

Inequality & Unemployment, Redistribution & Social Insurance, and Participation:
A Theoretical Model and an Empirical System of Endogenous Equations*

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ABSTRACT: Conflicts of interest over the generosity and structure of redistribution and social insurance (call these jointly: social policy) include that between the relatively poor and wealthy—which theoretically produces the famous median-voter result that democratic demand for broad redistribution increases in the income skew—and that between the safely employed and the unemployed and precariously employed—which yields a different theoretical result, namely that inequality reduces median-voter demand for social insurance. In each case, the generosity and structure of social policy may itself affect simultaneously the efficiency of the labor market and the political participation of society’s less fortunate, which affects the identity and so the income and job-security status of the median voter. These considerations imply several endogenous relationships between economic performance (employment/income level and distribution), social policy (redistribution and social insurance), and political participation. This paper will elaborate the theoretically expected nature of these endogenous relationships, suggest identification conditions that derive from the theory and substance, and offer empirical estimates of the resulting system of equations.

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ABSTRACT: Conflicts of interest over the generosity and structure of redistribution and social insurance (call these jointly: social policy) include that between the relatively poor and wealthy—which theoretically produces the famous median-voter result that democratic demand for broad redistribution increases in the income skew—and that between the safely employed and the unemployed and precariously employed—which yields a different theoretical result, namely that inequality reduces median-voter demand for social insurance. In each case, the generosity and structure of social policy may itself affect simultaneously the efficiency of the labor market and the political participation of society’s less fortunate, which affects the identity and so the income and job-security status of the median voter. These considerations imply several endogenous relationships between economic performance (employment/income level and distribution), social policy (redistribution and social insurance), and political participation. This paper will elaborate the theoretically expected nature of these endogenous relationships, suggest identification conditions that derive from the theory and substance, and offer empirical estimates of the resulting system of equations.

I. Theoretical Models of Democratic Policy with Income, Employment, and Participation Inequality

We begin with a reconsideration of the Moene-Wallerstein (2001) (M&W) model of unemployment, inequality, and the democratic demand for redistribution and social insurance, which offers a very useful formulation for considering jointly the redistributive and insurance motivations for social policies and the effects of inequality thereupon. First, we illustrate and discuss the implications of the M&W model for the expected relationships between inequality, unemployment, redistribution, and social insurance. Then, we extend the model discussion to consider *median-preserving* increases in income inequality (as explained below), continuous heterogeneity in income (or wages, or wealth), and, more crucially, heterogeneity in unemployment rates/risk correlated with income. Penultimately, we consider the effects of incomplete and heterogeneous political participation (voter abstention, weightier political input from some than others) that, critically, also correlates with economic status. Finally, we acknowledge and grapple with the endogeneity of all of the aspects of this expanded theoretical model: inequality (skew) and unemployment (risk), redistributive and social-insurance policies, and political participation.

A. The Moene-Wallerstein Model of Redistribution & Social Insurance with Exogenous Unemployment & Inequality

The M&W model¹ includes population shares, σ_0 of permanently unemployed, σ_H of high-income (w_H) earners who face no appreciable employment risk,² and σ_L of low-income (w_L) workers who face appreciable risk, α , of losing their income source (job). Job-losers have probability β of regaining

¹ All notation and equation numbering given here exactly follows M&W to facilitate comparison.

² As the authors note (and as illustrated below), high-income earners can face unemployment risk without qualitative (but with quantitative) change to the conclusions, provided unemployment risk remains weakly negatively correlated with income.

