The rise of the modern welfare state, ideology, institutions and income security: analysis and evidence

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Abstract: In the 25-year period between 1960 and 1985, there was a great expansion of welfare state programs throughout the West. The fraction of GDP accounted for by social expenditures doubled in much of Europe and grew by 40–50% in many other OECD nations. After 1985, growth in social insurance programs slowed relative to other parts of the economy. This paper explores the extent to which institutions and ideological shifts may have accounted for the period of rapid growth, for differences in the extent of that growth, and for the subsequent reduction in the growth rates of social insurance programs.

Key Words: Constitutional Choice and Institutional Analysis, Ideological Change, Public Choice, Public Finance, Public Policy, Social Insurance, Welfare State.

JEL Categories: H4, D6, P5

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1. Introduction

The foundations of contemporary social insurance programs were laid in the late nineteenth century at a time when liberal and conservative political parties dominated governments. For example, Germany's national social security programs began in 1889, France's in 1893, Australia's and Sweden's in 1909, and the United Kingdom's in 1911 The early social insurance programs reflected liberal aims and were widely supported after adoption. Similar programs were adopted somewhat later by other democracies. Japan adopted several social welfare programs during the 1920s. The United States and Switzerland adopted social security programs somewhat later, in 1935 and 1947, respectively.

. Early twentieth century European liberals tended to favor (nearly) universal suffrage, free trade, anti-trust regulation, public education, and modest social insurance programs. In the years after World War I, social democratic and labor parties began to dominate European parliaments. Given this, one might have expected the modern welfare state to have emerged in Europe a half century earlier than it did. Instead, the early social insurance programs remained at relatively low (liberal) levels for approximately 50 years.

It was not until well after World War II that social insurance programs began to dominate national budgets. Social insurance programs in the United States rose from 5% of GDP in 1960 to about 13% in 1985. Similar programs in Japan increased from 4% to 13% of GDP in the same period. Even relatively large programs grew rapidly in that period, as social insurance programs in the United Kingdom grew from 7% to 14% of GDP, in Germany from 12% to 16% of GDP, and in France from 13% to 22% of GDP. If the welfare state is a "nanny" state with a relatively high "safety net," it emerged relatively late in the twentieth century.

Figure 1:
Social insurance as a fraction of GDP
1960-2000
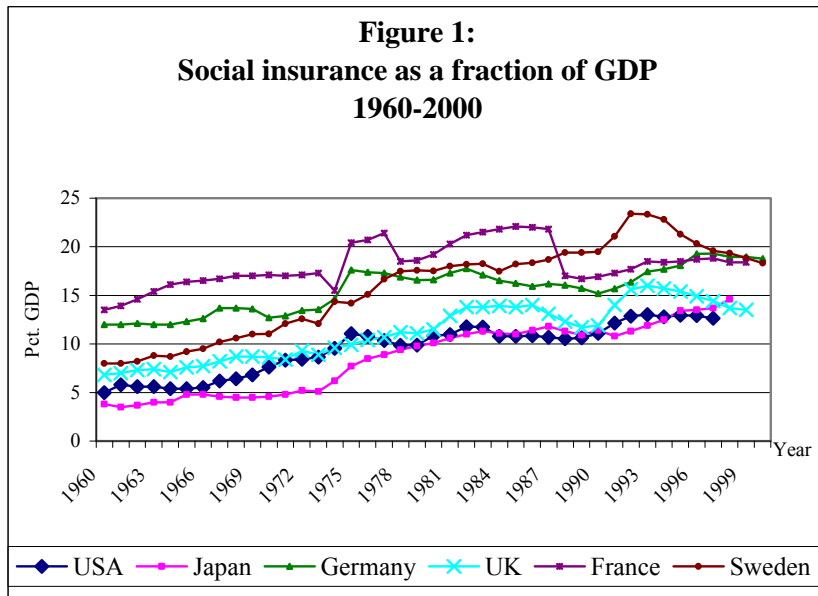
There are several economic rationales for the emergence of the early social insurance programs, but these do not account for the rapid growth of social insurance programs in the 1960–85 period. For example, the adoption and/or expansion of national social insurance programs in democratic states tend to occur when perceived risks, income, and suffrage increase for pivotal voters. All of these effects were associated with industrialization in the West during the late nineteenth century. Business cycles became more severe at the same time that a broad middle class emerged, and the private societies created to pool risks often failed during times of great stress. Congleton (2007) demonstrates that an efficient risk-pooling model can explain many of the durable features of the early national social insurance programs.

The efficient insurance rationale for the welfare state is also broadly consistent with empirical evidence developed by Tanzi and Schuknecht (2000), which suggests that only modest flattening of the distributions of income in OECD countries can be attributed to the social welfare programs of the twentieth century. All insurance, whether publicly or privately provided, tends to reduce income inequality, because insurance reduces variations in income caused by exogenous shocks. Health insurance shifts resources from the healthy to the sck,

and unemployment insurance shifts resources from the employed to the unemployed. In this manner, some flattening of the income distribution occurs, but without an unconditional shift of resources from the rich to the poor.

The rapid expansion of social insurance after World War II is not as easily explained. Subjective assessments of risks doubtless increased during the Great Depression and World War II. In most OECD countries, this increase in demand could not affect policy until after the war was over and democratic governments were re-established. Such pent up demands would partially explain expansions in social insurance during the 1950s and early 1960s. As peace and prosperity replaced war and depression, however, subjective risk assessments would tend to decrease, which would tend to reduce rather than increase the growth rate of social insurance programs in the 1960s and 1970s.

This effect would have been offset to some extent by income growth after World War II, insofar as the demand for all insurance tends to increase with personal income. Reductions in perceived economic risk would also have been offset to some extent by increases in the average and median age of the electorate, insofar as economic and health risks tend to increase with age.

It is possible that the increased income and longevity associated with postwar prosperity dominated the effect of risk reduction. If so, social insurance programs would have continued to expand in the 1960s, 1970s, and 1980s for ordinary economic reasons. However, unless social insurance is a luxury good, its income elasticity should be closer to 1 than to 2 or 3. The doubling and tripling of the size of these programs during the 1960s and 1970s relative to GDP requires much greater income elasticity than that associated with normal goods and ordinary private insurance.[1]

The extent of social insurance demanded would also have increased if the cost of providing it decreased during the postwar period relative to other services. There were

changes in taxation and new technologies that reduced the marginal cost of funding and administering such programs. Economic theories of risk management and statistical methods for assessing risks and forecasting tax revenues also improved, which allowed reserves to be reduced. The cost of computers and accounting software also fell, which reduced the record-keeping costs of taxation and the administrative costs for social insurance programs. However, these cost reductions do not seem sufficient to account for the dramatic increase in the fraction of GDP devoted to social insurance programs, or for the variation in program expansions among Western countries. The main costs of social insurance programs are payments to beneficiaries, rather than administrative costs, and these rose during the period of interest, which caused average and marginal tax rates to increase. The latter implies that the marginal cost of social insurance increased, rather than decreased, for most voters during the postwar period.

All this suggests that the rapid expansion of social insurance programs in the West during the post war period can only be partially explained by "ordinary" changes in the demand for government-provided insurance.

