and the regions reported correspond to the country's electoral districts (or to regions that comprise the electoral districts), the proportion of low-income households in each district is estimated in a straight-forward way.

(B) In several cases (e.g., Australia), data on the distribution of income within electoral districts are available from other sources. Sometimes the construction of income measures or samples differ from the measures or samples used the analysis presented below; these differences are noted in Appendix A.

(C) When income data corresponding to the electoral district are not available, LIS data are usefully combined with other resources to estimate the proportion of low-income citizens in each electoral district.

[5] The set of countries included in the analysis are those for which LIS data are available, and in which the poverty threshold (here, the thirty-third percentile of the national income distribution) is at least as great as the official 2000 U.S. poverty line ($8,969). Countries included in LIS, but excluded from this analysis are Czech Republic, Estonia, Greece, Hungary, Mexico, Poland, Romania, Russia,Slovak Republic, Slovenia, and Taiwan. Although Taiwan's poverty threshold ($14,350) exceeds the U.S. poverty line, this threshold is only 39% of the Taiwanese median income; all other countries have thresholds that are at least 60% of the median income, and are on average 70% of the median income.

To illustrate, the geographic distribution of low-income households in France, was evaluated in several steps: While LIS data do not report each household's electoral district (*circonscription*), they do include each respondent's region of residence. One way to proceed, therefore, might be to use the regional proportions of low-income households to estimate the proportion of low-income households in each electoral district. This strategy, however, would fail to reflect within-region cross-district variance in the concentration of poverty.

Alternatively, although *Institut National de la Statistique et des Études Économiques* (INSEE) does not report income data that correspond to the measures of poverty used in this analysis, INSEE does report data on the structure of the labor force – data that correspond to LIS variables – within each electoral district. Using LIS data, I estimate the proportion of low-income households in each labor force status and industrial sector for each French region, and then use this relationship in combination with the INSEE labor force data to estimate the proportion of low-income citizens in each district. This latter strategy has the advantage incorporating within-region across-district differences that are related to the distribution of poverty, but would be misleading if poverty rates vary within labor force status and industrial sector categories, within each region. For this reason, this strategy is pursued only when LIS regions do not correspond to electoral districts and other measures of the geographic distribution of income are unavailable or are quite different from the measure developed here.

(D) Finally, when available data only roughly correspond to electoral districts, and/or are insufficiently detailed to be combined with LIS data in a meaningful way (i.e., only unemployment rates are available), the electoral strength of a low-income voting bloc is estimated by calculating the binomial expectation of the number of seats won within a region. For Italy and Germany, the two country cases for which this strategy was followed, the binomial parameter p, the probability of winning each seat in the SMD components of each system, is calculated in a way that incorporates regional levels of poverty, and the within-region cross-district variance in unemployment rates.

Appendix A reports the specific details of the estimation strategy used for each country and lists the electoral districts in which a low-income voting bloc could elect (lower house) members of the national legislature.

3.2 Allocating Seats to a Low-Income Voting Bloc

The second task in assessing the electoral strength of a low-income voting bloc involves the allocation of seats according to the electoral rules of each system. Following the classification of electoral systems used in the formal analytic examples, this section of the discussion distinguishes between systems in which all legislators are elected in single-member districts (SMDs), systems in which all legislators are elected in a single nation-wide district, and systems in which the number of legislators varies across districts (usually in a way that reflects population density). Countries included in a fourth category, "mixed" electoral systems, form a hybrid category and typically have two or more levels of nested districts, with separate (but sometimes related) allocations of seats at each level. Using this classification, then, this section outlines the general strategy used for seat allocations, for countries in each category of electoral rules. More complete details are included in Appendix A.

Single-Member District Systems

The "first past the post" systems typically allocate legislative seats to the candidate who is supported by the largest share of votes cast, although some countries impose additional criteria (i.e., the location of the "post") or vary in how ballots are counted (how candidates get "past"). For example, winning candidates in France must secure the support of a majority of voters, or a second run-off election is held between the two most competitive candidates. Australia also requires that winning candidates are supported by a majority of voters, but instead of holding a run-off election, voters rank order candidates when they cast their ballots. Then, ballots that give first preference to less popular candidates are re-allocated in the order of each voter's preference until one candidate is surpasses a 50 percent threshold.

Even without the alternative vote and majoritarian revisions of a simple plurality rule, the challenge of analyzing SMD systems for this analysis lies in identifying a threshold of representation: When is a low-income voting bloc large enough within a district such that it is likely to be pivotal in the election of that district's legislator? Following Lijphart (1994, 28; also Boix 1999), this analysis sets an effective threshold of 35 percent for all SMD systems, and allocates a district's seat to the low-income voting bloc if the proportion of low-income voters exceeds 35 percent. This threshold, Lijphart suggests, represents the mid-point between an upper threshold that defines the largest share of votes a candidate in a SMD could receive without winning the seat (50 percent), and a lower threshold that identifies the smallest share of votes with which a candidate could win her seat when faced with three or four competitors (20-25 percent), yielding a "rough but reasonable estimate" that, if fewer than four or five parties typically stand for election in these SMD systems, likely over-states the electoral power of low-income citizens. As a consequence, this relatively low threshold – recall that low-income citizens comprise the bottom third, or 33 percent of the national income distribution – will understate differences between SMD and MMD systems in the representation of low-income citizens.

National District Systems

In the two countries in which seats are allocated in a single national district, according to a PR allocation rule – Israel and the Netherlands – a low-income voting bloc could secure a third of the seats in the legislature.

Varying District-Magnitude Systems

In most countries, legislators contest their seats in multi-member districts that vary in magnitude, or the number of legislators elected, usually with population density. These electoral systems, however, share few other features: They differ in the seat allocation rule, the number of electoral districts, and whether seats are allocated in one round, within each district, or across multiple tiers. Appendix A describes each system in some detail, as well as the strategy used to estimate the number of seats a low-income voting could elect in each country. Here, I outline the general strategy used to allocate seats to a low-income voting bloc within each district.

Electoral analysts typically distinguish between "highest average" and "largest remainder" formulas (e.g., Farrell 2001), and emphasize implications for the proportionality of seat distributions. This distinction is also important for this analysis: Highest average allocation rules require complete information about the distribution of support for all political parties that contest each election, while the number of seats allocated to a political party under largest remainder rules can be well-approximated without knowledge of the distribution of support for other political parties.

Consider, for example, an election contested in a five-member district, with the following distribution of support for the five political parties that contested the election (see Table 1). A common highest-average formula for the allocation of seats is the d'Hondt formula:[6]

$$A_t^p = \frac{v^p}{s_{t-1}^p + 1} \tag{1}$$

For each party p, the index, $t = 1..T$, denotes each round of seat allocation until all seats within a district are allocated, such that for each party, the denominator used to calculate the average A_t^p reflects the number of seats won in previous allocations. In the first round, $s_{t-1}^p = 0$ for each party. Then, after the first seat is allocated to Party A ($A_1^A > A_1^p$ for $p \neq A$), Party A's "average," $A_2^A = 150$. Seats are then allocated to Parties B, C and then A, in order of the highest "averages." Finally, when the "averages" are re-calculated to reflect the seats won in the second allocation, Party D is awarded the fifth seat.

As the example presented in Table 1 illustrates, a "highest average" seat allocation requires complete knowledge about the number of parties competing in each district, and their levels of support. If, instead, seats are allocated according to the Droop quota, a common "largest remainder" allocation formula, in which the numbers of seats allocated to especially larger parties are well-approximated by the (rounded) ratios ($\hat{S}^p$) of each party's vote share to a "quota" (Q) that incorporates the total number of valid ballots (V) and number of seats (s) to be allocated in district d:

$$\hat{S}^p = v^p \div \big(\frac{V}{s+1} + 1\big) \tag{2}$$

$$\approx \frac{v^p}{V} \cdot (s+1). \tag{3}$$

Importantly, little knowledge and few assumptions about the number of parties competing in each election or about distribution of support for other parties is needed to estimate the seats won by each party. For this reason, and following the analytic examples presented above, a Droop quota is used to estimate the number of seats won by a low-income voting bloc in those systems in which seats are typically allocated according to a "highest average" formula.

[6]This discussion owes much to Rae's (1971) discussion of electoral rules.

Table 1: PR "Highest Average" and "Largest Remainder" Seat Allocations

Party	Votes	"Highest Average"			"Largest Remainder"
		1st (A_1^p)	2nd (A_2^p)	3rd (A_3^p)	Seats ($\hat{S}^p$)
Party A	300	1st (300)	4th (133)		2 (1.796)
Party B	250		2nd (250)		1 (1.497)
Party C	200		3rd (200)		1 (1.198)
Party D	130			5th (130)	1 (0.778)
Party E	80				0 (0.479)
Party F	40				0 (0.240)
TOTAL	1000				

Mixed Electoral Systems

As suggested at the beginning of this section, some countries included in this analysis are distinguished by multiple levels of nested electoral districts, and separate (though sometime related) seat allocation processes. Germany and Italy elect between one-half and three-quarters of sitting legislators in SMDs. The remaining legislators are elected in MMDs, and seats are allocated to party lists according to a compensatory or parallel vote tabulation. In this analysis, seats in SMDs are allocated according to the strategy proposed above (i.e., using an effective threshold of 35 percent), and PR seats are allocated according to the rules governing each country (though a Droop quota is used in place of "highest average" calculations).

3.3 The Electoral Power of Low-Income Voters

How many seats could a low-income voting bloc elect, if all low-income voters turned out to vote, and they all voted the same way? Table 2 reports the results of this analysis, specifically the number of electoral districts in which low-income citizens are over-represented, and the shares of seats a low-income voting could win in each country. The data reported in Column (2) will serve as the key independent variable in the analysis that follows, the electoral strength of a low-income voting bloc.

Note, first, that the success of a low-income voting bloc varies within electoral system groups, and particularly within the group of SMD countries. In the US and the UK, for example, the electoral success of a low-income voting bloc is potentially quite limited, while the largest seat share observed is France. This variance in the electoral strength of a low-income voting bloc within SMD systems, and observed across the complete set of countries more generally, is especially startling when one recalls that the low-income voting bloc represents the same proportion of the electorate in each country.

Second, while there is a direct correspondence between the number of districts in which low-income voters are over-represented and their share of seats under SMD rules, there is no correspondence in the systems with varying district magnitudes. What matters for the representation of low-income citizens under varying district-magnitude rules is whether or not low-income voters are over-represented in rural districts that elect a small number of legislators (e.g. Finland, Norway and Sweden): Under these circumstance, the dis-proportionality of low-magnitude districts, typically found in the rural regions of these countries, can favor the legislative representation of the low-income voters.

Table 2: Seats Elected by a Low-Income Voting Bloc

Country	(1) # of Districts[a]	(2) Seat Share[b]
SINGLE MEMBER DISTRICT SYSTEMS		
United States	104/435	24%
Canada	94/308	30%
United Kingdom	190/569[c]	33%
Australia	51/150	34%
France	267/570[d]	47%
NATIONAL DISTRICT SYSTEMS		
Netherlands	0/1	33%
Israel	0/1	33%
VARYING DISTRICT-MAGNITUDE SYSTEMS		
Austria	1/43	33%
Belgium	5/11	33%
Denmark	12/17	33%
Luxembourg	0/4	35%
Spain	28/52	35%
Ireland	12/43	36%
Finland	9/15	37%
Switzerland	21/26	37%
Norway	14/19	38%
Sweden	20/29	40%
MIXED ELECTORAL SYSTEMS		
Germany	8/15[e]	33%
Italy	11/26[f]	35%

NOTES. This Table reports estimates of the number of seats that a low-income voting bloc could secure if all low-income citizens cast ballots, and cast ballots for the same party. Please refer to the Appendix materials for details of how these estimates were calculated.

[a] This column reports the number of districts in which low-income citizens are over-represented.

[b] This column reports the total share of seats secured by a low-income voting bloc. The districts in which these seats are secured are listed in the Appendix materials.

[c] Parliamentary constituencies in Scotland and Northern Ireland are excluded.

[d] The 15 overseas districts are excluded from the denominator reported in this column, but are included in the calculation of the seat share a low-income voting bloc could win.

[e] This ratio refers to the MMD *Länder*, not the SMDs.

[f] This ratio refers to the MMD *circoscrzioni*, not the SMDs, the *collegi uninominali*.