employment, giving steady-state employed, e , and unemployed, u , population-shares, $e = \sigma_H + \frac{\beta}{\alpha+\beta} \sigma_L$ and $u \equiv 1 - e = \sigma_0 + \frac{\alpha}{\alpha+\beta} \sigma_L$, respectively.³ Governments collect revenues by a flat tax, t , which generates revenues and expenditures (i.e., all revenues are spent and no borrowing) of [1] $T = \tau(t)e\bar{w}$, where $\bar{w} \equiv \frac{1}{e} \left[\sigma_H w_H + \frac{\beta}{\alpha+\beta} \sigma_L w_L \right]$ is the average wage and $\tau(t)$ is revenue as a share of earnings (i.e., the average tax-rate), incorporating deadweight losses in that this revenue function is strictly concave (i.e., deadweight losses rise at increasing rates as tax rates rise) and with $\tau'(0) = 0$ and $\tau(0) = \tau(1) = 0$ (i.e., no deadweight cost if no tax, and no revenue if tax rates are zero or one). Finally, a share, γ , of revenues (*cum* expenditures), T , goes to current earners, with the remaining $(1 - \gamma)T$ going to the unemployed.

Individuals currently with and without jobs will thus have net income (*cum* consumption) of [2] $c_E = (1 - t)w_i + \frac{\gamma T(t)}{e}$ and [3] $c_N = \frac{(1 - \gamma)T(t)}{1 - e}$, respectively. M&W (2001: 862) assume utilities, $u(c)$, are concave in consumption ($u'(c) > 0, u''(c) < 0$), which implies some risk aversion, and satisfy other conditions assuring that insurance is a normal good (coefficient of relative risk aversion exceeds one: $\frac{-cu''(c)}{u'(c)} > 1$) and is demanded in some amount if risk is non-negligible ($u'(c) \rightarrow \infty$ as $c \rightarrow 0$).⁴ Given all this,⁵ the lifetime utility of a currently employed low-income worker—the group which is, very importantly and highly plausibly, assumed also to be the median (i.e., to contain the median voter)—is a simple weighted average of that type's employed and unemployed utility:

$$v = \left(\frac{\beta + r}{\alpha + \beta + r} \right) [u(c_E(w_L))] + \left(\frac{\alpha}{\alpha + \beta + r} \right) [u(c_N)] \quad [6].$$

The weights simply and intuitively reflect the shares of life spent employed and unemployed, with the former weighted and the latter discounted by the time discount-rate, r , since employment is the current state. Inserting [2] and [3] explicitly into [6], yielding [6'], and then [1] explicitly into the result, yielding

³ The job-loss and job-finding rates are instantaneous. M&W solve the resulting continuous-time dynamic model for steady-state equilibria from which they derive their comparative statics. I will discuss only these steady states and so will skip their explicit derivation, expressing the model instead in simpler, static terms (without further loss of content or generality).

⁴ Empirical estimates generally suggest coefficients of relative risk-aversion of $\mu \geq 1$. Log utility, which has constant relative risk-aversion $\mu = 1$, would not satisfy this, but other functions in the class of constant relative risk-aversion could.

⁵ ...and assuming infinitely-lived actors, but relaxation of this assumption adds only notational (and actuarial) complexity, requiring replacement of r with $\frac{r}{1 - \exp^{-rH}}$, with H the actor's life expectancy, in the asset equation that produces [6] below.

This would add little relevant substantive content, although it could possibly introduce a social *life*-insurance motivation.

[6''], will facilitate illustration and discussion of the model's implications:

$$v = \left(\frac{\beta + r}{\alpha + \beta + r} \right) \left[u \left\{ (1-t)w_L + \frac{\gamma \tau(t)}{e} \right\} \right] + \left(\frac{\alpha}{\alpha + \beta + r} \right) \left[u \left(\frac{(1-\gamma)\tau(t)}{1-e} \right) \right] \quad [6']$$

$$v = \left(\frac{\beta + r}{\alpha + \beta + r} \right) \left[u \left\{ (1-t)w_L + \frac{\gamma[\tau(t)e\bar{w}]}{e} \right\} \right] + \left(\frac{\alpha}{\alpha + \beta + r} \right) \left[u \left(\frac{(1-\gamma)[\tau(t)e\bar{w}]}{1-e} \right) \right] \quad [6'']$$