This paper focuses on two additional factors. It suggests that social insurance programs may have expanded after World War II, in large part because of ideological shifts in national electorates. The extent to which such shifts in demand affected national insurance programs, in turn, would have been affected by national political institutions. Such factors may account for both differences in the extent of social insurance programs and their growth rates during the period of interest. With such possibilities in mind, Section 2 develops a model of an individual voter's demand for social insurance that includes both personal insurance and ideological interests. The extended voter model is then imbedded into two election models to illustrate how political institutions and ideological shifts can affect the effective electoral demand for government-provided insurance. Sections 3 and 4 undertake some statistical tests

of the model, using data from 18 OECD countries. The results suggest that ideological shifts, income changes, and institutions all contributed to the expansion of the welfare state in the postwar period.

Other factors, such as increases in the effectiveness of interest groups, may also have affected the trajectory of social insurance programs, although these factors are not analyzed in the present study. It bears noting, however, that interest group explanations for the period of rapid growth are not straight forward. An interest group–based analysis would require a theory that predicts trends in the effectiveness of particular interests. It is not immediately obvious that interest groups favoring social insurance were more effective in the 1960s and 1970s than they were in the 1930s or 1990s. Exploring that possibility is left for future research.[2]

2. A model of voter demand for social insurance

Suppose that a random "shock" strikes people and reduces their ability to work and play. Such shocks include debilitating diseases, accidents of various kinds, technological shocks that affect the value of one's human and physical capital, and recessions that reduce one's employment opportunities. To simplify the discussion, assume that such shocks affect a person's potential for work and that only two potential states are possible.[3] When "well off" (when not affected by a negative shock), a typical person (who we will refer to as Alle) has H hours to allocate between work, W, and leisure, L. When "not well off" (when affected by a negative shock), Alle has only S hours to allocate between work and leisure. Work produces private good Y, which is desired for its own sake, with $Y_i = \omega W_i$, where ω is the marginal and average product of labor. The probability of being affected by a negative shock is $P=p(A)$ for a person of age A.

In addition to economic interests, a person's interest in social insurance is assumed to be influenced by normative theories of various kinds. The norms of interest for the present study

are ideological and philosophical theories that characterize the good society or social welfare. Such norms are not necessarily altruistic, egalitarian, or utilitarian in nature, although such theories also include notions of the good society (for given resources). Persons may, for example, simply regard "minimal" levels education, food, and shelter as appropriate safety nets for a civil society, without giving much thought to the utility generated by those services for recipients or for associated distributional effects.[4]

The typical voter, Alle, is assumed to maximize a strictly concave utility function defined over private consumption, Y, leisure, L, and the extent to which the actual social institutions, I, depart from his or her ideological notion of the good society, I^{**}, as with $U = u(Y_i, L_i, |I-I_i^{**}|)$. We assume that a person's ideology does not affect his or her demand for income and leisure, $U_{Yi} = U_{Li} = 0$, although it may affect his or her demand for social insurance.[5]

In the absence of an income insurance program, Alle maximizes:

$$U^H = u(\omega W_i, H_.-W_i, |I-I_i^{**}|) \tag{1}$$

when well off and maximizes

$$U^S = u(\omega W_i, S_.-W_i, |I-I_i^{**}|) \tag{2}$$

when he or she is not. In either case, Alle's work day (or work week) will satisfy similar first order conditions:

$$U^H_Y \omega - U^H_L = 0 \quad \text{and} \quad U^S_Y \omega - U^S_L = 0 \tag{3}$$

Alle's workday sets the marginal utility of the income produced by his or her work equal to the marginal cost of that work in terms of the reduced utility from leisure.

The implicit function theorem implies that Alle's work day (supply of labor) can be characterized as:

$$W_i^* = w(T, \omega, I, I_i^{**}) \tag{4}$$

In general, Alle's work day varies with her potential active hours (T = S or H), marginal

product (wage rate, ω), current programs (I) and vision of the good society (I_i**).[6] Alle's

income falls from $\omega\,w(H,\omega,$ I, I_i**) to $\omega\,w(S,\omega,$ I, I_i**) when affected by negative shock in

the absence of income insurance.

2.1 Labor-leisure choices with a government-provided safety net

Consider the effects of a government-sponsored program that collects a fraction, t, of the

output produced by each taxpayer-resident through an earmarked proportional tax and returns

it to "unwell" residents through conditional demogrant, G. This income security program

provides a "safety net" of G units of the private consumption good Y for persons who are less

able to work. An income security program, like a circus safety net, keeps the unfortunate

from hitting the "ground," and the higher the net (the greater is G) the less one "falls" when

adversely affected by a shock. Under such an income security program, Alle's net income is

$Y^H = (1\text{-}t)\,\omega\,W^H$ when she is fully able to work, and $Y^S = (1\text{-}t)\,\omega\,W^S + G,$ when she is less

able to work.

Of course, the initiation of such a program changes Alle's behavior. Alle now maximizes

$$U^H = U(\ (1\text{-}t)\ \omega_i\ W,\ H\text{ - }W,\ |I\text{-}I_i\text{**}|) \tag{5}$$

when well and

$$U^S = U(\ (1\text{-}t)\ \omega_i\ W + G,\ S\text{ - }W,\ |I\text{-}I_i\text{**}|) \tag{6}$$

when unwell. The first-order conditions that characterize Alle's work day (or work week)

during well and unwell work periods are again similar to each other and can be written as

$$Z \equiv U^T{}_Y\,[(1\text{-}t)\ \omega_i + t\omega I\ /N]\ \text{-}\ U^T{}_L = 0 \tag{7}$$

Equation 7 differs from equation 3 in that Alle now equates the marginal utility of net income

produced by working (which now includes effects from taxes and the government's income-

security guarantee) to the marginal opportunity cost of time spent working.

The implicit function describing Alle's work day is now

$$W_i^* = w(T, \omega, t, G, I, I_i^{**}).\qquad(8)$$

Equation 8 is the same as equation 4 if the taxes (and insurance benefits) equal zero. T again represents the potential work time available (H or S) to Alle in the week of interest.

Strict concavity of the utility function along with the assumed fiscal structure (proportional taxation and conditional demogrants) allows two derivatives of interest to be signed unambiguously.

$$Wi^*_T = [U_{YT} [(1-t)\ \omega_i + t\omega /N] - U_{LL}] / -[Z_W] < 0\qquad(10)$$

$$Wi^*_t = [U_{YY} (W\omega_i + \omega_i\ \Sigma\ W_j/N)\ ((1-t)\ \omega_i + t\omega_i /N) +$$

$$U_Y(-\omega_i + \omega_i/N)\ - U_{LY} (W\omega_i + \omega_i\ \Sigma\ W_j /N)] / -[Z_W] < 0\qquad(11)$$

$$where\ Z_W = U_{YY} [(1-t)\ \omega_i + t\omega_i /N]^2 - 2\ U_Y [(1-t)\ \omega_i + t\omega_i /N] - U_{LL} < 0$$

Partial derivatives of equation 8 imply that Alle works more when he or she is well than not well, and generally works less when he or she is covered by a social insurance program than when not.