4 Measuring Poverty Relief

Rather than using conventional social spending or aggregate-level measures of the effectiveness of redistributive policy,[7] this section develops a measure of targeted transfers to the first third of the market income distribution. Importantly, this measure reflects the perspective of low-income voters, as well as the variety of policy instruments legislators may use to provide poverty relief.[8]

4.1 Dimensions of Poverty Relief

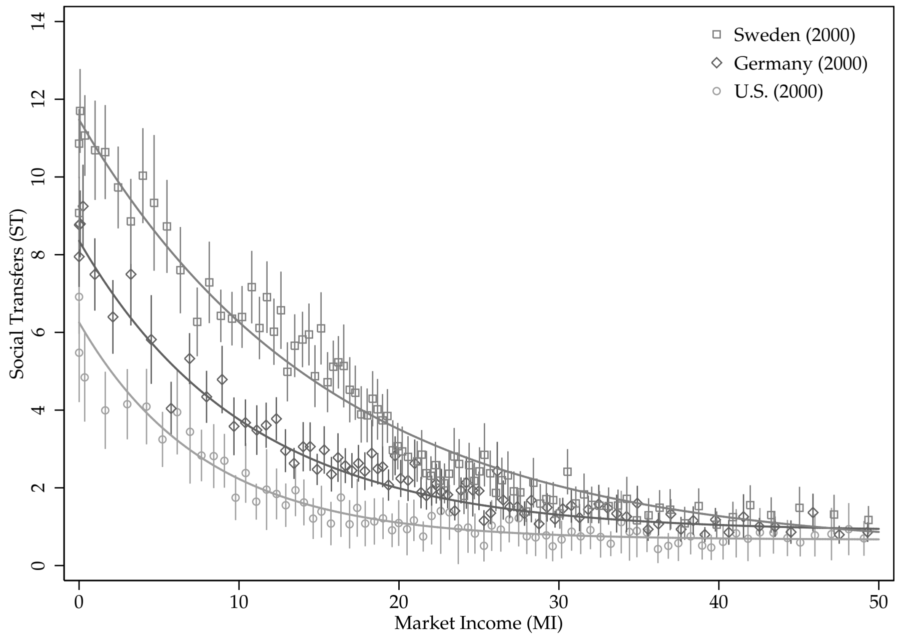
The Luxembourg Income Study (LIS) data present an obvious way to overcome the challenges in evaluating a cross-national, electoral account of poverty relief: For large samples in each country, the LIS data report both the total amount of transfers received by each household, as well as detailed information about the household's earnings and investment (i.e., market) income. In fact, the relationship between total social transfers and market income provides a useful basis of a measure of poverty responsiveness. Consider Figure 1, which reports the bivariate relationships between (equivalent household) market income and social transfers for Esping-Andersen's archetypal countries, Sweden (square points), Germany (diamond points), and the U.S. (round points). Each data point represents the mean values estimated for one per cent of each working-aged equivalent-household national sample, and all currency amounts are standardized to (thousands of) 2000 U.S. dollars.

More rigorous cross-national comparisons of the relationship between market income and social transfers are presented later in the discussion. Here, patterns in the relationships between market income and social transfers in Sweden, the U.S., and Germany can be usefully compared to identify dimensions of poverty relief. There are three important differences in the American, German and

[7] Others (Bradley, Huber, Moller, Neilsen & Stephens 2003, Milanovic 2000) use changes in aggregate measures of inequality, or changes in the shares of market and disposable income distributions accounted for by different income groups. However, changes in aggregate measures of inequality may not reflect changes in the economic well-being of those with low income. Finally, other recent studies incorporate or adapt OECD measures of income replacement rates, which report ratios of income derived from benefits to market income (e.g. Bäckman 2005). Because, however, benefits often vary according to the length of time a recipient is out of work, past earnings, and the number of dependents, income replacement rates must be calculated for the 'typical' (often 40 year old) worker, in very specific circumstances (Martin 1996, Whiteford 1995). Moreover, income replacement rates are not very useful for describing the benefits received by those who have no market income.

[8] The types of policies – minimum income provisions, social insurance, and other non-means-tested measures – from which low-income households benefit vary considerably cross-nationally. Note: When estimated as a mean proportion of total transfers, minimum income provisions – the policies most obviously directed towards antipoverty goals – *never* comprise the most important source of income support for low-income households.

Figure 1: Social Transfers and Market Income



NOTE. Figure 1 reports the bivariate relationship between total social transfers and market income for Sweden (2000; square points), the U.S. (2000; circle points), and Germany (2000; diamond points). Each data point represents the mean social transfers and market income values for one per cent of each working-age sample. All currency amounts are reported in thousands of 2000 U.S. dollars, for equivalent households. Error bars denote 95 per cent confidence intervals. This Figure exclude the top one, six, and 22 per cent of the German, Swedish and American income distributions, respectively.

Swedish distributions: First, note that the amount of support provided to those with no market income (at the extreme left-hand side of the distribution) varies across these three countries, and is more generous in Sweden than in either Germany or the U.S. Second, these countries vary in the rates at which transfer amounts vary with small increases in market income.[9] Finally, a closely-related third feature concerns the distribution of universal- or near-universal benefits. Non-means-tested non-contributory transfers provide an important source of support for low-income residents in some countries, including Germany and Sweden.Differences in these amounts, as well as benefits distributed through social insurance programs, are reflected in the relative levels of the tails of the distribution, not surprisingly with Sweden and Germany distributing somewhat more contributory and non-contributory universal benefits than the U.S..[10] Nevertheless, because low-

[9]This feature is similar to Barr's (2004) "horizontal efficiency," which corresponds to the distribution of benefits among low-income citizens: Do all citizens with incomes below a specified poverty threshold receive support?

[10]This feature is similar to Barr's (2004) "vertical efficiency," which describes the extent to which benefits are

income citizens may benefit disproportionately from these types of policies, a measure of poverty responsiveness, therefore, ought to include universal benefits as well as levels of support for those with little or no market income, and the rate at which these levels of support vary within increases in income.

To generate a summary measure that reflects these three components of poverty relief, note that the relationship between market income and social transfers in each country is well-approximated by the non-linear expression:

$$ST_{ij} = \alpha_j + \beta_{1j} \exp(\beta_{2j} MI_{ij}) + e_{ij}, \tag{4}$$

where ST_{ij} denotes social transfer amounts, and MI_ij denotes market income, for individuals $i = 1...n$ in countries $j = 1...J$, the parameters $\alpha_j > 0$, $\beta_{1j} > 0$, and $\beta_{2j} < 0$ describe the bivariate relationship within each country, and e_{ij} is a stochastic residual term. The solid lines in Figure 1 demonstrate that, in fact, this non-linear specification fits the LIS data in Germany, Sweden and the U.S. quite well.

The specification in Eq. (4) provides an accessible substantive interpretation. Notice that, when $\beta_{2j} < 0$,[11] individuals who have no market income receive social transfers in the amount of $\alpha_j + \beta_{1j}$. Similarly, for very high levels of MI_{ij}, ST_{ij} is expected to take on the value α_j. Thus, (with the identification restriction) α_j describes the basic level of transfers for which all or most members of a society are eligible (including social insurance programs), $\alpha_j + \beta_{1j}$ reports transfers made to residents with no market income, and β_{2j} reports the curvature of the line, or the rate at which benefit levels decline increased market earnings.[12] The parameters α_j, β_{1j}, and β_{2j}, therefore, jointly describe the antipoverty policy that characterizes a specific country, and can be used as the basis for a comparison of poverty relief within a society over time, or across societies more generally.[13]

Looking at the cross-national distribution parameter estimates (see Figure 2), which plots average transfers to those with no market income ($\alpha + \beta_1$) against the average rates at which benefit

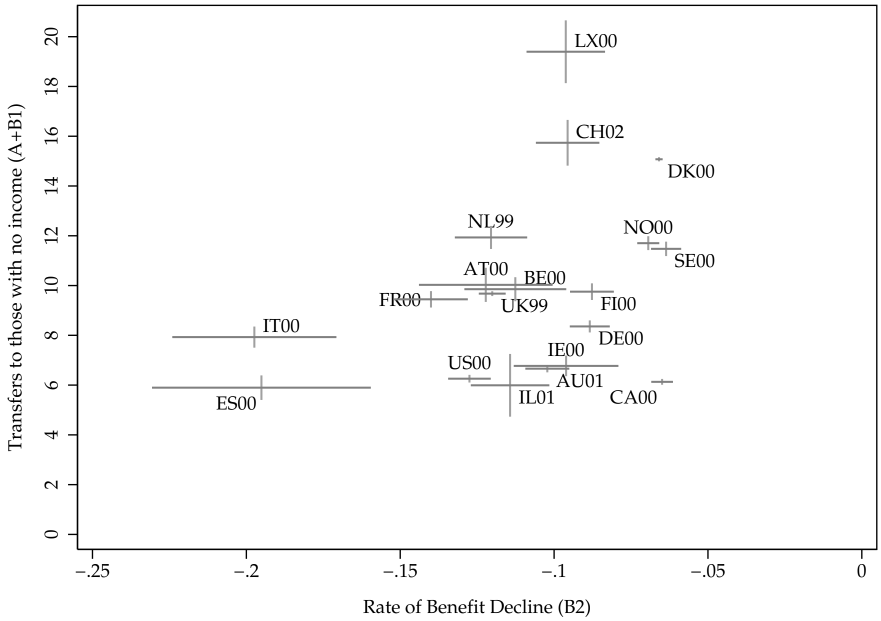
concentrated among those with low-income, or or are they more generally distributed.

[11] This restriction ensures that the parameters are identified.

[12] While this is a useful way to interpret β_2, it is not precisely correct: The rate at which benefits decline is also a function of β_1.

[13] This function is identified with the restriction that β_1 and β_2 do not equal zero.

Figure 2: Social Transfers and Market Income: Parameter Estimates



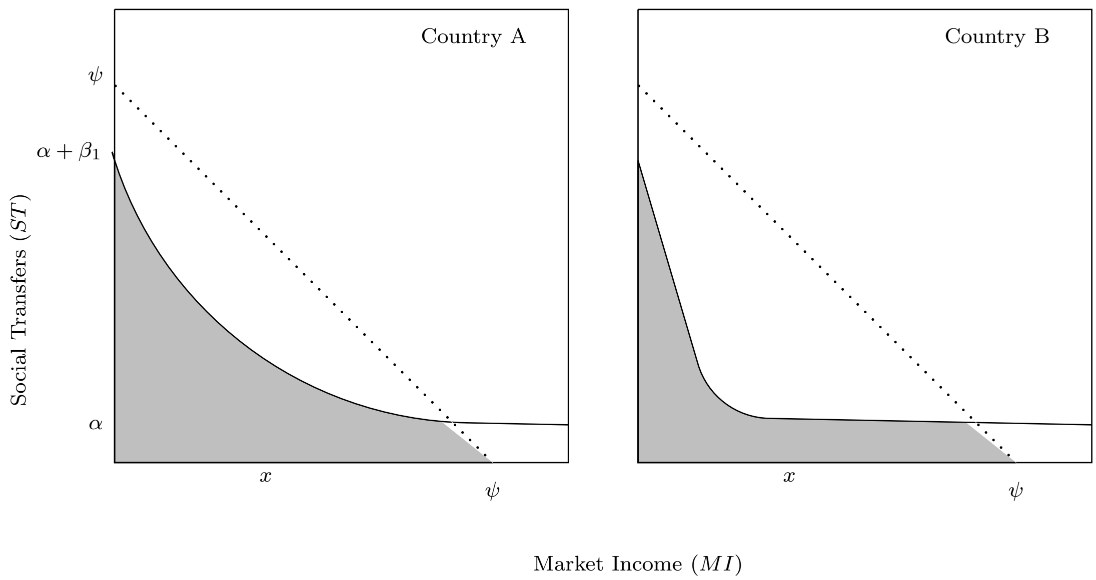
NOTE. Figure 2 reports of estimates of the parameters $\alpha + \beta_1$ and β_2 for the countries included in this analysis. Error bars denote 95 percent confidence intervals.

SOURCE. LIS.

levels decline ($\beta_2 < 0$), we find a clear pattern of increasing poverty responsiveness: Countries in the upper right corner, for example, are those that provide large transfers to those with no market income which drop off relatively slowly with small changes in market income. Those countries situated towards the lower left-hand corner of Figure 2 provide little support for those with no market income, and what benefits are provided, drop off quickly with increases in income. What is less apparent in Figure 2, however, is distinct clusters of countries reflecting the conventional types of welfare systems. Although there is some clustering, particularly of the Scandinavian countries in the upper right-hand corner of the Figure, there is quite a bit of variance, in both dimensions, within these clusters. Further, when considered in this way, these data do not reflect cross-national differences in the underlying market income distributions: How well, for example, do transfers to those with no market income ($\alpha + \beta_1$) support the beneficiaries, given their national context?