M&W designed this model to analyze the democratic choice of both the generosity or size of the system, captured in t , and the degree of welfare-targeting of its benefits, captured in the parameter $(1-\gamma)$, which gives the share of spending on those without jobs. Consider the utility effects for the median voter, a currently employed worker of type L , of increasing t in this model. Starting with the first term in the first square brackets of [6''], this tax increase costs the worker some take-home wages, as reflected in the $-tw_L$ term, but returns to her some public transfers insofar as (i) public spending accrues to the employed, γ ; (ii) taxable income is not lost to the deadweight inefficiencies of taxation incorporated in $\tau(t)$, and (iii) the source of revenue, average wages, \bar{w} , are high, all combined as reflected in the $+\gamma\tau(t)\bar{w}$ term. This is the usual motivation for and tradeoff in redistribution; the more skewed is the income (here: wage) distribution, i.e., the higher is \bar{w} relative to w_L , the more redistribution the median voter (an employed type L) would like by this motivation.⁶ However, as reflected in the $\frac{\beta+r}{\alpha+\beta+r}$ term, these considerations matter in this model only in proportion to the share of time the worker expects to stay employed (the $\frac{\beta}{\alpha+\beta}$ part of that term), and that she discounts the future (the $+r$ parts). To the remaining proportion, $\frac{\alpha}{\alpha+\beta+r}$, in which time the median expects to be unemployed, she will derive utility from the second half of [6'']. There, the increased taxes bring higher utility in those times when she is without a job in the future, which she expects to be $\frac{\alpha}{\alpha+\beta}$ of the time and discounts by r . In these times, to the degree public expenditures go to the unemployed, $1-\gamma$, she will receive her equal share of total revenues, $\tau(t)e\bar{w}$, as divided among the unemployed, $\frac{1}{1-e}$, yielding the $\frac{(1-\gamma)\tau(t)e\bar{w}}{1-e}$ in transfers represented in the second square-bracket term. This provides the insurance motivation and demand for welfare-targeted redistribution.

⁶ A few other implications surrounding the first, second, and cross (with \bar{w}) derivatives of $\tau(t)$ emerge as well (see Franzese 2002, ch. 2). For example, the greater the deadweight losses (the more concave is $\tau(t)$), the less redistribution the median voter seeks by this redistributive motivation (or, indeed, by the insurance motivation also).

For our purposes, the most important results from the M&W model are these:⁷

- With exogenous targeting (γ fixed), a mean-preserving increase in income skew (i.e., a reduction in w_L holding \bar{w} fixed) increases the median voter's preferred social-policy generosity (t^*) if benefits go exclusively to the employed ($\gamma=1$) and reduces her preferred safety net if benefits go exclusively to the unemployed ($\gamma=0$). Thus, inequality increases (broad) redistribution whereas it decreases (targeted) social insurance.
- With endogenous targeting (both γ and t^* chosen democratically), a mean-preserving increase in income skew (i.e., w_L declining with \bar{w} fixed) increases the median voters' preferred targeting of benefits to the employed (γ) and generally increases her preferred *sum* of insurance and redistributive spending, total social-spending, t^* . Unconstrained desired-redistribution remains increasing in inequality, and unconstrained desired-insurance remains decreasing in inequality. With desired insurance spending rising with equality and desired overall spending declining with equality, however, at some point, all spending is welfare-targeted (to the unemployed: $\gamma=0$). At this point, $w_L=w_0$, these desires cross, and funding of the desired insurance becomes constraining. The results are:
 - A monotonic-positive relationship of equality to insurance spending, although with a kink at w_0 and some flattening as equality continues to rise from there;
 - A weakly monotonic-negative relationship of equality to redistribution spending, being strictly negative through w_0 but becoming zero at that and greater equality.
 - A non-monotonic relationship of equality to total social-spending (insurance + redistribution), with the sum declining as equality increases to w_0 , kinking there, and then rising as equality increases further.

In the case where $\gamma_i^* < 1$ so that the constraint is not binding (i.e., $w_L < w_0$), these implications of the full model⁸ are seen in the following first order conditions with respect to t and to γ , respectively:⁹

$$\tau'(t_L^*) = \frac{w_L}{\bar{w}} \quad [14]$$

⁷ M&W consider three classes: permanently-unemployed, low-wage at-risk (L), and high-wage permanently-employed (H) workers. L is the median. Thus, we follow them in replacing subscript i with L in this section.