2.2 Ideology and the electoral demand for social insurance

For most day-to-day purposes, the parameters of a government-sponsored social insurance program are exogenous variables for the individuals that take advantage of them. The exception occurs on Election Day, when the parameters of the program are indirectly controlled by voters. Elected representatives are induced by competitive pressures to pay close attention to the preferences of voters on that day, and to some extent before and after that day, if they want to hold office.

We assume for the purposes of this paper that each voter's conception of the good society includes a normatively "ideal" safety net, which is represented as G_i^{**}. The voter's ideological dissatisfaction with current social insurance levels is, consequently, an increasing function of $|G-G_i^{**}|$ where G is the existing program. Alle's preferred public safety net, G_i^*, as opposed to her ideal one, G_i^{**}, varies with both her own circumstances and ideology, and

the fiscal circumstances of the government that sponsors the service.

To see this, suppose that the public safety net program above is to fiscally balanced (on average). In that case, if there are N members in the community eligible for the program of interest and P^A is the average probability of being, $P^A N$ persons qualify for benefits during a typical work period. The tax revenues are earmarked for the safety net program, so the income guarantee associated with a particular tax rate is $G = (t \, \Sigma \, \omega_i \, W^T_i)/P^A N$, where superscript T denotes the state of individual i's health (H or S) during the tax week of interest and super script A denotes average values. The balanced budget constraint can also be characterized in terms of the income of the average person and the average risk of being more or less able to work. Let ω^A denote the wage rate of the "average person" and W^A the average work week of the average person.

$$W^A = P^A \, w(S, \omega^A, t, G, G^A **) + (1-P^A) \, w(H, \omega^A, t, G, G^A **)].$$

This allows the relationship between the social insurance benefit, G, and the tax rate, t, to be written as

$$G \, P^A \, N = t \, N \, \omega^A \, W^A$$

or

$$t = G \, P^A / \omega^A \, W^A \qquad (12)$$

The conditional public demogrant program preferred by voter i is determined by tradeoffs between personal economic goals (risk management and net insurance benefits) and ideological interests in the good society. Voter i maximizes:

$$U_i^e = P_i \, U(\, (1-t) \, \omega_i \, W_i + G, \, S - W_i, \, |G-G_i **|) + (1-P_i)U(\, (1-t) \, \omega_i \, W_i, \, H - W_i, \, |G-G_i **|)$$

which, after substituting for the balanced constraint, becomes

$$U_i^e = P_i \, U(\, (1- GP^A/\omega^A W^A) \, \omega_i \, W_i^S + G, \, S - W_i, |G-G_i **|)$$

$$+ (1 - P_i) \, U[(1 - GP^A/\omega^A W^A) \, \omega_i \, W_i^H, \, H - W_i, \, |G-G_i **|] \qquad (13a)$$

Differentiating 13a with respect to G allows voter i's ideal safety net program to be characterized as

$$P_i \, U^S_Y \, [1 - (P^A/\omega^A W^A - G P^A W^A_G /(\omega^A W^A)^2) \, \omega_i \, W^S_i + (1-P^A G/\omega^A W^A) \, \omega_i \, W^S_{iG} \,]$$

$$- U^S_L \, W^S_{iG} + U^S_I \; +$$

$$(1-P_i) \, U^H_Y \, [- (P^A/\omega^A W^A - G P^A W^A_G /(\omega^A W^A)^2) \, \omega_i \, W^H_i + (1-P^A G/\omega^A W^A) \, \omega_i \, W^H_{iG} \,]$$

$$- U^S_L \, W^H_{iG} + U^H_I \; = 0 \qquad \qquad (for \; G<G_i{**}) \qquad\qquad (14a)$$

The implicit function theorem implies that each voter's preferred government-provided safety net can be characterized as a function of the parameters of his or her optimization problem:

$$G_i{*} = g(\omega_i, \, P_i, \, S, \, H, \, G_i{**}, \, N, \, P^A, \, \omega^A) \qquad\qquad (15)$$

The typical voter's demand for social insurance varies with his or her wage rage, his or her probability of being affected by the opportunity-reducing shock, the extent to which opportunities are reduced by such shocks, and his or her ideological social insurance norm. For fiscal reasons, the demand for social insurance is also affected by the number of taxpayers, the average probability of being subject to the income reducing shock, and the average wage rate.

For most voters, tradeoffs exist between personal net receipts that are generated by effects on the size of the tax base similar to those in Meltzer and Richard's (1981) analysis (although in this case the "transfer" is received only when the person qualifies for it), and also tradeoffs generated by personal ideological goals. Our characterization of the typical voter's utility function implies that a typical voter's preferred government-provided safety net is somewhere between that of a "rational choice pragmatist," who chooses *G* to advance his or her narrow economic interests, and that of a political idealist, who chooses *G* to advance his or her vision of the good society.[7]

2.3 The pivotal voter's demand for social insurance

Social insurance programs tend to be quasi-constitutional in nature, because of the long-term nature of the risks covered. In our model, the uniform benefit levels, proportional tax on labor income, and the balanced budget constraint can be regarded as quasi-constitutional. Nonetheless, insurance benefits and associated taxes can be adjusted from year to year, without changing the basic structure of the program. Equation 15 characterizes how social insurance benefit levels are determined and vary through time, if they are adjusted to advance a particular voter's (i's)interest.

Two voters are of particular interest for most electoral models of public policy formation, the median voter and the average voter. The median voter's demand for the social safety net can be characterized by substituting values for median wage rates and ideology into equation 15. If median income is below average income, the median voter's preferred safety net tends to be somewhat *above her ideological ideal*, because she tends to be a net beneficiary of the tax-financed income guarantees. That is to say, if there is a widely accepted ideal level of social insurance, $I**$, the median voter tends to "over demand" social insurance relative to that ideal.

The average voter has both average wages, $\omega_i = \omega^A$, and average risks, $P_i = P^A$. As a consequence, equation 13a for the average voter can be rewritten as:

$$U^e = (1-P)U(\,((1-t)\omega^A\,W^A*,\,H - W^A*,\,|G-G^A**|)$$

$$+ P\,U(\,(1-t)\,\omega^A\,W^A*+ G,\,S - W^A*,\,|G-G^A**|) \tag{13b}$$

Differentiating equation 13b with respect to G, setting the result equal to zero, and applying the envelope theorem implies that:

$$(1-P)\,U^H_G + P\,U^S_G \approx 0 \quad at\ G^A* \tag{14b}$$

If the average voter is approximately risk neutral, $U^H_I = U^S_I$, which implies that there are no income advantages associated with social insurance. In this case, the average voter chooses G

to set $U^H_I = U^S_I = 0$, which implies that even a somewhat pragmatic average voter will act as an idealist.

That is to say, a risk neutral average voter prefers the social insurance program that *minimizes his or her ideological dissatisfaction*. If the average voter is pivotal, the mainstream (average) normatively ideal benefit level becomes public policy, $G^A* = G^A**$.[8]

2.4 Institutions, voter demands, and the extent of social insurance

Each voter's preferred social insurance benefit is a real number that can be rank ordered from low to high. This allows a frequency distribution of voter-preferred income security programs to be determined from equation 15 for a given distribution of utility functions, wages, and norms. Voter preferences are one-dimensional in the model developed above, because the budget and time constraint assumptions imply that voters have only a single degree of freedom. Together with the concavity and continuity assumptions, this allows the logic of spatial voting models to be applied.