Of course, a cross-national comparison based on only one (or even two) of the parameters α_j, β_{1j} or β_{2j} would be an incomplete, and potentially misleading, measure of poverty relief. Measures

Figure 3: Comparing Poverty Relief



NOTE. Figure 3 reports the relationships between market income (MI) and social transfers (ST), in two hypothetical countries, as expressed by the function $ST = \alpha_j + \beta_{1j} \cdot \exp(\beta_{2j} \cdot MI)$. Here, $\alpha_A = \alpha_B = \alpha$, $\beta_{1A} = \beta_{1B} = \beta_1$, and $\beta_{2A} > \beta_{B2}$. The dotted line represents the function, $ST_i = \psi - MI$, where ψ denotes a poverty threshold.

based on the benefits received by any particular low-income household (perhaps, the median) would be similarly misleading. To illustrate, consider Figure 3 which reports the relationship between market income and social transfers in two hypothetical countries. As in Figure 1, here the horizontal axis reports market income, and the vertical axis reports corresponding social transfers. In each panel, the solid line denotes the relationship between market income and social transfers, i.e., Eq. (4), and the dotted line reports the linear function,

$$ST_i = \psi - MI_i. \tag{5}$$

(The reason for Eq. 5's inclusion will become apparent shortly.) By construction, the parameters are fixed such that $\alpha_A = \alpha_B = \alpha$, $\beta_{1A} = \beta_{1B} = \beta_1$, but with β_2 varying across cases: $\beta_{2A} > \beta_{2B}$. If comparisons are made on the basis of benefits provided to those with no market income, or universal and social insurance transfers, Countries A and B are indistinguishable. However, a comparison of the relief received by other low-income households (e.g., household x) shows that the apparent similarity of Countries A and B can be misleading.

In Figure 3, the dotted lines which report the linear function Eq. (5), reflect the amount of transfers necessary to bring each household's income to the level of the current low-income threshold (i.e., the thirty-third percentile of the equivalent-household national market income distribution). Thus, the extent to which the estimated relationship between social transfers and market income approximates Eq. (5) reflects the extent to which a country is successful in providing poverty relief through the provision of cash transfers.

Using the threshold ψ, then, the extent to which social transfers provide poverty relief can be estimated as the ratio of the shaded region in each panel of Figure 3, to the area defined by the triangle, $(0, \psi), (0, 0),$ and $(\psi, 0)$. This ratio can be estimated according to the following expression:

$$\mathcal{R} = \frac{\int_0^{\tau} \big(\alpha + \beta_1 \cdot \exp(\beta_2 \cdot MI)\big) \partial MI + \int_{\tau}^{\psi} \big(\psi - MI\big) \partial MI}{\int_0^{\psi} \big(\psi - MI\big) \partial MI}, \tag{6}$$

where τ reports the point of intersection for Eqs. (4) and (5).[14]

Table 3 reports estimates of the parameters $\psi, \alpha, \beta_1, \beta_2$ and τ for each country included in the analysis, as well as estimates of the poverty responsiveness ratio, $\mathcal{R}$.[15] Although in some ways, these data conform to Esping-Andersen's expectations – the countries listed at the very top of Table 3 are countries with liberal welfare regimes, and the countries in the last two rows have social democratic regimes – there is little evidence of welfare regime clustering in the data presented in Table 3.

To see how the measure $\mathcal{R}$ compares to more conventional measures of social spending, Figure 4 plots $\mathcal{R}$ against social spending (as a percentage of GDP, left panel), and against the reduction in income inequality through redistributive policy (estimated as the percent reduction in Gini coefficients, right panel). In both cases, $\mathcal{R}$ and the conventional measures are positively correlated.

[14] The parameter τ was identified by searching for the value that equated Eqs. (4) and (5). Integrating over the region of 0 to ψ yields the following expression for $\mathcal{R}$:

$$\mathcal{R} = \frac{1}{\psi^2}\big(\frac{2\beta_1}{\beta_2}(\exp(\beta_2\tau) - 1) + 2\alpha\tau + 2\psi\tau - \tau^2\big) - 1 \tag{7}$$

Finally, notice that the value of $\mathcal{R}$ increases as universal transfers, and transfers to those with no market income, increase, and increases as the rate at which benefits decline decreases:

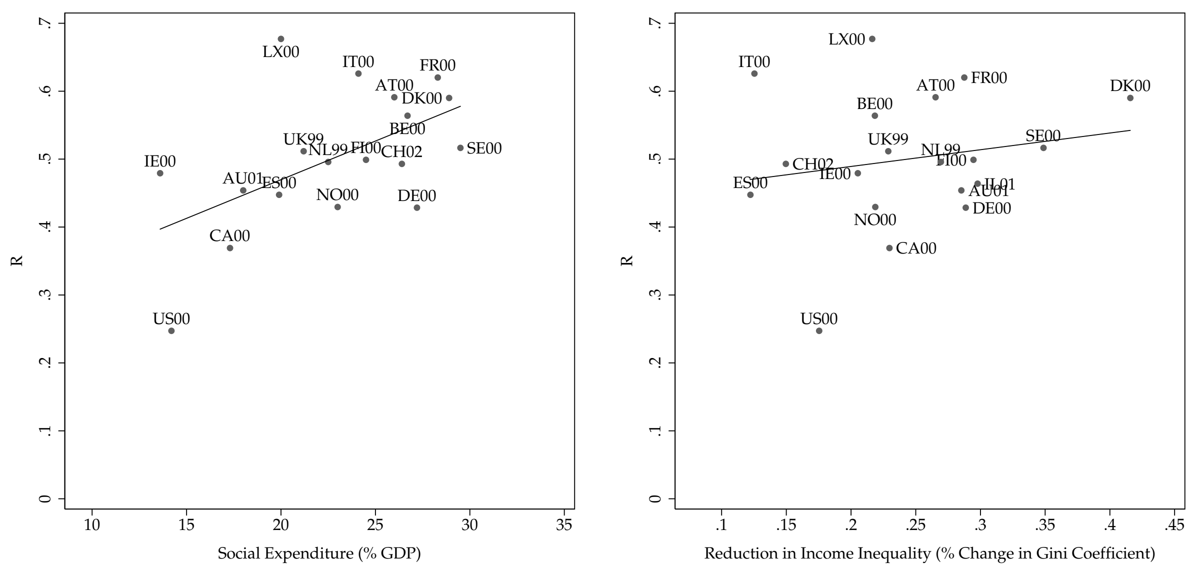
$$\frac{\partial \mathcal{R}}{\partial \alpha}, \frac{\partial \mathcal{R}}{\partial \beta_1} \text{ and } \frac{\partial \mathcal{R}}{\partial \beta_2} > 0 \tag{8}$$

Thus, $\mathcal{R}$ reflects well the dimensions of poverty responsiveness considered in the discussion.

[15] The parameters α, β_1 and β_2 are estimated in Stata SE, using a non-linear least squares (NLS) specification (specifically, Stata's `nl`procedure). Starting values of 1,2, and $-.1$ were established for α, β_1 and β_2, respectively.

Nevertheless, for countries with similar levels of social spending, and similar reductions in income inequality, we see quite different levels of poverty relief: The U.S. and Ireland (both liberal regimes), for example, look quite similar by conventional measures, but demonstrate quite different levels of poverty relief.[16] Similarly, Switzerland and Belgium (both conservative regimes), demonstrate similar levels of social spending but quite different levels of poverty relief. This variance suggests that the poverty responsiveness ratio reflects a dimension of social policy that is not well-captured by welfare regimes analysis.

Figure 4: Poverty Relief and Conventional Measures of Social Policy



NOTE. Figure 4 compares the poverty responsiveness ratio to more conventional measures of social policy outcomes, social spending (as a percentage of GDP, left panel) and income inequality reduction through redistributive policy (measured as the proportionate deduction in Gini coefficient, right panel). Solid lines report ordinary least-squares (OLS) fitted values (standard errors reported in parentheses):

$$\mathcal{R} = 0.242(0.103) + 0.011(0.004)\{\text{ Social Expenditure }\} \tag{9}$$

and

$$\mathcal{R} = 0.440(0.082) + 0.246(0.322)\{\text{ Reduction in Income Inequality }\}. \tag{10}$$

SOURCES. Social spending: Organisation For Economic Co-Operation and Development (OECD) (2004). Reduction in income inequality: LIS.

[16]Although Ireland and the U.S. spend similar proportions of their GDP on social policy, their allocations across social spending priorities are quite difference: For example, while Ireland spend 1.6 percent of their GDP on family benefits, including family allowances and support for maternity leave, the U.S. spends 0.4 percent of its GDP on family support policies. U.S. policy, instead, favors the support of the elderly, spending 5.2 percent of its GDP on social security; Ireland devotes roughly half of this amount to the support of the elderly (Organisation For Economic Co-Operation and Development (OECD) 2004).

Table 3: Poverty Relief in Developed Democracies

Country (Year of Study)	ψ^a	Parameter Estimates[b]			RMSE	τ^c	$\mathcal{R}^d$
		α	β_1	β_2			
United States (2000)	20.6137	0.6650	5.5925	-0.1275	3.3079	19.4818	**0.2472**
		(0.0256)	(0.0790)	(0.0035)		(0.1809)	(0.0030)
Canada (2000)	17.8213	0.4502	5.6803	-0.0649	2.4706	15.2595	**0.3690**
		(0.0474)	(0.0649)	(0.0018)		(0.0381)	(0.0028)
Germany (2000)	18.5923	0.8813	7.4763	-0.0884	2.7253	15.8736	**0.4286**
		(0.0700)	(0.1274)	(0.0033)		(0.1264)	(0.0052)
Norway (2000)	25.1071	0.8227	10.8806	-0.0694	3.0254	21.9067	**0.4295**
		(0.0703)	(0.1412)	(0.0018)		(0.1508)	(0.0039)
Spain (2000)	11.1563	0.54	5.3563	-0.1951	3.0408	9.8286	**0.4474**
		(0.0971)	(0.2545)	(0.0181)		(0.2898)	(0.0174)
Australia (2001)	13.9546	0.0390	6.6205	-0.1022	1.9526	11.9662	**0.4539**
		(0.0601)	(0.0890)	(0.0036)		(0.0652)	(0.0061)
Israel (2001)	12.4261	0.6785	5.3129	-0.1143	2.5003	10.0661	**0.4639**
		(0.0701)	(0.6450)	(0.0065)		(0.3139)	(0.0490)
Ireland (2000)	13.5248	0.5551	6.2163	-0.0961	2.4965	10.7600	**0.4792**
		(0.1628)	(0.2326)	(0.0087)		(0.1343)	(0.0128)
Switzerland (2002)	24.7025	0.6398	15.0969	-0.0956	4.6239	22.2636	**0.4929**
		(0.1527)	(0.4657)	(0.0053)		(0.4496)	(0.0131)
Netherlands (1999)	19.0197	0.5648	11.3683	-0.1205	3.362	16.9863	**0.4958**
		(0.1098)	(0.2445)	(0.0060)		(0.2776)	(0.0113)
Finland (2000)	17.9364	0.9705	8.7840	-0.0877	3.6431	14.5037	**0.4990**
		(0.0912)	(0.1708)	(0.0036)		(0.1317)	(0.0067)
United Kingdom (1999)	16.1428	0.5558	9.1189	-0.1201	2.4935	13.8605	**0.5116**
		(0.0326)	(0.0564)	(0.0022)		(0.0629)	(0.0042)
Sweden (2000)	16.6942	0.4034	11.0709	-0.0636	4.1215	10.6747	**0.5165**
		(0.1511)	(0.1768)	(0.0025)		(0.0821)	(0.0062)
Belgium (2000)	15.0303	0.7174	9.1362	-0.1126	2.8039	11.9283	**0.5639**
		(0.1853)	(0.2813)	(0.0084)		(0.2048)	(0.0146)
Denmark (2000)	21.7964	0.2026	14.8717	-0.0659	3.3232	16.6227	**0.5901**
		(0.0387)	(0.0509)	(0.0006)		(0.0277)	(0.0018)
Austria (2000)	12.6439	0.9466	9.0808	-0.1222	3.4423	8.4739	**0.5911**
		(0.2187)	(0.3687)	(0.0111)		(0.1981)	(0.0191)
France (2000)	11.4490	0.6687	8.7780	-0.1400	3.7848	7.8596	**0.6202**
		(0.0947)	(0.1745)	(0.0061)		(0.0945)	(0.0102)
Italy (2000)	9.95150	0.8509	7.0772	-0.1974	4.0317	7.4842	**0.6260**
		(0.1023)	(0.2239)	(0.0136)		(0.1437)	(0.0169)
Luxembourg (2000)	20.9575	1.838	17.5569	-0.0962	5.7119	14.9558	**0.6770**
		(0.2472)	(0.6450)	(0.0065)		(0.3631)	(0.0195)

NOTES. Table 3 reports parameters that describe the relationship between market income and social transfers, and the poverty relief ratio, $\mathcal{R}$. All values are reported in thousands of (2000) United States dollars.