⁸ Median-voter equilibria do not generally obtain in more than one dimension: here, the choice of both t and γ ; M&W also show, however, that if the policy choices are made sequentially (Shepsle's SIE) or if the party system prevents coalitions of rich and poor v. middle, then the median voter (group), being median in both dimensions, remains determinant.

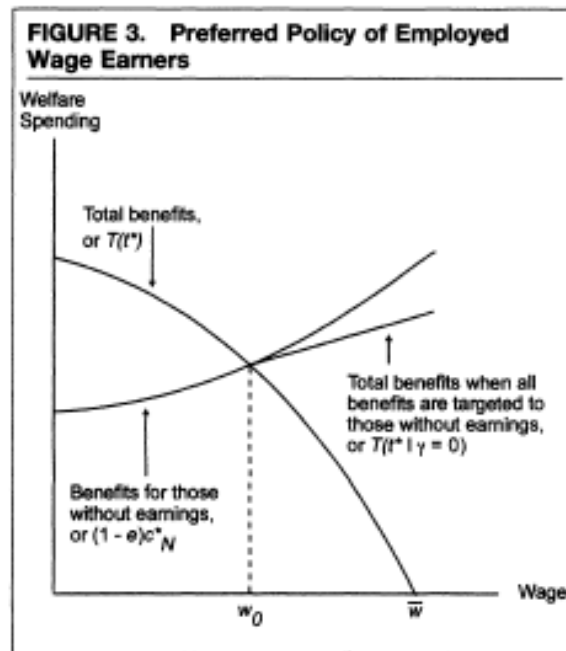
⁹ We have rewritten these two first-order conditions slightly to isolate further the implicit optimum choices on t and γ .

$$\frac{u'(c_E^*)}{u'(c_N^*)} = \left(\frac{e}{1-e} \right) \left(\frac{\alpha}{\beta+r} \right) \quad [15]$$

The first of these simply replicates the standard Romer/Meltzer-Richard median-voter equilibrium that total social-spending increases in the income skew. The second is more complicated but implies, *inter alia*, that welfare-targeted spending (insurance) and its share of total spending increase in w_L over this range. In the case where $w_0 < w_L$, so the constraint that $\gamma \leq 1$ becomes binding, all spending is welfare-targeted, and the second and now solely determinant of these first-order conditions becomes:

$$\frac{u'(c_E^*)}{u'(c_N^*)} = \left(\frac{e}{1-e} \right) \left(\frac{\alpha}{\beta+r} \right) \left(\frac{\tau'(t)\bar{w}}{w_i} \right) \quad [18],$$

which establishes a similarly positive, but flatter (since the additional last term exceeds one) relationship between w_L and welfare-targeted spending, which is now all spending. M&W's Figure 3 (reprinted with permission) illustrates these conclusions graphically:



The figure reads as follows. All considerations are of *mean-preserving* movements in inequality and so are fully captured by movements of w_L relative to the *fixed* \bar{w} . As w_L increases (skew decreases), the desired, unconstrained level of benefits to the unemployed strictly increase (the smoothly upward-sloping curve) and that of total social-spending strictly declines (the smoothly downward-sloping curve). Accordingly, the unconstrained, desired share of spending targeted to the unemployed/employed also

strictly increases/decreases (the ratio of the preceding two curves). However, beyond some wage (*cum* equality) level, w_0 , unconstrained desired welfare-targeted spending exceeds unconstrained desired total social-spending, so the constraint becomes binding. Beyond this point, all spending is welfare-targeted to the unemployed, and welfare-targeted spending remains upward sloping in median wages remains but the desire to restrain total taxes dampens that slope. Thus, in equilibrium, (i) welfare-targeted (insurance) spending strictly rises with w_L (equality), although with a kink at w_0 and more slowly thereafter; (ii) total social-spending (insurance+redistribution) non-monotonically declines with w_L (equality), kinks at w_0 , and rises (more slowly) thereafter; and (iii) the share of total spending targeted to the unemployed rises weakly monotonically with w_L (equality), reaching unity at w_0 and staying at 100% thereafter.