Figure 2 illustrates a distribution of voter ideal points over social insurance benefit levels. As depicted, it is assumed that the ideal points are interior solutions to equation 14a, although the existence of a few voters with corner solutions would not materially affect the conclusions, as long as interior solutions are sufficiently common that the middle of the distribution consists of voters with interior solutions.

Figure 2
Distribution of voter
preferred income
security levels
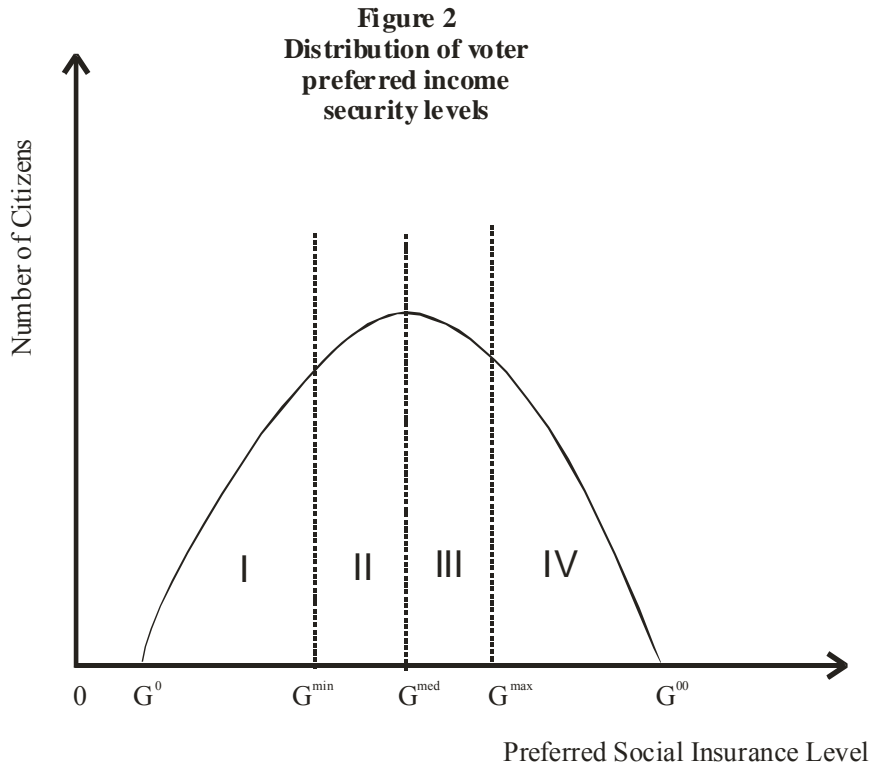
We assume policies are adopted through a sequence of votes over a sequence of small

proposed changes in program levels and that each new proposal is judged relative to the last

one to obtain majority approval. Under these assumptions, choosing a public safety net using

majority rule implies that the median voter's ideal program, G^{med}, tends to be adopted

irrespective of the starting point. It also implies that subsequent changes in the program

reflect changes in the median voter's demand for income security. G^{med} changes when the

median voter's wage rate, risks, or ideological norm change.

Under more complex decision rules, the benefit level adopted tends to be affected by

both the starting point of program negotiations and by the particular rules in place. Consider,

for example, a series of small increases in G evaluated by a two-thirds supermajority rule

with 0 as the initial point of departure. This procedure yields safety net G^{min} in Figure 2,

where area I is twice as large as area II. G^{min} is smaller than preferred by the median voter,

because a third of the voters oppose further increases. The same voting rule produces an

income security program that is larger than desired by the median voter, if the status quo ante

is initially above the median citizen's ideal, as with G^{00}, and incremental reductions are voted on. The policy chosen in that case will be G^{max}, where area IV is twice as large as area III.

The same logic implies that shifts in the distribution of voter ideal points tend to produce asymmetric shifts in policy from both G^{min} and G^{max}. For example, if the status quo benefit is G^{min}, and the entire distribution of voter preferences shifts in the negative direction (toward zero), only a minority will favor reducing the social safety net from its previous value. On the other hand, if the entire distribution of voters shifts in the positive direction, there is a supermajority favoring additional insurance benefits, and G would increase to the new G^{min}. Super majority rule at G^{min} creates a bias against reductions, whereas supermajority rule at G^{max} creates a bias against increases in program benefits.

Although Western governments do not routinely use supermajority rule to select social insurance benefit levels, relatively complex constitutional architectures can increase the effective size of the majorities required to pass laws by increasing the number and diversity of veto players. Supermajority effects imply that policy adjustments tend to be smaller on average and more asymmetric in countries with multiple veto players than in countries with fewer veto players.[9] In addition, voter trends favoring expansion (or contraction) of social insurance programs will often generate smaller increases (or decreases) in benefit levels in countries with relatively more veto players, other things being equal.

Note also that these asymmetric responses to demand shocks implies that estimates of model of benefit levels based on a model of voters that prefer G^{min} or G^{max} will tend to exhibit autocorrelation, even if the voter model is entirely correct.

3. Data for statistical tests of the models

We estimate several institution-augmented versions of equation 15 to determine whether our model of the demand for social insurance can account for the trajectory of social welfare expenditures in the West in the postwar period. We focus on the expenditures of 18 liberal

democracies included in the *Comparative Welfare States Data Set*. That data set provides fairly complete institutional and social insurance data for the period of interest in this paper, 1960-2000. The 18 countries included are Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Sweden, Switzerland, the United Kingdom, and the United States.[10]

Average income (real per capita gross domestic product) is taken from the World Bank's 2007 World Development Indicators data base.[11] This is a less than perfect measure of the income of the pivotal voters of our models, but it is a useful approximation. It may be argued that the estimated permanent income of the median voter tends to be closer to average income than current median income, because of life-cycle effects (Bénabou 2000). Moreover, if the shape (variance) of the distribution of income is stable in each country during the period of interest, the wage effects for a particular voter percentile can be estimated using average income, although the estimated coefficients will be biased downward if the pivotal voter earns less than average income.

We use median age as a proxy for health-related risks faced by pivotal voters. *World Population Prospects* (2008) includes median age data in five-year intervals from 1960 to the present. Linear interpolations are used for the missing years.

We use the Kim and Fording (2001) Riteleft index of median voter ideology to represent the ideology of the pivotal voter. Their index is calculated in three-steps. Ideology scores are calculated for the platforms of each party in a national election and placed on an international left-right spectrum. The percentage of votes received by each party in a particular national election is determined. The median ideology for that election is determined using the formula for the median of a grouped frequency distribution (Kim and Fording 2001: 163). The "Riteleft" index is available for the election years of the 18 countries in our sample. Values for the non-election years are computed with linear interpolation.[12]

Figure 3 depicts the average ideology of the median voters of the six countries, whose social insurance expenditures were plotted in Figure 1. On average, there is a general drift to the left (higher demand for social insurance) in the 30-year period plotted, although the individual median ideologies varied substantially among countries and through time. Several shifts to the left and right are evident within individual countries and for the average country during the period of interest.