[a] The parameter ψ reports the estimated income of the thirty-third percentile of the equivalent-household national market income distribution.

[b] The parameters reported in this column are estimated by NLS (see Eq. 4), with conventional Gauss-Newton standard errors in parentheses.

[c] τ reported the estimated point of intersection of Eqs. (4) and (5). Standard errors for both τ and $\mathcal{R}$, reported in parentheses, are estimated using repeated draws from the posterior distributions of the NLS parameters.

5 Electoral Geography and Poverty Relief

This section explores the relationship between electoral geography and poverty responsiveness. Taking the measure of the electoral power of a low-income voting bloc, developed in the previous section, as the key independent variable, this section considers the extent to which cross-national variance in poverty responsiveness can be attributed to legislators' incentives to be responsive to low-income voters. Specifically, are legislatures more generous in their antipoverty provisions when a larger proportion of their members owe their seats to the support of low-income citizens?

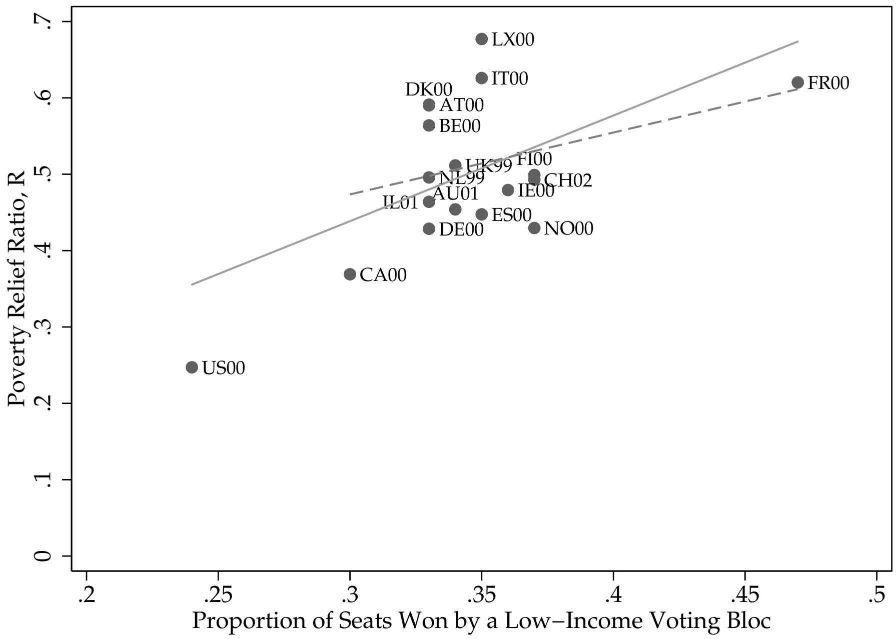
Figure 5 reports the bivariate relationship between the electoral strength of a low-income voting bloc (horizontal axis), and levels of poverty relief. As seen in Figure 5, the observed relationship between the electoral strength of a low-income voting and poverty responsiveness is consistent with an electorally-motivated account of antipoverty policy: Poverty relief generally increases with the share of seats low-income voters can elect, if all low-income citizens turned out to vote and all voted the same way.

While the small number of country cases included in this analysis limits the number of alternative explanations that can be considered simultaneously, in this section I consider the relative explanatory power of two variables, often emphasized by other political economic explanations of social spending: the historical power of the left and union strength. The electoral strength of leftist parties is associated both with greater social spending and a more redistributive program of taxes and transfers.[17]

Conventional accounts of the role of union strength in determining the generosity of social policy treats "generous social policy as a quid pro quo for wage restraint on the part of the unions" (Bradley et al. 2003, 200). Thus, where wage-setting is characterized by centralized bargaining by powerful comprehensive unions, social spending generally, and (some forms of) poverty relief measures ought to be more generous. Here, the measure of union strength is based on Kenworthy's (2001) analysis, and on data reported in Huber, Ragin, Stephens, Brady & Beckfield's (2004) *Comparative Welfare States Data-set*. This measure distinguishes those cases in which centralized wage bargaining occurs between powerful union confederations and coordinated employer organizations, and those in which

[17] It is quite likely that leftist parties dominate when electoral rules favor the representation of low-income voters. This proposition motivates a second component of this project, on the partisan representation of the poor.

Figure 5: Electoral Power and Poverty Responsiveness



NOTE. This Figure reports the bivariate relationship between the share of seats potentially secured by a low-income voting bloc and the poverty relief ratio, $\mathcal{R}$, estimated for each country. See Chapter 3 for a complete discussion of the poverty relief ratio; Appendix A provides information about how the electoral power of low-income voters was assessed for each country. The solid line reports ordinary least-squares (OLS) fitted values (standard errors reported in parentheses):

$$\mathcal{R} = 0.0234(0.1660) + 1.3838(0.4792)\{\text{ Seat Share }\}. \tag{11}$$

The dashed line reports OLS fitted values from a model that excludes the US:

$$\mathcal{R} = 0.2302(0.1982) + 0.8110(0.5637)\{\text{ Seat Share }\}. \tag{12}$$

coordinated wage bargaining occurs only within industries, if at all.

Table 4 reports the results of a regression of the poverty relief ratio, $\mathcal{R}$ on the measures of union strength and left party dominance. Note, first, that the electoral power of a low-income voting bloc contributes to the observed cross-national variance in poverty relief, even when either union strength or the historical dominance of left parties is taken into account: An increase in the share of seats secured by a low-income voting bloc is associated with an increase in levels of income support provided to low-income citizens. Second, while left party dominance contributes to cross-national variance in poverty relief, its explanatory power is considerably compromised when the electoral strength of low-income citizens is taken into account. Finally, notice that while collective bargaining coverage does not have an independent (unconditional) association with poverty relief. These two observations, that left party dominance is closely related to the contemporary electoral strength of a low-income voting bloc and that union strength does not contribute to cross-national variance in poverty relief, will serve as jumping off points for future research.

Table 4: Electoral Power and Poverty Responsiveness

	(1) Union Strength		(2) Left Party Dominance		(3) Complete Model
Seat Share		0.9069 (0.5649)		0.9351 (0.5089)	0.6817 (0.5270)
Collective Bargaining Coverage	0.2599 (0.9336)	0.1727 (0.1038)			0.1878 (0.1042)
Left Party Vote Share			0.4631 (0.1682)	0.2835 (0.1829)	0.1007 (0.2284)
Intercept	32.7434 (6.6690)	7.4502 (16.9854)	33.1674 (6.255)	7.2611 (15.2275)	9.8171 (14.6780)
N	16	16	16	15	14
RMSE	9.0531	8.5827	8.3667	7.6932	7.2972

NOTES. This Table reports parameters estimated in a least-squares regression analysis. Israel, Spain, and Luxembourg are excluded. Appendix A provides information about how the electoral power of low-income voters was assessed for each country.
SOURCES: Collective Bargaining Coverage: Organisation For Economic Co-Operation and Development (OECD) (2004). Left Party Vote Share: Huber et al. (2004).

6 Conclusion

This discussion tests the core intuition of a larger research project– that poverty relief reflects the electoral incentives of legislators– in a broadly comparative analysis. Specifically, the empirical evidence presented here is consistent with an electorally-motivated account of poverty relief.

This paper offers two other contributions: First, this paper demonstrates the importance of electoral geography – the joint geographic distribution of voters and seats – by examining cross-national variance in the number of seats a low-income voting block can elect. Second, this discussion introduces a new measure of poverty relief; that is, a measure of cash transfers that are targeted to the poor and very poor. As suggested earlier in this discussion, there is some early evidence that poverty relief may not be well-incorporated into comparative analysis of welfare regimes.

The results of this analysis, however, also raise important questions: First, as noted in the discussion of poverty relief measures, there is important variation in the composition of anti-poverty policies. Although minimum income provisions *never* provide the most important source of support for low-income households, their effectiveness in providing poverty relief varies cross-nationally. Similarly, some countries make extensive use of programs that are neither contributory nor means-tested in their poverty relief programs. What explains this cross-national variation in the composition of anti-poverty policies? A second question addresses the role of electoral geography in the viability and success of social democratic and other parties of the left: When will parties stand as the party of low-income voters? Is the long-term success of leftist parties conditioned by the joint geographic distribution of income and legislative seats? This question motivates a future research agenda, in which endogenous party formation is examined during periods of suffrage expansion and electoral reform.

Appendix A Measuring the Electoral Power of the Poor

This Appendix reports the specific details of the estimation strategy for each country, and lists the electoral districts in which a low-income voting bloc could elect (lower house) members of the national legislature, and is organized according to types of electoral systems, with the main distinction reflecting the number of legislators elected in each district.

Single Member District Systems

(A) Simple Plurality Rules

Canada. Estimates of the proportion of low-income citizens in each electoral district are calculated using 2001 Census data (corresponding to 2000 calendar year Statistics Canada 2003), reported for each Federal Parliamentary Riding (2003 Representation Order). The income measure includes all sources of income, including social transfers and is reported by income category, for men over the age of 15. This analysis distinguishes those with total income between \$1,000 and \$19,999 (in Canadian dollars; an amount slightly more than the \$17,821 threshold observed in the LIS data), from those earning higher levels of income. Following the strategy used in the other single member, simple plurality systems, a threshold of representation of 35% is used to identify electoral districts in which low-income citizens are likely to be pivotal. Table A.1 lists these districts, by province.

United Kingdom. To identify those electoral constituencies in which low-income citizens are likely to be pivotal, I used data collected under the auspices of the *Annual Survey of Hours and Earnings* (Office for National Statistics 2002). This data-set reports deciles of the gross income distribution within the (202) local authorities in the UK. These low-level geographic areas were matched to parliamentary constituencies according to the “Standard Names and Codes” (SNAC) protocol, provided by National Statistics. Then, those districts in which the 30th percentile of the district income distribution was less than the 30th percentile of the the national market income distribution (as reported in Office for National Statistics, approximately \$18,333) were identified as those districts in which low-income citizens are pivotal (see Table A.2).

The ASHE data offer the important measures of gross earnings distributions (the main component of market income), at much lower levels of geographic aggregation than is available through LIS, which uses the 11 Government Office regions (these are also correspond to the Eurostat NUTS 1 regions). The ASHE data, however, provide a conservative estimate of the proportion of low-income citizens in any district: Only individuals with earnings are included in the sample. As a consequence, the estimate of the number of seats a low-income voting bloc could secure is likely quite conservative.

United States. Estimates of the percentage of the each congressional district electorate composed of low-income households are generated using the *US Census of Housing and Population, Summary File 3* (U.S. Census Bureau 2002). These data offer the important advantage of direct correspondence to congressional districts. It should be noted, however, that the SF3 data report total income– a measure that includes social transfers, as well as earnings income, etc. – rather than market income. Further, because of the way in which these data are reported, a poverty threshold of \$24,999 was used, instead of the threshold reported in Table 3, \$20,613: This threshold reflects the 30th income percentile for these non-equivalent household total income data.

To calculate the seat share a low-income voting bloc could secure in the House of Representatives, I use Lijphart’s (1994) effective threshold of representation for majoritarian systems, 35%: If low-income households comprise 35% or a greater share of the congressional district, it is allocated the seat from that district. Table A.3 summarizes the distribution of seats secured by a low-income voting bloc, by state.