B. Median-Preserving Increases in Income Skew in the Moene-Wallerstein Model

M&W do not discuss the implications in their model of *median-preserving* increases in income skew, even though “yachts outpacing tugboats and rowboats”¹⁰ is more common than the alternative pattern of increasing inequality captured by the *mean-preserving* increases M&W study. The implications are not too difficult to discern intuitively using Figure 3 and utility functions [6"], although they are somewhat ambiguous in one respect. First, an increase in \bar{w} , holding w_i constant, pushes the $T(t^*)$ curve outward as the base for the median to tax has grown with the advances of the wealthy while the median’s income has remained fixed. Accordingly, she demands greater total social-spending at whatever w_i she may remain stagnated. Likewise, however, the increased tax-base available for the median voter also enables her to increase transfers to the unemployed, essentially thereby increasing her consumption of social insurance. Insurance being a normal good, she indeed will do so; accordingly, welfare-targeted benefits increase as well. Both curves in Figure 3 shift upward, in other words, which implies unambiguously that both total and welfare-targeted spending increase with a *median-preserving* increase in inequality (skew). However, whether the kink point, i.e., the wage (equality) level w_0 beyond which all spending is targeted to the unemployed, changes and in what direction, and therefore whether the shares of total spending going to the (un)employed change and in what direction is ambiguous, depending on the relative curvature (risk-aversion) of the median voter’s utility function and the (un)employment and

¹⁰ We heard and attribute this catchy phrasing to Tim Smeeding.

discount rates. Increasing average income, therefore, holding median-income and unemployment risk/rates constant, will increase total and welfare-targeted spending but has ambiguous effects on broad redistribution and the shares of spending on insurance and redistribution.

C. Continuous and Correlated Income Distributions and Unemployment Risks

Continuity in voter heterogeneity, which is intrinsically more realistic, adds little to the discussion beyond smoothing the predicted relations (also more realistic). This adds little qualitatively, and, indeed, we have already prepared to shift the model to a more-continuous basis by changing the subscript on wages of the decisive (median) *voter* to i from that of the decisive (median) *group*, L . The move to continuous voter heterogeneity serves more to facilitate us allowing income and unemployment-risk to correlate, which can now proceed by indexing α_i and β_i and assuming their ratio negatively correlated to w_i . We simplify by ignoring the time-discounting factor, which added little of substance anyway. This allows the hire-fire ratios to determine simultaneously the (un)employment rates, $\frac{1}{n} \sum_{i=1}^n \frac{\beta_i}{\alpha_i + \beta_i}$ (and $\frac{1}{n} \sum_{i=1}^n \frac{\alpha_i}{\alpha_i + \beta_i}$), the share of his/her life each worker will spend (un)employed, $\frac{\beta_i}{\alpha_i + \beta_i}$ (and $\frac{\alpha_i}{\alpha_i + \beta_i}$), and the relative weights in inter-temporal utility on consumption while (un)employed, again $\frac{\beta_i}{\alpha_i + \beta_i}$ (and $\frac{\alpha_i}{\alpha_i + \beta_i}$). With these ratios now positively (negatively) correlated with income, mean-preserving increases in wage skew, which imply decreases in median-voter wages, now also entail increases in unemployment and in the median's risk of unemployment. The main implication of this extension, therefore, is a flattening of the upward-sloping curve relating w_i to welfare-targeted spending (and its share of total spending) in Figure 3. Assuming that $\frac{\beta_i}{\alpha_i + \beta_i}$ remains greater than $\frac{\alpha_i}{\alpha_i + \beta_i}$, so the median remains employed longer than unemployed, this flattening does not switch the sign of the relationship nor does it alter that this curve will cross the (largely unchanged) downward-sloping total-spending curve at some $w_0 < \bar{w}$ and continue upward (flatter still) thereafter. Thus, the descriptions of the equilibria in the model offered above remain qualitatively accurate. Indeed, the flattening of the welfare-targeted spending curve under these conditions likely also implies that w_0 shifts rightward so that the range of income skews over which the total-spending relationship remains strictly negative and the targeted-spending levels (and shares)

relationships remain strictly (and not weakly) positive increase.