Figure 3
6-Country average median voter ideology,1965-1995
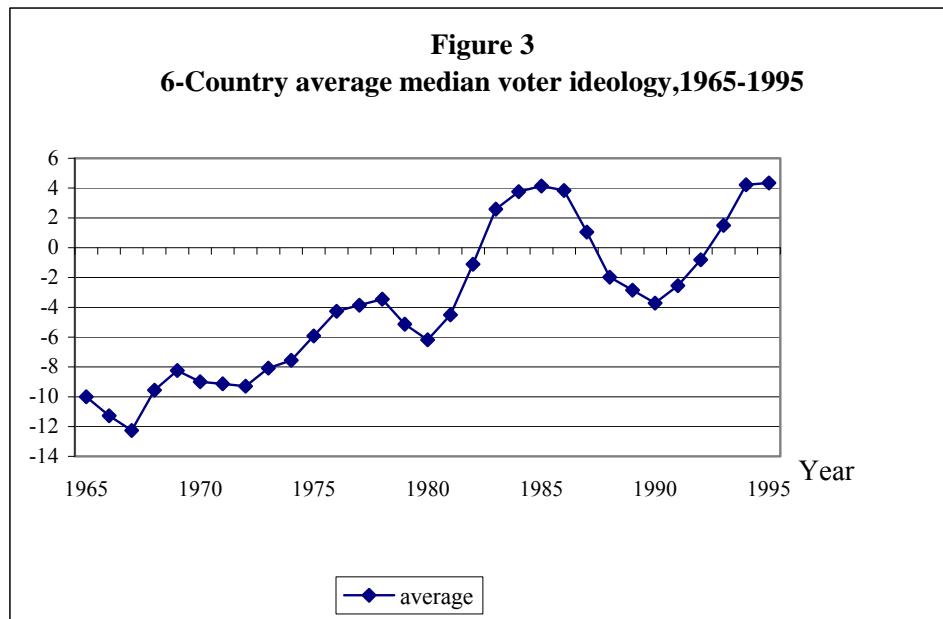
Two alternative measures of the extent of social insurance were used in our estimates, although only one is reported below. The first, social security tranfers (SSTran), is from the *OECD Historical Statistics* (2001). This index of aggregate social transfers is available from 1960 to 1998 and includes most national safety net programs—benefits for sickness, old age, family allowances, social assistance grants, and welfare. The second, social expenditures (SocExp), is a similar index of social expenditures that includes a few additional income security programs including labor market programs, unemployment insurance, and some family programs, but it is available for a much shorter period. Both are reported as a percent of national GDP, which provides a convenient measure of the relative size of social insurance programs and avoids a variety of currency conversion and index problems. Results using

SocExp are generally similar to those for SSTran.

The constitutional variables are from the *Comparative Welfare States Data Set*. The strength-of-bicameralism variable is coded 0 if there is no second chamber or second chamber with very weak powers, 1 when there is weak bicameralism, and 2 when there is strong bicameralism (Huber et. al. 1997). The presidential system variable is coded 0 for parliamentary systems and 1 for president or collegial executive. In addition to the presidential and bicameral variables, we also included measures of institutional characteristics studied in previous work on government size and responsiveness (see, for example, Persson and Tabellini [2006] or Mueller [2006]). The single-member district variable is coded 0 for proportional representation, 1 for modified proportional representation, and 2 for single-member plurality systems. The federalism variable is coded 0 for none, 1 for weak, and 2 for strong. All such discrete representations of political institutions are open to interpretation by those doing the coding. For example, the United Kingdom's House of Lords is not considered to be a significant chamber of the legislature in the bicameral index, and so the United Kingdom is coded as 0 rather than 1 under the bicameralism measure. For the purposes of this study, we simply accept the Huber et. al. (1997) coding of institutions.[13]

Data availability varied somewhat among OECD countries, but in most cases was reported for the period in which the modern welfare state emerged, 1960–85, and for the 15 years after, 1985–2000. A few observations were unavailable for the ideological index and for the extent of social insurance transfers during the first and last few years of the period of interest. The missing values slightly reduced the usable sample size, but did not affect the main period of program growth. Table 1 provides descriptive statistics for our data set.

Table 1: Descriptive statistics

	Mean	Standard Deviation	Minimum	Maximum
Bicameralism	0.68	0.814	0	2
Federalism	0.577	0.843	0	2
Ideology (right-left)	–3.85	12.891	–39.94	42.88
Median Age	32.85	3.608	22.29	41.38
Presidential System	0.22	0.416	0	1
Real GDP/capita (WB Penn 6.1, 1950–2000)	14,862.44	5,794.26	2,417.02	33,308.40
Real GDP/capita (WDI, 1960–2000)	17,302.88	6,615.57	4,987.67	37,164.60
Single-Member District	0.60	0.816	0	2
Social Expenditures (SocExp)	22.25	5.838	10.19	36.77
Social Transfers (SSTran)	13.33	4.947	3.50	28.80

4. Empirical tests of the model: Estimates and statistical inference

Our model implies that a voter's preferred social insurance level is determined by his or her income, assessment of risks, and ideology. Because voters tend to disagree about the best level of social insurance, the policies in place also reflect the political institutions under which policy choices are made. Political institutions implicitly determine which voter will be pivotal in a given country and the extent to which changes in the pivotal voter's interests affect the extent of the social insurance programs.

Average and median voter models also differ somewhat in their predictions about the relative importance of ideology and income for the benefit levels implemented. If the average voter determines the extent of social welfare programs and is approximately risk neutral, then the height of the social insurance net is determined by risk, ideological, and institutional variables. If the median voter (or another pivotal voter) determines the extent of social insurance, then income variables are also relevant. The presence of supermajority and quasi-constitutional effects are expected to appear as intertemporal dependencies in the residuals of our estimates.

For the purposes of this paper, it is assumed that social insurance programs can be adjusted at the margin every year and that the intention of representatives is to meet the current demands of their supporters. This implies that current income and current ideology, rather than income and ideology at the time of the last election, are politically-relevant variables. This approach is consistent with models that assume candidates are forward looking, although it neglects the quasi-constitutional nature of the many of these programs, which makes them difficult to adjust annually. It also neglects permanent income effects that may influence voter demands for long-standing programs.

The effects of democratic political institutions on public policies have been explored in the comparative political economy literature. Dynamic effects and asymmetries, however, have previously been neglected. The analysis above implies that political institutions affect both the level and the rate at which policies are adjusted in response to new voter demands. (Congleton and Swedenborg 2006 provide a useful survey of that literature.)

4.1 Least squares estimates

The models and data sets allow a number of possible functional forms and methods of estimation to be employed. We somewhat arbitrarily limit ourselves to linear representations of the model and to least squares approaches to the estimation. Two series of estimates are undertaken for the two pivotal voter models (average and median voter) augmented by two types of institutional effects (static and dynamic).

As a point of departure, we estimate equation 15 augmented with institutional variables using ordinary least squares. The results are reported in table 2. These are "unvarnished" estimates, without adjustments for various dependencies that may exist in the error distributions within and among the countries and periods in the sample. If the model is essentially correct, ordinary least squares will be unbiased (i. e., the error term will have an expected value of zero), although ordinary least squares will not necessarily be the most

efficient estimator if the error terms are correlated across countries or through time.

The first two columns report estimates of the average voter model in which ideology and risk are of greatest concern to the pivotal voter. The second two columns estimate median voter models in which income variables also matter. The estimates are broadly consistent with previous studies based on other models and data sets.