Table A.1: Districts and Seats Won by a Low-Income Voting Bloc in Canada

Province	Federal Parliamentary Ridings
Nunavut (1/1)	Nunavut
Prince Edward Island (4/4)	Cardigan, Charlottetown, Egmont, Malpeque
Nova Scotia (8/11)	Cape Breton-Casno, Central Nova, Halifax, Kings-Hant North Nova, South Shore-St. Margaret's, Sydney-Victora, West Nova
Newfoundland and Labrador (5/7)	Avalon, Bonavista - Gander - Grand Falls - Windsor, Humber - St. Barbe - Baie Verte, Random - Burin - St. George's, St. John's South
New Brunswick (6/10)	Acadie - Bathurst, Beauséjour, Madawaska - Restigouche, Miramichi, St.Croix-Belle Isle, Tobique-Mactaquac
Saskatchewan (8/14)	Battlefords-Lloydminster, Churchill River, Prince Albert, Regina - Qu'Appelle, Saskatoon - Rosetown - Biggar Souris-Moose Mountain, Yorkton - Melville
Manitoba (7/14)	Brandon- Souris, Churchill, Dauphin - Swan River, Portage-Lisgar, Selkirk - Interlake, Winnipeg Centre, Winnipeg North
Quebec (35/75)	Ahuntsic, Beauce, Beauport - Limoliou, Berthier-Maskinong, Bourassa, Charlevoix-Montmorency, Drummond, Gaspesie-Iles de la Madeleine, Haute-Gaspesie - La Mitis - Matapdia - Matane, Hochelaga, Jeanne - Le Ber, Joliette, LaSalle Émard, Laurentides - Labelle, Laurier - Sainte-Marie, Megantic- L'Erable, Mount Royal, Notre Dame De Grace-Lachine, Nunavik-Eeyou, Outremont, Papineau, Quebec, Richelieu, Richmond-Arthabaska, Rimouski- Temiscouata, Riviere du Loup-Montmagny, Roberval, Rosemont - La Petite-Patrie, Saint-Laurent-Cartierville, Saint-Leonard - Saint-Michel, Saint-Maurice - Champlain, Sherbrooke, Trois-Rivieres
British Columbia (10/36)	Chilliwack-Fraser Canyon, Nanaimo-Cowichan, North Okanagan Shush, Richmond, Southern Interior, Surrey North, Vancouver East, Vancouver Kingsway, Vancouver South
Ontario (9/106)	Davenport, Hamilton Centre, Parry Sound-Musoka, Prince Edward-Hastings, Scarborough-Agin Court, Scarborough-Guildwood, Scarborough-Rouge River, York South-Weston, York West
Alberta (1/28)	Edmonton East

NOTE. Provinces are listed in descending order of the proportion of parliamentary constituencies likely to be secured by a low-income voting block (reported in parentheses).

Table A.2: Districts and Seats Won by a Low-Income Voting Bloc in the UK

Region	Parliamentary Constituencies
East Midlands (31/44)	Amber Valley, Ashfield, Bassetlaw, Bolsover, Boston and Skegness, Broxtowe, Chesterfield, Derby North, Derby South, Erewash, Gainsborough, Gedling, Grantham and Stamford, High Peak, Leicester East, Leicester South, Leicester West, Lincoln, Louth and Horncastle, Mansfield, Newark, North East Derbyshire, Nottingham East, Nottingham North, Nottingham South, Rushcliffe, Sherwood, Sleaford and North Hykeham, South Derbyshire, South Holland and The Deepings, West Derbyshire
North East (23/30)	Berwick-upon-Tweed, Blaydon, Blyth Valley, Darlington, Gateshead East and Washington West, Hartlepool, Hexham, Houghton and Washington East, Jarrow, Middlesbrough, Middlesbrough South and East Cleveland, Newcastle-upon-Tyne East and Wallsend, North Tyneside, Redcar, Sedgefield, South Shields, Stockton North, Stockton South, Sunderland North, Sunderland South, Tyne Bridge, Wansbeck
Wales (27/40)	Blaenau Gwent, Brecon and Radnorshire, Caernarfon, Caerphilly, Carmarthen East and Dinefwr, Ceredigion, Clwyd South, Clwyd West, Conwy, Cynon Valley, Gower, Islwyn, Llanelli, Meirionnydd Nant Conwy, Merthyr Tydfil and Rhymney, Montgomeryshire, Newport East, Newport West, Pontypridd, Preseli Pembrokeshire, Rhondda, Swansea East, Swansea West, Vale of Clwyd, Wrexham, Ynys Mon
South West (29/51)	Bournemouth East, Bournemouth West, Bridgwater, Christchurch, East Devon, Exeter, Falmouth and Camborne, Mid Dorset and North Poole, North Devon, North Dorset, Plymouth– Devonport, Plymouth– Sutton, Poole, Somerton and Frome, South Dorset, South East Cornwall, South West Devon, Taunton, Teignbridge, Tiverton and Honiton, Torbay, Torridge and West Devon, Totnes, Truro and St. Austell, Wells, West Dorset, Yeovil
Yorkshire and the Humber (20/56)	Barnsley East and Mexborough, City of York, Cleethorpes, Don Valley, Doncaster Central, Doncaster North, Great Grimsby, Harrogate and Knaresborough, Kingston upon Hull East, Kingston upon Hull North, Kingston upon Hull West and Hessle, Richmond (Yorks), Rother Valley, Rotherham, Ryedale, Scarborough and Whitby, Selby, Skipton and Ripon, Vale of York, Wentworth
North West (22/76)	Ashton under Lyne, Blackburn, Blackpool North and Fleetwood, Blackpool South, Bolton North East, Bolton South East, Bolton West, Halton, Heywood and Middleton, Leigh, Liverpool– Garston, Liverpool– Riverside, Liverpool– Walton, Liverpool– Wavertree, Liverpool– West Derby, Makerfield, Oldham East and Saddleworth, Oldham West and Royton, Rochdale, St. Helens North, St. Helens South, Wigan
Eastern (16/56)	Bury St. Edmunds, Central Suffolk and North Ipswich, Great Yarmouth, Ipswich, Luton North, Luton South, Mid Norfolk, North Norfolk, North West Norfolk, Norwich North, Norwich South, South Norfolk, South Suffolk, South West Norfolk, Southend West, Suffolk Coastal, Waveney, West Suffolk
West Midlands (16/59)	Dudley North, Dudley South, Halesowen and Rowley Regis, Halesowen, Hereford, Leominster, Ludlow, North Shropshire, Redditch, Shrewsbury and Atcham,Stourbridge, The Wrekin, Warley, West Bromwich East, West Bromwich West, Wolverhampton North East, Wolverhampton South East, Wolverhampton South West
South East (6/83)	Bexhill and Battle, Eastbourne, Hastings and Rye, Isle of Wight, Lewes, Wealden

NOTE. Regions are listed in descending order of the proportion of seats likely secured by a low-income voting block (reported in parentheses).

Table A.3: Districts and Seats Won by a Low-Income Voting Bloc in the US

State	Congressional District Numbers
Mississippi (5/5)	1, 2, 3, 4, 5
Montana (1/1)	At-large
North Dakota (1/1)	At-large
West Virginia (3/3)	1,2, 3
Arkansas (3/4)	1, 3, 4
Alabama (5/7)	1, 2, 3, 4, 7
Louisiana (5/7)	2, 3, 4, 5, 7
Tennessee (5/9)	1, 3, 4, 8, 9
Maine (1/2)	2
Oklahoma (3/6)	2, 3, 6
Texas (13/30)	1, 2, 13, 15, 16, 17, 18, 20, 23, 27, 28, 29, 30
Georgia (4/11)	1, 2, 8, 10
Kentucky (2/6)	1, 5
Missouri (3/9)	1, 7, 8
Nebraska (1/3)	3
Pennsylvania (7/21)	1, 2, 3, 5, 11, 12, 14
Virginia (3/11)	3, 5, 9
Florida (6/23)	2, 3, 5, 17, 18, 23
North Carolina (3/12)	1, 7, 11
New York (7/31)	10, 11, 12, 15, 16, 17, 24
Ohio (4/19)	1, 6, 11, 18
Arizona (1/6)	2
South Carolina (1/6)	6
Illinois (3/20)	1, 4, 19
California (7/52)	2, 20, 30, 32, 33, 35, 37
Maryland (1/8)	7
Michigan (2/16)	14, 15
Wisconsin (1/9)	5
New Jersey (1/13)	10

NOTE. This Table reports those Congressional Districts in which a low-income voting block comprises more than 35% of the population. States are listed in descending order of the proportion of seats which a low-income voting block can secure (reported in parentheses).

(B) Alternative Vote Rules

Australia. Seats in Australia's House of Representatives are elected under Alternative Vote Rules (ATV), in single member districts (of "Commonwealth Electoral Division"). ATV rules are similar to the single member, simple plurality rules that regulate elections in the United States, the United Kingdom and Canada in that candidates who receive the majority of the vote are elected. However, when all candidates fail to secure a majority of the votes cast – when, under SMSP rules, seats are allocated to the candidate who wins a plurality of the votes cast – ATV rules invoke voters' ranking-ordering of preferences. Ballots in which the voters' first preferences are allocated to the candidate winning the smallest vote share are re-allocated to the candidates ranked second by these voters. This process is repeated, with ballots reallocated at each step and according to voters' preferences, until a candidate has secured the majority of the vote share. In practice, however, although at least four major parties compete for election, most of the seats are allocated to two major parties or coalitions, and election results closely resemble outcomes that characterize elections held under SMSP rules. For this reason, and to limit the influence of assumptions made about the number of parties competing, this analysis uses the same seat allocation rule as was used in the SMSP systems: Seats are allocated to the low-income voting bloc in those districts in which the proportion of low-income citizens exceeds 35% of the population.

To estimate the proportion of low-income citizens in each district, I use income data collected as part of the 2001 Census: For each district, the Australian Bureau of Statistics reports the number of individuals in 14 gross income categories (including social transfers) and eight age categories (Australian Bureau of Statistics 2001). Including only working-aged individuals (in this case, 25-64 years old), estimates of the number of low-income citizens are based on the number of individuals whose yearly earnings are less than $10,884 (AUD$15,599), an amount slightly lower than that listed in Table 3 ($13,954). Table A.4 lists those districts in which the proportion of low-income citizens exceeds 35%.

Table A.4: Districts and Seats Won by a Low-Income Voting Bloc in Australia

State	Commonwealth Electoral Divisions
New South Wales	Blaxland, Charlton, Cowper, Fowler, Gilmore, Gwydir, Hunter, Lyne, New England, Newcastle, Page, Parkes, Paterson, Reid, Richmond, Shortland, Throsby
Northern Territory	Lingiari
Victoria	Ballarat, Bendigo, Corio, Gellibrand, Gippsland, Maribyrnong, Mcmillan, Wannon
Western Austrlia	Brand, O'Connor

(C) Two-Round Majoritarian Rules

France. Legislative seats in France are allocated in single member districts, when a candidate secures 50% of the votes cast in their district. If, after the first round election, no candidate has secured this majoritarian, the two candidates who secured the largest vote shares stand in a a second round election. The candidate winning this second round election will then be allocated the seat. Following Lijphart (1994) and Powell (2000), I use the 35% threshold of representation, and allocated seats in those districts in which low-income citizens comprise at least 35% of the district to a low-income voting bloc.

Under current rules, seats are allocated in 555 single-member electoral districts ("circonscriptions électorales", plus 15 overseas SMDs). While income data are not available at this low level of aggregation, census data collected in 1999 on the composition of the labor force are available for each district (National Institute for Statistics and Economic Studies (INSEE) 2002). Using the LIS data to generate estimates of the proportion of low-income households for each labor force category (in which the head of household is classified as employed in agricultural, industrial, construction, service work, or is unemployed), for each of eight regions, and then using these regional proportions, the proportion of low-income citizens in each district is estimated in a way that reflects within-region variance in labor market conditions. Table A.5 reports, by region, those districts in which a low-income voting bloc exceeds 35% of population within the electoral district.

Table A.5: Districts and Seats Won by a Low-Income Voting Bloc in France

Region	Departments (Number of Seats in Department)
Mediterranean (65/65)	
North (38/38)	
South-West (40/62)	Ariëge (2), Aveyron (2), Corrze (2), Creuse (2), Dordogne (3), Gers (2), Gironde (7), Haute-Garonne (3), Haute-Vienne (2), Hautes-Pyrnes (1), Landes (1), Lot (2), Lot-et-Garonne (3), Pyrnes-Atlantiques (2), Tarn (4), Tarn-et-Garonne (2)
Paris Basin (61/103)	Aisne (5), Ardennes (3), Aube (3), Calvados(3),Cher (1), Eure(4), Eure-et-Loir (1), Haute-Marne (1), Indre (1), Indre-et-Loire (2), Loir-et-Cher (2), Loiret (1), Manche (2), Marne (2), Niëvre (2), Oise (5), Orne (2), Sane-et-Loire (4), Seine-Maritime (10), Somme (5), Yonne (2)
West (39/73)	Charente (4), Charente-Maritime (4), Ctes-d'Armor (3), Deux-Svres (2), Finistre (1), Ille-et-Vilaine (1), Loire-Atlantique (5), Maine-et-Loire (4), Mayenne (2), Morbihan (4), Sarthe (4), Vende (3), Vienne (2)
Center-East (24/63)	Ain (1), Allier (3), Ardche (3), Cantal (1), Drme (3), Haute-Loire (2), Isre (1), Loire (4), Puy-de-Dme (3), Rhne (3)
Paris (0/99)	
East (0/52)	

NOTE. This Table reports those Departments in which a low-income voting block could secure a legislative seat. Regions are listed in descending order of the proportion of circonscriptions in which a low-income voting block could be successful (reported in parentheses, in first column).