D. Incomplete Participation, Correlated with Income Distributions and Unemployment Risks

Penultimately, consider that not everyone votes or, more generally, participates equally and equally effectively politically. Obviously, the relevant population with regard to democratic policy choice is the *voting* (more generally: the *effective-political*) public, and, in one-dimensional (or in SIE-sequential, or party-coalition-constrained: see note 8) models, the median *voter* (or *effective-participant*) decides. Moreover, as Verba et al. (1978), Wolfinger and Rosenstone (1980), Conway (1985), Harrop and Miller (1987) and many others have firmly established, the relatively wealthy have higher propensity to vote than the relatively poor.¹¹ Under fairly general conditions (see Franzese 2002, ch. 2), these empirical regularities combine to imply that the median *voter* will be poorer (and closer to the median person) as voter participation increases. Referring back to Figure 3, a very low participation environment implies one should read median-*voter* preferred, and so equilibrium, welfare-targeted and total spending from a wage (skew) level considerably higher (lower) than the underlying wage (skew) in the population. As participation becomes very high, one can read the median-*voter* preferred more directly from those of the population median and so refer with less modification to population wages (skews). The combination implies that both curves in Figure 3 flatten (and their left ends shift downward) as participation decreases, rising back toward the situation depicted in Figure 3 as participation grows toward 100%.¹² Similarly to the consideration that unemployment risk may correlate (negatively) with income, political participation correlating (positively) with income seems likely to shift w_0 and the associated kinks in the relationships between skew and redistribution/insurance spending outward, leaving more of the possible range of equality with the relatively simple, monotonic equilibrium relationships.

We focused on voting above, but other modes of participation—lobbying, campaign contributions, directly contacting representatives, letters to editors, etc.—also yield influence. Indeed, considering the minuscule probabilities that individual votes will alter election outcomes, these other participatory modes are likely more influential than mere voting. Considering heterogeneity in effective political participation

¹¹ Nagel (1987:117-9) takes the next step to show that US voters, at least, are generally wealthier than non-voters.

¹² Intuitively, in the limit, with no voters or effective political participants, i.e., in pure autocracy, both curves are flat and policy is completely insensitive to societal interests.

rather than just voting, however, only strengthens the empirical relevance of the preceding discussion, for two reasons. First, as voting declines, the relative prevalence and influence of alternative modes of participation logically tends to increase. Second, socioeconomic status correlates even more strongly with extra-electoral participation—most obviously, appreciably, and notoriously: contributions—than with voting: “[C]lass differences in mobilization typically aggravate rather than mitigate the effects of class differences in political resources,” Rosenstone and Hansen (1993: 241; see also Verba et al. 1978, 1995). Therefore, as voter participation declines, not only does electoral representation of the poor and high-unemployment-risk decline, but the political influence of extra-electoral participation rises and disadvantaged groups are even less-well represented there. All this also means that voter participation can legitimately summarize effective political participation more generally for present purposes.

We distill the key intuition deriving from these considerations thus. In the (democratic) polity, the relevant population for policymaking influence is the effectively *politically* active. In the economy, and specifically regarding average wages (income) for the median voter to tax to fund social-spending, the relevant population is instead the *economically* active, i.e., the employed. And regarding policy outputs, specifically regarding social-spending outlays, the relevant population is the *entire society*, perhaps divided into employed and unemployed camps by targeted policy-tools if available. Society, economy, and polity together determine social-policy outcomes, and this suggests the final, thorniest consideration.