The estimate reported in the first column accounts for possible static effects of institutions. Note that the signs of the coefficients are consistent with the model and, with caveats to be explored below, are statistically distinguishable from zero at conventional levels. Column 2 extends the model by including interactive terms between ideology and institutions to determine whether similar support exists for dynamic institutional effects. Both estimates are consistent with the institution-augmented electoral model. Most coefficients have the predicted signs and are statistically distinguishable from zero at conventional levels of significance. The fraction of gross domestic product devoted to social insurance increases with risk (median age) and ideology. It falls with multiple member districts, bicameralism, and federalism, but rises within presidential systems.

Columns three and four report similar estimates and tests of the median voter model, for which average income is used as a proxy for pivotal voter income. Again, there is evidence that demand for social insurance is driven by risk, income, and ideology, and that institutions have both static and dynamic effects on program benefit levels. The fraction of gross domestic product devoted to social insurance increases with average income, median age, and ideology. It falls with single member districts, bicameralism, and federalism, but rises within presidential systems.

Statistically significant contributions are made by the dynamic institutional variables in both the average and median voter model estimates ($F_{2>1} = 4.52$, and $F_{4>3} = 4.18$).

	Average Voter		Median Voter	
	OLS	OLS	OLS	OLS
Table 2 Estimates of the Welfare State as a Fraction of GDP Average and Median Voter Models 1960–98, 18 OECD Countries, Ordinary Least Squares				
C	-5.798 (-3.32)***	-5.285 (2.88)***	-3.916 (2.07)**	-3.580 (1.82)*
Real Per Capita GDP			0.000086 (2.90)**	0.000082 (2.53)**
Ideology	0.081 (5.51)***	0.095 (5.46)***	0.0817 (5.67)***	0.0996 (5.88)***
Median Age	0.647 (13.56)**	0.638 (12.76)***	0.553 (9.21)***	0.550 (8.83)***
Bicameral	−1.249 (−5.68)***	−1.346 (−6.41)***	−1.341 (−6.27)***	−1.38 (−6.62)***
Single-Member Districts	−1.249 (−5.84)***	-1.210 (-5.39)***	-1.343 (-6.25)	1.271 (5.67)***
Presidential	0.005 (0.01)	0.760 (−1.94)**	-0.220 (-0.54)	0.514 (1.20)
Federalism	-0.586 (-2.85)**	−0.805 (−3.76)***	-0.693 (-3.11)***	−0.895 (-3.84)***
Ideo x Bicam		-0.29 (-3.76)***		−0.030 (−1.49)
Ideo x Pres		0.111 (4.29)***		0.0968 (3.59)***
Ideo x Singmem		0.019 (0.86)		0.0180 (0.84)
Ideo x Fed		-0.061 (-2.77)***		−0.062 (−2.74)***
R^2	0.36	0.38	0.37	.39
Standard Error of Regression	4.00	3.96	4.01	3.98
F-Statistic	62.23***	39.95***	53.90***	36.46***
Durbin-Watson	0.07	0.07	0.07	0.08
Observations	663	663	652	652

Notes: T-statistics appear in the parentheses, *** denotes statistical significance at the 1% level,** at the 5% level, and * at the 10% level.

The OLS estimates account for less than half of the variance of the social insurance as a fraction of gross domestic product. However, the Durban-Watson statistics imply that OLS is not likely to be an efficient estimator, because the residuals exhibit intertemporal correlation, (as predicted by our analysis of supermajority effects). More sophisticated estimation

techniques should improve the accuracy of our model estimates.

4.2 Parks feasible GLS estimates

There are several techniques for filtering out correlations among error terms in panel data, most of which are feasible general least squares estimators (GLS). In principle, the improvement that GLS techniques produce over OLS depends on the existence of systematic stochastic relationships among the errors. If these relationships are relatively simple, they can be estimated and filtered from the residuals, reducing the unexplained residual, and increasing the efficiency of the estimation process. The remaining errors are normally and independently distributed (if specific GLS estimator assumptions are satisfied), which allows statistical tests of parameter estimates using conventional t and F statistics.

Among the earliest and most widely used of the feasible GLS methods for filtering dependencies among error terms is one developed by Parks (1967). Other feasible GLS methods have been suggested by Avery (1977), and Beck and Katz (1995). We somewhat arbitrarily adopt one of the Parks methods, because it is readily available, widely used, and was designed to filter out the types of error relationships that are likely to exist in our panel data. We use the iterative version of the Park's estimator, as implemented by E-Views 4.1.[14] A fixed-effects approach is used to further account for stable, nation-specific, factors such as culture and weather that might affect voter demands for social insurance.

Table 3 reports four Parks GLS estimates of the institution-augmented average voter model. The first two columns are pure election models in which institutional effects are only indirectly accounted for (by the constants estimated for each country). The last two columns assess the static and dynamic effects of institutions in specifications similar to those estimated in Table 2. (The dynamic GLS specifications differ slightly from the OLS ones, because the share of GDP devoted to social insurance in 1960 and "year" are used to represent country and temporal fixed effects.) The results are generally similar to the OLS

results.

	Table 3			
	Estimates of the Welfare State as a Fraction of GDP (SSTrans) Average Voter Model 1960–98, 18 OECD Countries			
	Static			Dynamic
	Parks-GLS	Parks-GLS	Parks-GLS	Parks-GLS
C	(fixed effects)	(fixed effects)	-396.29 (-38.41)***	-396.48 (-37.36)***
Ideology	0.0154 (6.33)***	0.0143 (6.38)***	0.0096 (4.73)***	0.0202 (5.92)***
Median Age		0.521 (46.70)***	0.103 (9.09)***	0.140 (11.59)***
Bicameral			-0.322 (-6.10)***	-0.201 (-3.46)***
Single-Member Districts			-0.267 (-8.73)***	-0.328 (-7.55)***
Presidential			1.033 (15.02)***	1.542 (19.61)***
Federalism			-0.474 (-11.60)***	-0.488 (-10.57)***
Ideo x Bicam				-0.0071 (-0.81)
Ideo x Pres				-0.0118 (1.52)
Ideo x Singmem				-0.0091 (-3.02)***
Ideo x Fed				-0.0217 (-4.87)***
SSTran (1960)			0.867 (68.36)***	0.843 (63.96)***
Year			0.201 (37.98)***	0.201 (36.88)***
R^2	0.50	0.63	0.51	.52
Standard Error of Regression	3.56	3.07	3.50	3.47
Durbin-Watson	0.08	0.11	0.08	0.08
Observations	663	663	663	663
Notes: T-statistics appear in the parentheses, *** denotes statistical significance at the 1% level,** at the 5% level, and * at the 10% level.				

The fit of the regression is improved by the Parks filtering and by the fixed effect approach, which reduce the standard error of the regression and improve several of the t-statistics. Again, most coefficients have the predicted signs and are statistically significant. Voter ideology (left) and risks both increase demands for social insurance. The estimates suggest that effective electoral demand is again tempered somewhat by institutions. Unitary, unicameral, and proportional representation systems are more responsive than federal, bicameral, and first-past-the-post systems.