Varying District Size-Magnitude Systems

(A) Single Transferable Vote

Ireland. Legislators in Ireland's lower house of representatives, ("Dail Eireann") are elected in MMDs and seats are allocated according to a Single-Transferable vote rule. In practice, this implies that voters rank candidates on a single ballot, and in a first allocation, seats are distributed according to a Droop quota "largest remainder" formula (see Eq. 2). The surplus votes cast in favor of any candidate whose share of votes exceeds the quota (and thus is automatically elected) are redistributed to candidates who are listed as each voters' second preference, in proportion to the preferences of all ballots cast in favor of the successful candidate. Seats are allocated to each candidate whose vote share exceeds their district's quota, and votes are re-distributed until all of the seats in the district are filled. If, at any stage in the allocation of seats, no candidate is supported by a share of votes which exceeds the quota, votes for the least popular candidate are re-distributed according to the distribution of preferences expressed by her supporters.

To estimate the number of seats won by a low-income voting bloc in Ireland, I consider only the first allocation of seats, using the approximation of Droop quota given in Eq. (2) as the basis of this calculation. This strategy avoids assumptions about the number of candidates competing in each district and voters' rank order preferences.

Generating estimates of the proportion of low-income citizens in each constituency involves a number of steps: The LIS data report the Eurostat NUTS 3 region for each household. Each of the eight NUTS 3 regions, however, includes between two and 12 districts (in the Midland and Dublin regions, respectively), each electing three to five seats. Fortunately, although the Central Statistics Office Ireland does not report distributions of income within the 43 electoral districts, the published census data include the number of employed and unemployed (male) residents for each district. Using corresponding head-of-household employment status data, which are included in LIS, I've identified the proportion of low-income households in each employment status group, for each region, and use these proportions here to estimate the proportion of low-income citizens in each electoral district. This strategy offers the important advantage of incorporating within-region variation in the geographic distribution of income by incorporating differences in the structure of the labor market; an alternative strategy would be to simply impute the region proportion of low-income citizens for each electoral district. In practice, proportions of low-income citizens estimated in this way have regional means that are within a one or two percentage points of the LIS-generated regional proportions. Table A.6 reports the number of seats in each region that could be elected by a low-income voting bloc.

Table A.6: Districts and Seats Won by a Low-Income Voting Bloc in Ireland

Region	Dail Constituencies (Number of Seats)
Border (10/18)	Donegal South – West (2), Louth (2), Sligo - North Leitrim (2), Donegal North - East (2), Cavan-Monaghan (2)
Midland (4/9)	Laoighis - Offaly (2), Longford - Westmeath (2)
West (7/17)	Galway West (2), Galway East (2), Roscommon - South Leitrim, Mayo (2)
South-West (10/25)	Carlow-Kilkenny (2), Kerry North, Kerry South, Cork South - West, Cork South - Central (2), Cork-East (2), Cork North - Central (2), Cork North - West
South-East (7/20)	Tipperary North, Tipperary South, Waterford, Wexford (2)
Mid-West (4/12)	Limerick West, Clare, Limerick East (2)
Mid-East (5/18)	Meath West, Kildare North, Wicklow, Kildare South, Meath East
Dublin (12/47)	Dublin North - West, Dublin South - Central, Dublin South - East, Dublin - Central, Dublin South, Dublin North, Dublin North - Central, Dublin Mid - West, Dun Laoighaire, Dublin South - West, Dublin West

NOTE. Regions reported in descending order of the proportion of seats which a low-income voting block could secure (reported in parentheses).

(B) Single-Tier Systems

Belgium. Legislative seats in Belgium are allocated in 11 multi-member districts (largely corresponding to provinces) that range in magnitude from 4 seats in Luxembourg, to 24 seats in Antwerp. Although seats are typically allocated according to "highest average" d'Hondt formula, this analysis uses the Droop quota approximation, Eq. (14), as the basis of this analysis.

As with several of the other countries included in this analysis, unfortunately, income data are not available at the district level of analysis. Data on the age structure of each district, however, are available for each district through Eurostat, and can be usefully combined with regional information about the geographic distribution of poverty from the LIS data-set:[18] The LIS data provide the respondents' region of residence (Brussels, Flemish Region and Walloon Region), as well as their age. To estimate the number of seats a low-income voting bloc could secure, first, using LIS data, I calculate the regional proportion of low-income citizens in several age categories that correspond to Eurostat age categories. Then, I use these proportions to estimate the number of low-income citizens, given their age distribution, for each district. This strategy has the important advantage of reflecting within-region district-level variation in the composition of the districts. Table A.7 reports the number of seats in each region that could be elected by a low-income voting bloc.

Table A.7: Districts and Seats Won by a Low-Income Voting Bloc in Belgium

Region	Number of Seats	Province
Walloon Region (20/49)	2/5	Brabant-Wallon
	7/19	Hainaut
	6/15	Liege
	2/4	Luxembourg
	3/6	Namur
Flemish Region (24/79)	7/24	Antwerp
	4/12	Limburg
	6/20	East Flanders
	2/7	Leuven
	5/16	West Flanders
Brussels-Capital Region (5/22)	5/22	Brussels-Halle-Vilvoorde

NOTE. Regions reported in descending order of the proportion of seats which a low-income voting block could secure (reported in parentheses, in the first column).

Finland. Legislative seats in Finland are allocated in way that is similar to the Belgian allocation of seats: 200 seats are allocated in 15 multi-member districts that range in the number of seats allocated from one in Aland, to 34 in Uusimaa, according to the d'Hondt formula (the modified Droop quota, described above, is used here instead). With a few exceptions, the boundaries of the electoral districts correspond to the boundaries of Finland's 20 administrative districts.[19] Because the LIS data identify the administrative district of each household, the geographic distribution of income can be estimated directly from the LIS data; no supplementary data are needed. Table

[18] In this case, Eurostat unemployment data yield within-region proportions of low-income citizens that are quite different from BI'S estimates of regional proportions. The Eurostat age data, used here instead of unemployment rates, yield within-region estimates that are much closer to the LIS regional estimates.

[19] The city of Helsinki comprises a district in itself, and several electoral districts combine two or three administrative districts.

A.8 reports the number of seats in each district, with districts grouped by province, that could be elected by a low-income voting bloc.

Table A.8: Districts and Seats Won by a Low-Income Voting Bloc in Finland

Province	Number of Seats	District
Oulu (10/18)	10/18	Oulu
Eastern Finland (11/21)	4/6	Northern Karelia
	4/10	Northern Savonia
	3/6	Southern Savonia
Lapland (3/7)	3/7	Lapland
Western Finland (27/71)	7/17	Vaasa
	6/18	Pirkanmaa
	4/9	Satakunta
	4/10	Central Finland
	6/17	Finland Proper
Southern Finland (22/81)	4/21	Helsinki
	4/12	Kymi
	5/14	Tavastia
	9/34	Uusimaa
Aland (0/1)	0/1	Aland Islands

NOTE. Regions reported in descending order of the proportion of seats which a low-income voting block could secure (reported in parentheses, in the rst column).

Luxembourg. Elections to Luxembourg's 60-seats legislature are contested in four multi-member districts that range in magnitude from 7 to 23 seats. Seats are allocated according to the Droop quota (see Eq. 2).

The LIS data, however, provide no geographic information about the location of the Luxembourg respondents. To estimate the geographic distribution of income, therefore, I use a strategy similar to that implemented in the analysis of Belgium: Using the relationship between age (of household heads) and low-income status, and data on the age structure within each Luxembourg canton (which combine to form the electoral districts Statec 2003), I estimate the proportion of low-income voters for each district. Then, using the Hagenbach-Bischoff seat allocation rule, I estimate the number of seats a low-income voting bloc could secure in Luxembourg's Chamber of Deputies. Table A.9 reports the regional distribution of these seats.

Table A.9: Districts and Seats Won by a Low-Income Voting Bloc in Luxembourg

District	Number of Seats
East	3/7
South	8/23
Center	7/21
North	3/9

Norway. Legislative elections in Norway are contested in 19 multi-member districts, that range in the number of seats elected from 4 (in Aust-Agder) to 17 (in Oslo). The electoral districts correspond to the Norwegian counties; the numbers of seats in each district reflect both the distribution of the population and the geographic size of each county, with the result that voters in rural areas are over-represented in the *Storting.* Following elections, seats are allocated first according to the modified Saint-Laguë method, which uses a slightly different quota from the more common d'Hondt allocation rule used in several of the other systems included in this analysis (the d'Hondt denominator in the expression for A_t^p, Eq. 1, is replaced by the series $1.4, 3, 5, .., (2s_{t-1}^p - 1)$). Then, an additional "leveling" seat is allocated within each district to the party whose seat share is less than its vote share (provided that the party meets the nation 4% threshold). The number of seats elected in each district varies slightly across elections; the analysis presented here reflects the 2001 distribution of seats.

The LIS data do not report the Norwegian respondents' region of residence. Therefore, to estimate the distribution of poverty, I use the national relationship between low-income status, age (whether the respondent is 25-39 years of age, or aged 40-54), and labor market activity (whether the head of household is employed, unemployed or receiving a pension), in combination with similarly-coded data on the county-level relationship between age and labor market activity (Statistics Norway 2001). Table A.10 reports the results of this analysis, with the distribution of seats secured by a low-income voting bloc listed by district.

Table A.10: Districts and Seats Won by a Low-Income Voting Bloc in Norway

County	Seats in County
Aust-Agder	2/4
Finnmark	2/4
Buskerud	3/7
Oppland	3/7
Møre and Romsdal	4/10
Sør-Trøndelag	4/10
Sogn and Fjordane	2/5
Vest-Agder	2/5
Oslo	6/16
Hedmark	3/8
Østfold	3/8
Vestfold	3/8
Rogaland	4/11
Hordaland	6/17
Akershus	5/15
Nord-Trøndelag	2/6
Nordland	4/12
Telemark	2/6
Troms	2/6

Spain. Spain's 52 provinces serve as the multi-member districts for the Congress of Deputies. Although a PR allocation rule was used, seats are allocated (according to the d'Hondt "highest average" formula, though the approximate Droop quota, Eq.14, is used in this analysis) such that each province has at least two seats (plus one seat for each of Spain's autonomous cities, Ceuta and Melilla); the distribution of the remaining 248 seats reflects the distribution of the population. As a consequence, most districts elect fewer than eight seats, while the districts that include Barcelona and Madrid elect 31 and 35 legislators, respectively.

LIS data identify the (NUTS 1, groups of autonomous communities) region of each respondent household, but not the province in which they reside. Regions include between one (Madrid) and 16 (Castile and Léon) provinces. Fortunately, Spain's Instituto Nacional de Estadística reports data on the structure of the labor force (by industrial sector and rates of unemployment) within each province (for the first quarter of 2000 Instituto Nacional de Estadística N.d.). Using LIS data on the economic activity and industrial sector of each working-aged head of household, in combination with income data for each household, I have calculated the proportion of low-income households in each labor force group (agricultural, industrial, service, construction and unemployed works), for each region. Then, using these regional proportions, I estimate the proportion of low-income households in each labor force category for each province. Finally, Table A.11 reports the number of seats that would be allocated to a low-income voting bloc in each region.