Similar GLS estimates of the median voter model are reported in Table 4. Real per capita GDP is used as a proxy for the median voter's income, as in the estimates reported in Table 2. Institution-augmented median-voter model estimates are reported in columns three and four. The median voter model results are very similar to those of the average voter model, although the median-voter model accounts for more of the variation in the relative size of the welfare state than the average voter model. Ideological, income, and institutional variables affect the height of the social safety net in the predicted manner. The greater the income of the median voter, the more to the left median ideology, and the older the median voter, the higher is the public safety net, ceteris paribus.

Countries that have multiple veto players tend to have smaller welfare states than those that do not. And again, the dynamic effects of multiple veto players are evident. Bicameralism, single-member districts, and federalism reduce the extent to which the welfare is affected by ideology. The static and dynamic institutional effects have the predicted signs, except the presidential ones. Presidential systems evidently make a polity more responsive to changes in the median voter's ideology, although they include an additional veto player relative to parliamentary systems.

	Static			Dynamic
	Parks-GLS	Parks-GLS	Parks-GLS	Parks-GLS
C	(fixed effects)	(fixed effects)	-356.80 (-29.58)***	-359.4 (-27.80)***
RGDP per capita	0.000238 (33.05)***	0.000042 (3.39)***	0.000057 (6.07)***	0.000059 (6.24)***
Ideology	0.0182 (7.37)***	0.0161 (6.71)***	0.00506 (2.25)**	0.0226 (6.286)***
Median Age		0.452 (21.88)***	0.0416 (3.12)***	0.0648 (4.734)***
Bicameral			-0.141 (-2.49)**	-0.194 (-3.02)***
Single-Member Districts			-0.183 (-6.01)***	-0.300 (-6.06)***
Presidential			1.249 (14.36)***	1.562 (15.16)***
Federalism			-0.798 (-16.38)***	-0.847 (-15.83)***
Ideo x Bicam				-0.0079 (-2.61)***
Ideo x Pres				0.022 (2.54)**
Ideo x Singmem				-0.0089 (-2.81)***
Ideo x Fed				-0.0178 (-3.71)***
SSTran in 1960			0.932 (49.46)***	0.907 (44.92)***
Year			0.181 (29.04)***	0.182 (27.57)
R2	.67	.65	0.52	0.54
S.E. Regression	2.91	3.02	3.51	3.44
Durbin-Watson	0.13	0.12	0.8	0.9
Observations	652	652	652	652

Table 4
Estimates of the Welfare State as a Fraction of GDP
(SSTrans) Median Voter Model
1960–1998, 18 OECD Countries

Notes: T-statistics in parentheses, *** denotes statistical significance at the 1% level,** at the 5% level, and * at the 10% level.

Overall, the three sets of estimates are consistent with our augmented models of the demand for social insurance. Income, risk, ideology, and institutions affect the extent of the

social insurance in the predicted manner. Increases in ideology (to the left), age, and income produce a more extensive is the social safety net. The evidence also supports the hypothesis that institutional variations among democracies affect their public policies. Single-member electoral districts, bicameralism, and federalism tend to reduce the extent of social insurance programs and also the extent to which they are affected by ideological changes. Presidential systems, however, evidently make social insurance policies more responsive to changes in the median voter's ideology, rather than less. This may reflect the fact that presidents are directly elected by national electorates, rather than appointed by parliamentary coalitions.

In general, the estimates provide support for an election-based, social insurance, model of the modern welfare state. The estimates do not provide incontrovertible support, but demonstrate that such models can account for about half of the variation among social insurance programs in OECD countries during the second half of the twentieth century. Ideology, income, risk, and institutions affect the extent of governmental income security programs.

4.3. Caveats

A number of caveats are, of course, in order. As is often the case, the ideal data set was not available. Although the ideology variable that we used is as good or better than others used in comparative work, it does not perfectly distinguish between ideological and income-driven demand for government services.[15] Moreover, party platforms are often more extreme than the policies that parties actually implement when in authority, because coalition politics is often important both among and within political parties. We were not able to assess directly the income and age of the median voter. The pivotal voter's age, ideology, and income tend to vary with turnout and institutions. We were not able to address fully the efficiency problems of our estimation methods. Autocorrelation was present in all of the estimates (as predicted) in spite of the various Parks corrections to the GLS error matrix. This does not bias

the parameter estimates, if the electoral model is essentially correct and complete. However, if the autocorrelation is caused by missing variables, model-specification bias cannot be ruled out.[16]

It should be kept in mind, however, that GLS filtering techniques are not risk-free estimation strategies, because assumptions about the error matrix are rarely grounded in theory. The filters devised can inappropriately filter out underlying political economy factors that link residuals, including those from minor extension of the models being estimated. For example, the models developed above predict autocorrelation from supermajority effects. Similar effects on residuals will be found if income, risk, ideology, and institutions do not operate in a linear fashion or operate with a distributed lag. The relevant income variable for voter planning, might, for example, be a moving average rather than a single year's income. Applying the usual autocorrelation corrections in such may introduce bias, rather than increase efficiency.[17]

5. Conclusions: electoral politics and the emergence of the modern welfare state

The analysis of this paper provides a possible explanation for both the relatively modest welfare state that existed before World War II and for the rapid expansion that took place after the war was over. Democratic constitutional designs adopted before 1925 often included multiple veto players elected under somewhat different procedures. These tended to cause public policies to lag behind the median of ideological tides, even if politicians were forward looking. After World War II, several countries adopted constitutional reforms that streamlined their political decision-making procedures. For example, two of the most extensive welfare states, Sweden and Denmark, eliminated their first chambers shortly after World War II, while Great Britain, the Netherlands, and France further weakened their first chambers (noble and/or federal chambers). Reducing the number or effectiveness of veto players tended to make their governments more responsive to median voter preferences.

Although energetic left-of-center movements existed during the interwar period, the median voter normally remained in the moderate liberal or moderate social democratic camp and was inclined to proceed slowly on the expansion of social insurance programs. Even in Sweden, which was not much involved in the wars of the twentieth century, the "center party" (old farmer's party) was pivotal prior to World War II, rather than the Social Democrats, although Social Democrats served as prime ministers for most of the period from the late 1920s onward (Congleton 2003).

After World War II, the center of Western politics shifted significantly to the left, particularly in the 1960s and 1970s. Liberalism itself shifted to the left throughout much of the twentieth century, which reflected generational shifts, external shocks, and electoral competition, as well as rhetorical success by activists and political philosophers to the left of the previous center. To the extent that social insurance in democracies is determined by voter preferences, more extensive social insurance programs are predictable outcomes of constitutional democracies with aging and leftward drifting electorates—especially in prosperous countries with relatively few veto players.

Normatively, however, the effect of veto players is less clear. Social insurance programs adopted through political institutions with more veto players tend to be less "democratic" in the sense that they are less connected to the demands of the median or average voter. However, voter preferences for social safety nets are affected by both idealistic and pragmatic considerations (see equations 14a and 15 above). If the pivotal voter's income is below average, he or she will demand more than his or her "ideal" level of social insurance. Insofar as polities with many veto players tend to provide less social insurance than those with fewer veto players, it is possible that the level provided is closer to their society's mainstream ideal than the median voter's preferred policy.

Acknowledgements

End Notes

1. See, for example, Mantis and Farmer (1968) or Gruber and Poterba (1994), for estimates of insurance demand. Both report positive coefficients for income that are consistent with a less than unitary income elasticity for the demand for insurance.

2. In previous work, models that included both electoral and interest group effects provided slightly better explanations of the U. S. public pension program than a pure electoral model (see, for example, Congleton and Shughart 1990). Feld, Fischer, and Kirchgässner (2010) provide a series of estimates and statistical tests of redistributive theories of the welfare state using Swiss data.

3. The results from a two-state model tend to be very similar to those generated by models with a bounded continuum of shocks. Very similar results, for example, could have been generated from a model that characterized health states with a uniform probability distribution.

4. Only a few public choice–based studies have explored the effects of norms on voter behavior, although norms and civic duty have long been part of rational-choice explanations of voter turnout. Aldrich (1993) provides an overview of rational choice theories of turnout that take account of civic duty. Jackman's (1987) study demonstrates that institutional differences and closeness affect turnout at the margin, but suggests that cultural differences are the most important determinants of average turnout. (The Swiss and U.S. dummy variables, and the unexplained constant term are relatively large in his estimates.) Plutzer (2002) provides evidence that propensities to vote are affected by families and peer groups, which are likely mechanisms for the transmission of norms. See Eichenberger and Oberholzer-Gee (1998) for an application within a rational choice model of politics. Linbeck (1997a, 1997b) develops a theory of the welfare state that includes a role for norms.

5. Early rational choice models of the political effects of ideological theories held by voters are developed by Congleton (1991a) and Hinich and Munger (1994).

6. There is a significant sociological literature on the importance of norms in leisure-labor choices, beginning with Weber's *Protestant Ethic and the Spirit of Capitalism* (1904), which continues to be widely cited for its analysis of the "Protestant" work ethic. Rational choice models that analyze the economic effects of such norms occur much later, as in Congleton (1991b) and Buchanan and Yoon (2000).

7. Tensions between personal and ideological interests are often mentioned in the expressive voting literature. See, for example, Brennan and Hamlin (2000). The conflict implied here, however, is actually the opposite of that stressed by Brennan and Hamlin. There is clearly a sense in which a "disinterested" voter may regard it better to aim for the good society than to maximize expected median voter utility, narrowly defined.

8. A similar result occurs for cases in which the insurance provides an exact "replacement rate" for wages lost because of illness or other misfortune, $G_i = g^* \omega_i (W^h - W^s)$, and each risk class (S) is self-financing. In such cases, the Meltzer and Richard's expected net income effects also disappear, and voter policy preferences are again ideologically driven, as in equation 14b; although, ideology may differ by risk class for reasons unconnected with social insurance per se.

9. Such implicit requirement for supermajorities was first noted by Buchanan and Tullock (1962). More formally, G^{min} is the solution to $\int_{Gmin} f(G) = 100 - \phi$, where $f(G)$ is the distribution of voter ideal points implied by equation 15, given the existing distribution of ideologies and wages, and ϕ is the implied supermajority requirement for the political institutions of interest. Similarly, G^{max} is the solution to $\int^{Gmax} f(G) = 100 - \phi$. Note that $G^{max} = G^{min}$ when $\phi = 50\%$. Contemporary democracies often differ in the number of veto players and their manner of election (Tsebelis 2002, Congleton and Swedenborg 2006).

10. The "Comparative Welfare States Data Set" was originally assembled by Evelyne Huber, Charles Ragin, and John D. Stephens in December 1997 and was updated by David Brady, Jason Beckfield, and John Stephens in April 2004.

11. Alternative estimates using somewhat older data from the Penn-World Tables, versions 6.1 and 6.2, were also undertaken. The results are similar, but are not reported.

12. The Kim and Fording Riteleft index is a better measure of median voter ideology than many widely used alternatives, although it is not perfect. It is a better measure, for example, than the percentage of seats held by left (or right) of center parties or the vote shares of a particular national party, because it takes account of party platform changes that occur through time as a consequence of political competition. The latter have been very substantial during the postwar period. The common political spectrum used in their

index also avoids problems associated with using parties in cross-sectional international studies. Parties with similar names may have quite different platforms across countries and through time. It also has some advantages over answers to survey questions, because it avoids framing effects and shifts in the meaning of political terminology through time and among societies.

13. See Huber, Ragin, and Stephens (1993) for early comparative study of the size of government transfer programs that include institutional and ideological variables. Estimates of public pension policies in the United States were undertaken by Congleton and Shughart (1990), who found modest support for ideological or altruistic voting behavior.

14. All the feasible GLS methods make assumptions about the specific patterns of relationships that exist among the errors and, given those assumptions, filter out the hypothesized relationships, leaving (by assumption) a normal independently distributed error term. Because the assumption used to derive particular GLS estimators may or may not accurately characterize the relationships within specific data sets, however, it is often the case that the feasible GLS methods perform worse in Monte Carlo studies than ordinary least squares. Beck and Katz (1995), for example, note that in some cases the Parks GLS approach yields results that are inferior to those of ordinary least squares in some cases. GLS estimates for our models vary significantly among the GLS estimators included in the Stata and E-views econometric packages.

15. The Kim and Fording Riteleft index does not sharply distinguish between the ideological and income basis of voter demands for government services. Fortunately, this is not a problem in the period of interest, because party platforms were evidently driven by ideological rather than economic interests during period of interest. A simple regression of per capita RGDP on ideology in election years (the times at which Riteleft can be

directly calculated) has an $R^2 < 0.02$ and the estimated coefficient for income that is not

statistically different from zero at the 10% level of significance. A similar regression

using the interpolated values also has an $R^2 < 0.02$, although the income coefficient is

significant in that estimate. Ideology and income are only weakly correlated in this period.

16. To account for all the quasi-constitutional aspects of the individual social insurance

programs and relevant differences in voter calculations among programs, a more

disaggregated approach is probably necessary. For example, public pensions are a major

component of the insurance package provided by modern welfare states. Public pensions

also provide income security, but resemble annuities more than health or unemployment

insurance. Consequently, the risk and benefit calculations for annuities differ somewhat

from those modeled in section two. Congleton and Shughart's (1990) model of the

electoral demand for social security programs in the United States takes account of

expected years to retirement and expected longevity, as well as the median voter's age,

income, and the size of the retired population.

The error terms among countries are also likely to be correlated if voters have

imperfect information about the relative merits of alternative policy at the time that they

cast votes. Models of yardstick competition, such as Besley and Case (1995), or

international mobility, as with Tiebout (1956), imply that there may be systematic

relationships among the policies of similar countries, as voters look to their neighbors to

see what polices they like best.

17. Statistical methods to remove autocorrelation may introduce bias by assuming that the

autocorrelation is determined by factors that are exogenous to the model. Autocorrelation,

is normally modeled as a temporal relationship between error terms, $u_t = e_t + \alpha u_{t-1}$.

However, if the true relationship is $u_t = e_t + \alpha u_{t-1} + \delta z_{t-1}$, where z_{t-1} is a political economy

variable, then estimating α without estimating δ may introduce bias. In the present case, simple methods of trying to correct for autocorrelation, such as including lagged values of the dependent variable, tend to strip out the political economy effects, evidently biasing down the effects of politics on social insurance levels.

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