Table A.11: Districts and Seats Won by a Low-Income Voting Bloc in Spain

Region (Seats in Region)	Community	Seats	Province
South (33/61)	Andalusia	3/6	Almería
		4/9	Cádiz
		3/6	Córdoba
		3/7	Granada
		3/5	Huelva
		3/6	Jaén
		4/10	Málaga
		5/12	Seville
	Region of Murcia	4/10	Murcia
	Ceuta and Melilla	1/2	Ceuta and Melilla
Centre (33/63)	Castile and León	2/3	Ávila
		2/4	Burgos
		2/5	León
		2/3	Palencia
		2/4	Salamanca
		2/3	Segovia
		1/2	Soria
		2/5	Valladolid
		2/3	Zamora
	Castile–La Mancha	2/4	Albacete
		2/5	Ciudad Real
		2/3	Cuenca
		2/3	Guadalajara
		3/6	Toledo
	Extremadura	3/6	Badajoz
		2/4	Cáceres
Canary Islands (7/15)	Las Palmas	4/8	Las Palmas
	Santa Cruz de Tenerife	3/7	Santa Cruz de Tenerife
North-east (12/40)	Basque Country	1/4	Álava
		2/6	Guipúzcoa
		2/8	Biscay
	Aragon	1/3	Huesca
		1/3	Teruel
		2/7	Zaragoza
	Navarre	2/5	Navarre
	La Rioja	1/4	La Rioja
North-west (10/36)	Asturias	2/8	Asturias
	Cantabria	1/5	Cantabria
	Galicia	2/8	Corunna
		2/4	Lugo
		1/4	Orense
		2/7	Pontevedra
East (22/88)	Catalonia	7/31	Barcelona
		2/6	Girona
		1/4	Lleida
		2/6	Tarragona
	Valencian Community	3/12	Alicante
		1/5	Castellán de la Plana
		4/16	Valencia
	Balearic Islands	2/8	Balearic Islands
Madrid (7/35)		7/35	Madrid

Switzerland. Seats in Switzerland's National Council are contested in the 26 districts (corresponding to the cantons and half-cantons), each electing between 1 (in 6 cantons) and 34 legislators (in Zurich). Ballots are cast in complex ways, as voters can cast votes for candidates across party lists, or cast multiple votes for their most preferred candidates. Seats are allocated according to the Hagenbach-Bischoff highest average rule.[20]

LIS data report only the region of each respondent's residence, not the canton, and so a strategy similar to that used in several other cases included in this analysis is used here, as well: Swiss Statistics reports the distribution of workers over three economic sectors (primary, secondary and tertiary), as well as the unemployment rate, for each canton, in the on-line *Regional Portraits*(Swiss Statistics 2004). Using the LIS data, the proportion of low-income households is calculated for each of these categories (using the head of household's economic activity). Finally, using these regional proportions in combination with the Swiss Statistics data on the composition of the labor force within each canton, I estimate the proportion of low-income citizens in each canton. Table A.12 reports the results of this analysis.

Table A.12: Districts and Seats Won by a Low-Income Voting Bloc in Switzerland

Region (Seats in Region)	**Seats in Canton**	**Canton**
Tessin (4/8)	4/8	Ticino
Eastern Switzerland (23/52)	1/1	Appenzell Innerrhoden
	1/1	Appenzell Ausserhoden
	1/1	Glarus
	1/1	Nidwalden
	1/1	Obwalden
	1/1	Uri
	3/6	Thurgau
	1/2	Schaffhausen
	2/4	Schwyz
	2/5	Graubünden
	4/10	Lucerne
	1/3	Zug
	4/12	St. Gallen
Espace Mittelland (19/47)	1/2	Jura
	3/7	Fribourg
	3/7	Solothurn
	2/5	Neuchâtel
	10/26	Berne
Lake Geneva region (13/36)	3/7	Valais
	4/11	Geneva
	6/18	Vaud
Northwest Switzerland (7/27)	2/7	Basel-Land
	4/15	Aargau
	1/5	Basel-Stadt
Zürich (8/34)	8/34	Zürich

[20]Although there are differences in practice, particularly in small electorates, here the Hagenbach-Bischoff allocation that is functionally equivalent to the Droop quota.

(C) Multi-Tier Systems

Austria. Legislative seats in Austria's National Council are allocated in three steps, or across three tiers: Voters cast ballots for candidates contesting seats allocated within 43 local electoral districts, or *regionalwahlkreise*, and for candidates competing for election within the Austrian states (*landeswahlkreise*). Allocations within the states are compensatory: Seats won within districts are subtracted from state-level allocations. A final allocation of seats occurs at the national level, and taking into account all valid votes, and allocates any remaining seats to parties that have secured at least one lower-tier seat or four percent of the national vote share.

To identify the strength of a low-income voting bloc in this complex system, I replicate these three stages of seat allocations, using LIS and data published in the *"Statishisches Jahrbuch"* (Statistik Austria 2008). LIS data report each respondent's region of residence. Statistik Austria reports the composition of the labor force (specifically, the number of workers in the primary, secondary and tertiary sectors, and the number of registered unemployed workers, in 2001 and 2002, respectively) for each of the 35 NUTS 3 regions, which correspond to groups of *Bezirks*, Austria's traditional "districts" and independent cities. Then, using the regional relationship between labor force group and low-income status, observed in the LIS data, in combination with the Statistik Austria labor force composition data, I estimate the proportion of low-income citizens in each electoral district. The results of the seat allocations made using these data are reported in Table A.13.

Table A.13: Districts and Seats Won by a Low-Income Voting Bloc in Austria

Region (Seats in Region)	State	Seats in District	District
Westöstereich (23/66)	Obersterreich	3/6	Müviertel
		3/6	Traunviertel
		3/7	Linz und Umebung
		2/5	Innviertel
		3/8	Hausruckviertel
	Salzburg	1/3	Salzburg Stadt
		1/4	Flachgau/Tennengau
		1/4	Lungau/Pinzgau/Pongau
	Tirol	1/3	Innsbruck
		1/3	Oberland
		1/3	Unterland
		1/5	Innsbruck-Land
		0/1	Osttirol
	Vorarlberg	1/4	Vorarlberg Nord
		1/4	Vorarlberg Süd
Öostösterrich (25/76)	Burgenland	1/3	Burdenland Süd
		1/4	Burdenland Nord
	Niedersterreich	2/4	Niederösterreich Sud
		2/4	Niederösterreich Sud-Ost
		3/7	Weinviertel
		2/5	Waldviertel
		2/5	Niederösterreich Mitte
		2/5	Wien Umgebung
		2/6	Mostviertel
	Wien	1/3	Wien Innen-Ost
		1/3	Wien Innen Süd
		1/3	Wien Innen-West
		2/7	Wien Süd
		1/5	Wien Nord-West
		1/6	Wien Nord
		1/6	Wien Süd-West
Südösterrich (12/41)	Kärnten	1/3	Klagenfurt
		1/3	Kärnten West
		1/3	Villach
		1/4	Kärnten Ost
	Steiermark	1/3	Steiermark Süd
		1/3	Steiermark Süd-Ost
		1/3	Steiermark Nord
		1/3	Steiermark Nord-West
		1/3	Steiermark West
		1/4	Steiermark Ost
		1/4	Steiermark Mitte
		1/5	Graz

Denmark. Legislative seats in Denmark's *Folketing* are allocated in two tiers, first according to the Sainte-Lägue highest average allocation rule in 17 multi-member districts (corresponding to Denmark's counties), and second, in a compensatory allocation, according to the Danish highest average formula.[21] As a consequence of this two-tiered allocation, Danish seat allocations are highly proportional, with party seat shares closely matching their national vote shares.

To estimate the electoral power of a low-income voting bloc, LIS data can be used directly: The county of residence is reported for each respondent.[22] Table A.14 reports the results of this analysis.

Table A.14: Districts and Seats Won by a Low-Income Voting Bloc in Denmark

Region (Seats in Region)	Seats in County	County
Jutland (19/37)	2/7	South Jutland County
	2/6	Ribe County
	3/9	Vejle County
	2/7	Ringkøbing County
	5/16	Århus County
	2/6	Viborg County
	5/13	North Jutland County
Copenhagen and Frederiksberg (6/14)	2/4	Southern District
	2/6	Eastern District
	2/4	Western District
Öerne (15/57)	4/14	Copenhagen County
	2/9	Frederiksborg County
	1/5	Roskilde County
	3/8	West Sjællands County
	2/7	Storstrøms County
	1/2	Bornholms County
	4/12	Fyns County

Sweden. Elections to the *Riksdag* are contested in 29 MMDs (*valkrestar*), with 39 seats allocated in a second nation-wide tier to ensure the proportionality of the result, for those parties securing at least four percent of votes cast, or 12 percent of the votes cast in any constituency. A modified Sainte-Lägue highest average allocation rule is used for the allocation of seats in both tiers. Following the convention established above, a Droop quota is used in the allocation of first-tier seats in this analysis. (Seats allocated in the second tier are excluded from this analysis to avoid assumptions about the distribution of support for other parties.)

Although LIS data do not report the electoral districts in which each Swedish respondent lives, LIS does report each respondent's county. With two exceptions, the boundaries of the 22 counties largely coincide with the boundaries of Sweden's electoral districts: The Skåne county contains four electoral districts, and Västra Göalands county is comprised of five electoral districts. Here, the county proportions of low-income citizens are used for each of the composite districts. The results of this analysis are reported in Table A.15.

[21]This formula is similar to the d'Hondt formula, but like the Sainte-Lägue formula, uses a different series of divisors.

[22]Although the cities of Copenhagen and Frederiksberg together form three electoral districts, they jointly form one LIS category.

Table A.15: Districts and Seats Won by a Low-Income Voting Bloc in Sweden

Region (Seats in Region)	Seats	District
Middle Norrland (8/16)	3/5	Jämtlands County
	5/11	Västernorrlands County
North Middle Sweden (16/35)	6/13	Dalarna County
	5/11	Värmlands County
	5/11	Gävleborg County
Upper Norrland (9/20)	5/11	Västerbotten County
	4/9	Norrbotten County
East Middle Sweden (27/62)	6/12	Örebro County
	5/11	Västmanlands County
	5/12	Uppsala County
	5/12	Södermanslands County
	6/15	Östergötland County
South Sweden (20/48)	6/13	Skäne County South
	2/5	Blekinge County
	4/10	Malmö
	4/10	Skäne County West
	4/10	Skäne County North-East
Småland and the Islands (12/30)	2/2	Gotland County
	4/8	Kalmar County
	4/13	Jonkoping County
	2/7	Kronoberg County
West Sweden (28/70)	5/11	West Gotalands County North
	5/11	West Gotalands County East
	3/7	West Gotalands County South
	7/18	Gothenburg City
	5/13	West Gotalands County West
	3/10	Hallands County
Stockholm (22/70)	9/28	Metropolitan Stockholm
	13/42	Stockholm County

Mixed Electoral Rules

(A) Simple Plurality – MMD

The electoral systems of Germany and Italy are described in the text of Chapter 4. Here, the discussion focuses on the estimation of the number of seats a low-income voting bloc could win in each case.

Note, first, that while LIS data report geographic regions for each respondent, these regions do not correspond to the primary electoral districts in either country. These regions roughly correspond to the primary districts in pre-reform Italy and the secondary districts in post-reform Italy, and they correspond perfectly to the secondary districts in Germany. To use the observed data to estimate the proportion of low-income citizens in each district (L_d for $d = 1, ...D$) with a region, let

L_r denotes the (observed) regional proportion of low-income voters. Then, the relationship between L and L_d may be expressed in the following way,

$$L_d = L_r + u_d. \tag{13}$$

Here, u_d describes within-region cross-district variation. Suppose u_d is well-approximated by a normal distribution $u_d \sim N(0, \sigma_u^2)$, for the bounded interval $[0, 1]$. Then, given knowledge of σ_u^2, the proportion of low-income citizens in any district d can be estimated using a the normal probability density function. Specifically, we can estimate L_d and σ_u^2, the probability, p, that the proportion of low-income citizens in any district d in the region, is greater than the electoral threshold τ. If σ_u^2 is known, this is easily accomplished using the cumulative normal distribution function for the truncated distribution of τ (i.e., $0 \leq \tau \leq 1$):[23]

$$p = 1 - \frac{\Phi(\frac{\tau - L_r}{\sigma_u})}{(\Phi(\frac{1-L_r}{\sigma_u}) - \Phi(\frac{-L_r}{\sigma_u}))} \tag{14}$$

When L_r is not observed directly, but is estimated from LIS data, there is an additional sampling variance component, $\epsilon \sim N(0, \sigma_\epsilon^2)$, in the expression for L_d:

$$\hat{L}_d = L_r + u_d + \epsilon \tag{15}$$

Note that because u_d and ϵ are uncorrelated, the residual component, $u_d + \epsilon$, is distributed $N(0, \sigma_u^2 + \sigma_\epsilon^2)$. Thus, the quantity of interest, p, can be estimated according to the following expression:

$$\hat{p} = 1 - \frac{\Phi(\frac{\tau - \hat{L}_r}{\sqrt{\sigma_u^2 + \sigma_\epsilon^2}})}{(\Phi(\frac{1-\hat{L}_r}{\sqrt{\sigma_u^2 + \sigma_\epsilon^2}}) - \Phi(\frac{-\hat{L}_r}{\sqrt{\sigma_u^2 + \sigma_\epsilon^2}}))} \tag{16}$$

In this analysis, $\hat{L}_r$ is estimated directly from the LIS data, and τ is the specified electoral threshold. Thus, the challenge lies in estimating the variance of the residual component,

$$\sigma_u^2 + \sigma_\epsilon^2. \tag{17}$$

The first component of Eq.(13) σ_ϵ^2, the variance of the proportion of low-income citizens living in the region, is estimated according to the usual expression for the variance of a proportion,

$$\hat{\sigma}_\epsilon^2 = \frac{\hat{L}(1 - \hat{L})}{n_r} \tag{18}$$

where n_r denotes the number of respondents residing in the region ($\sum_r n_r = N$).

The second component of Eq. (17), σ_u^2, the within-region cross-district variance, however, cannot be estimated directly using the LIS data: Data reporting each respondent's electoral district are not available. Instead, using unemployment data, which are reported at levels of aggregation that generally approximate both the regional level at which the LIS data are reported and the electoral districts in both Germany and Italy(Eurostat 2008*b*).[24] Thus, an estimate of the ra-

[23] In practice, the denominator of Eq. (14) is almost always equal to one.

[24] The unemployment data are reported for the NUTS 1, 2 and 3 administrative units. In Germany, NUTS 1 units correspond to the Länder, and NUTS 3 units generally correspond to the electoral districts, although there are some electoral districts that intersect with several NUTS 3 units (there are 439 NUTS 3 units, and 328 SMDs in

tio of the within-region cross-district variance in unemployment, to the cross-region variance in unemployment, provides a way to approximate σ_u^2:

$$\hat{\sigma}_u^2 = \rho\overline{\sigma}_u^2 \tag{19}$$

Here, ρ reports the ratio of the within-region cross-district variance in unemployment to the cross-region variance in unemployment, and $\overline{\sigma}_u^2$ reports the cross-district variance in L, or the proportion of low-income citizens. Thus, with estimates of the proportion of low-income citizens residing in each region, and the within-region cross-district variance in this proportion, the number of seats allocated to a low-income voting bloc can be estimated in a straightforward way.

Germany. Let s_r^S and s_r^M report the total numbers of SMD and MMD seats to be allocated in region (*Land*) $r = 1..R$. Then, using the procedure described above, let $\hat{p}_r$ denote the probability that the proportion of low-income citizens in each district in region r exceeds the electoral threshold τ. The number of SMD seats won by a low-income voting bloc in region r, S_r^S, can be approximated for each region by a binomial function, in which the probability of a low-income voting bloc electing k seats within region r is approximated by the following expression:

$$P(S_r^S = k) = \binom{d_r}{k} p_r^k (1 - p_r)^{d_r - k} \tag{20}$$

The electoral strength of a low-income voting bloc can then be estimated as the expectation of a binomial distribution with parameters p_r and d_r:

$$E(S_r^S) = p_r \cdot d_r. \tag{21}$$

Under Germany's Niemeyer allocation rule, the total number of MMD seats S_r^M to be allocated to a low-income voting bloc in each region can be calculated according to the following expression:

$$S_r^M \leq L_r \cdot \frac{n_r}{N} \cdot S \leq S_r^M + 1 \tag{22}$$

where $S = \sum_r s_r^S + \sum_r s_r^M$ reports the total number of seats in the legislature. Finally, the number of direct mandates (S_r^S) is subtracted from the MMD allocation (S_r^M), yielding the number of list seats mandates allocated to a low-income voting bloc in region r. Table 4.4 reports the results of this analysis.

Italy. SMD district seats are allocated using the same strategy as that which was used in the analysis of Germany. The allocation rule for MMD seats, however, is considerably less complex than the German allocation: In Italy, MMD seats are allocated according to a simple quota, with the denominator in Eq. (2) equal to the number of seats to be allocated.[25] The results of this analysis are reported in Table 4.3.

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the post-reform period). Matching the NUTS 3 units with the electoral districts was done using spatial information provided by EUROSTAT and the Federal Returning Officer. This allowed weighted estimate of unemployment to be calculated for each district, with weights corresponding to the relative geographic areas of the component NUTS 3 units.

In Italy, the NUTS 3 units are slightly larger than the post-reform SMDs (there are 475 SMDs, and 110 NUTS 3 units). As a result, and because the spatial data are not available for the Italian SMDs, district-to-region ratios were calculated using NUTS 3-level unemployment data instead of SMD level data.

[25] As noted in Chapter 4, there is also a *scorporo* , or vote-share penalty for winning applied to parties winning SMD seats: A winning party's vote share is adjusted by the vote share won by the second-place party prior to the PR allocation. Here, to avoid assumptions about the number of parties competing, no *scorporo* is applied.

References

Alesina, Alberto & Edward L. Glaeser. 2004. *Fighting Poverty in the US and Europe*. New York: Oxford.

Amorim, Octavio Neto & Gary Cox. 1997. "Electoral Institutions, Cleavage Structures and the Number of Parties." *American Journal of Political Science* 41:149–74.

Australian Bureau of Statistics. 2001. "2001 Census Community Profiles by Location.".

Bäckman, Olaf. 2005. Welfare States, Social Structure And The Dynamics Of Poverty Rates: A Comparative Study Of 16 Countries, 1980-2000. Technical Report 408 Luxembourg Income Study Working Paper Series.

Barr, Nicholas. 2004. *The Economics of the Welfare State*. London: Oxford UP.

Bartels, Larry. 2002. "Economic Inequality and Political Representation." Mimeo, Princeton University.

Bartels, Larry. 2003. "Partisan Politics and the U.S. Income Distribution." Mimeo, Princeton University.

Boix, Carles. 1999. "Setting the Rules of the Game. The Choice of Electoral Systems in Advanced Democracies." *American Political Science Review* 93:609–624.

Bradley, David, Evelyne Huber, Stephanie Moller, Francois Neilsen & John D. Stephens. 2003. "Distribution and Redistribution in Postindustrial Democracies." *World Politics* 55(2):193–228.

Central Statistics Office Ireland. 2006. "Theme 8 - 1 : Persons aged 15 years and over by principal economic status and sex, 2006." On-line "Beyond 20/20" data-base.

Chhibber, Pradeep & Ken Kollman. 1997. *The Formation of National Party Systems*. Princeton, New Jersey: Princeton UP.

Cox, Gary. 1997. *Making Votes Count*. Cambridge: Cambridge UP.

Duverger, Maurice. 1954. *Political Parties*. New York: John Wiley & Sons.

Esping-Andersen, Gøsta. 1990. *The Three Worlds of Welfare Capitalism*. Princeton: Princeton UP.

Eurostat. 2008*a*. "Average Population, by Sex and Age (Belgium 2000)." Custom table created through the on-line "General and Regional Statistics" data-base.

Eurostat. 2008*b*. "Unemployment rates by sex and age, at NUTS levels 1, 2 and 3 (2000)." Custom table created through the on-line "General and Regional Statistics" data-base.

Farrell, David. 2001. *Electoral Systems: A Comparative Introduction*. New York: Palgrave.

Franzese, Robert. 2005. "Political Participation, Inequality, and the Social Safety Net: Multiple Equilibria, Endogeneity, and Empirical Estimation." Mimeo, University of Michigan.

Franzese, Robert J. 2002. *Macroeconomic Policies of Developed Democracies*. Cambridge UP.

Franzese, Robert & Karen Long Jusko. 2006. Political-Economic Cycles. In *Oxford Handbook of Political Economy*, ed. Donald Wittman Stokes & Barry. New York: Oxford UP.

Gilens, Martin. 2005. "Inequality and Democratic Responsiveness." *Public Opinion Quarterly* 69(5):778–896.

Huber, Evelyne, Charles Ragin, John D. Stephens, David Brady & Jason Beckfield. 2004. "Comparative Welfare States Data Set." [Data-file available at http://www.lisproject.org/publications/welfaredata/welfareaccess.htm].

Huber, Evelyne & John D. Stephens. 2001. *Development and Crisis of the Welfare State: Parties and Policies in Global Markets*. Chicago: University of Chicago Press.

Instituto Nacional de Estadística. N.d. "Población de 16 y más años por sexo, comunidad autónoma y relación conla actividad económica." Data collected and published as part of the Economically Active Population Survey (EAPS).

Iversen, Torben & David Soskice. 2006. "Electoral Institutions, Parties, and the Politics of Class: Why Some Democracies Redistribute More than Others." *American Political Science Review* 100.

Kenworthy, Lane. 2001. "Wage-Setting Measures: A Survey and Assessment." *World Politics* 54(1):57–98.

Kim, Jae-on & Mahn-Geum Ohn. 1992. "A Theory of Minor Party Persistence: Electoral Rules, Social Cleavage and the Number of Political Parties." *Social Forces* 70(3):575–599.

Lijphart, Arend. 1994. *Electoral Systems and Party Systems*. Oxford UP.

Lizzeri, A. & N. Persisco. 2003. "The Provision of Public Goods Under Alternative Electoral Incentives." *American Economic Review* 91.

Martin, John P. 1996. "Measures Of Replacement Rates For The Purpose Of International Comparisons: A Note." *OECD Economic Studies* 26:99–115.

Milanovic, Branko. 2000. "The median-voter hypothesis, income inequality, and income redistribution: an empirical test with the required data." *European Journal of Political Economy* 16:367–410.

Milesi-Ferretti, Gian, Roberto Perotti & Massimo Rostagno. 2002. "Electoral Systems and Public Spending." *Quarterly Journal of Economics* 117(2):609–58.

Moene, Karl Ove & Michael Wallerstein. 2001. "Inequality, Social Insurance and Redistribution." *American Political Science Review* 95(4):859–874.

National Institute for Statistics and Economic Studies (INSEE). 2002. "Circonscription Legislatives Tableaux Analyses 2002." CD-ROM.

Office for National Statistics. 2002. "Table 7.7a Annual pay - Gross (£) - For all employee jobs: United Kingdom, 2002." Annual Survey of Hours and Earnings (ASHE).

Ordeshook, Peter & Shvetsova. 1994. "Ethnic heterogeneity, district magnitude and the number of parties." *American Journal of Political Science* 38:100–23.

Organisation For Economic Co-Operation and Development (OECD). 2004. "Social Expenditure Database (SOCX)." Published on-line at www.oecd.org/els/social/expenditure.

Persson, Torben & Guido Tabellini. 2003. *The Economic Effects of Constitutions*. Cambridge: MIT Press.

Persson, Torsten & Guido Tabellini. 2000. *Political Economics: Explaining Economic Policy*. Cambridge: MIT Press.

Powell, G. Bingham. 2000. *Elections as Instruments of Democracy: Majoritarian and Proportional Visions*. New Haven: Yale UP.

Rae, Douglas. 1971. *The Political Consequences of Electoral Laws*. New Haven: Yale UP.

Riker, William H. 1982. "The Two-Party System and Duverger's Law: An Essay on the History of Political Science." *The American Political Science Review* 76(4):753–766.

Roemer, J. 1999. "The democratic political economy of progressive income taxation." *Econometrica* 67.

Romer, Thomas. 1975. "Individual Welfare, Majority Voting and the Properties of a Linear Income Tax." *Journal of Public Economics* 14.

Sartori, Giovanni. 1976. *Parties and Party Systems*. Cambridge: Cambridge UP.

Statec. 2003. "Population par subdivision territoriale et selon l'âge 2001." Table published on-line at http://www.statistiques.public.lu.

Statistics Canada. 2003. "2001 Federal Electoral District Profile (2003 Representation Order)." Statistics Canada Catalogue No. $94F0044XIE$.

Statistics Norway. 2001. "2001 Population and Housing Census." Data published on-line as Table 04247.

Statistik Austria. 2008. "Regionldaten Östrerrichs in NUTS-Gliederung." Published on-line at http://www.statistik.at as part of *Statistisches Jahrbuch*.

Swiss Statistics. 2004. "Regional Portraits." Published on-line at http://www.bfs.admin.ch/ .

Tufte, Edward R. 1978. *Political Control of the Economy*. Princeton, New Jersey: Princeton UP.

U.S. Census Bureau. 2002. "Census 2000 Summary File 3." Custom tables constructed using American FactFinder.

Whiteford, Peter. 1995. The use of replacement rates in international comparisons of benefit systems. Technical Report 54 Social Policy Research Center Discussion Paper.