E. Endogeneity of Distributional & Employment Outcomes, Redistributive & Insurance Policies, and Political Participation

Finally, consider the previously ignored elephant in the room: endogeneity. The distributional and employment conditions used as key explanatory factors in these political-economic models of social policy, w_i , \bar{w} , $e = \frac{\beta}{\alpha+\beta}$ (and $u \equiv 1 - e = \frac{\alpha}{\alpha+\beta}$), are themselves affected by the redistributive and social-insurance policies aimed toward redressing them. Regarding incomes and income-skew, if these are measured post-taxation-and-spending, then obviously redistribution and insurance affect them as well as the other way around; that is their *raison d’etre*. Even if incomes and income-skew are measured pre-tax-and-transfer, and even regarding (un)employment outcomes and risks, these taxation-and-spending policies have important effects. Indeed, the disincentive and distortionary effects of economic policies

like these lie at the heart of all welfare economics. Thus, we have notable causal arrows from policies to economic conditions as well as from economic conditions to policies. Moreover, as Section *D* discussed, political participation should condition these relationships of economic conditions to policies, yet it is also endogenous to the economic conditions whose effects on social policies we argue it moderates (and likely to policies as well). Empirical exploration of the theoretical propositions above, therefore, must address these endogenous relations somehow, suggesting a simultaneous system-of-equations approach.

II. Empirical Model: A System of Equations for Inequality & Unemployment, Redistribution & Social Insurance, and Political Participation

A. Identifying the System of Equations

The theoretically suggested system of equations involves the two economic conditions, S =skew-inequality and U =unemployment; the two policy aggregates, W =welfare-targeted (social-insurance) and R =redistributive spending (total minus welfare-targeted spending); and P =political participation. In general, to identify a system of M simultaneous equations—here, we have five:

$$\begin{aligned}
 S &= s(U, R, W, P, \varepsilon_s) \\
 U &= u(S, R, W, P, \varepsilon_U) \\
 R &= r(S, U, W, P, \varepsilon_R) \\
 W &= w(S, U, R, P, \varepsilon_W) \\
 P &= p(S, U, R, W, \varepsilon_P)
 \end{aligned}
 \tag{19}$$

—we must “tie down” $M(M-1)$ terms—here: $5 \times 4 = 20$ —by some restrictions on these equations given by some sort of outside information (Greene 2003: 378-395). We will use the most-common strategy of providing that necessary identifying information, that of suggesting certain exclusions, i.e., that some variable(s) from among these five endogenous ones and/or among the other regressors (represented by the in [19]) do not belong on the right-hand side of some of the equations.¹³ Such right-hand-side variables can therefore be excluded from those equations, reducing the number of parameters to estimate by one per variable per equation. In words, exclusion assumptions or arguments must satisfy a statement

¹³ Other sources of information include any identities known to hold (and so unnecessary to estimate) in or across any of the equations, other sorts of restrictions on the coefficients in or across the equations (e.g., that some coefficients are equal or proportionate), specific knowledge of certain constraining functional forms for the equations, any restrictions applicable to the variance-covariance of the residuals across equations, etc. This list of useful information sources is not exhaustive, exclusive, or disjoint. Bayesian priors on some of these parameters, for example, can also add information useful for identification.

like: “Regressor Z affects one or more of the endogenous variables but does not affect one or more of the others except in so far as it affects (causes) the first one or set.” If, for example, we could find one unique variable per equation that *belongs*, in this sense, in only that one equation, that would provide four restrictions per such variable (namely, that the coefficients on each of these variables in the other equations are all zero), giving the minimum $5 \times 4 = 20$ needed, “just-identifying” the system. Finding more than the minimum additional such information, i.e., “over-identifying” the system, adds efficiency (“ties down the system more firmly”) and opens the possibility of testing over-identifying restrictions.¹⁴

B. Identification by Exclusions among the Endogenous Variables

We start by considering which endogenous variables, S , U , R , W , and P “belong in others’ equations” in this sense, beginning with the economic outcomes, *Skew* and *Unemployment*. First, we can argue strongly from [14] that *Skew* and not *Unemployment* enters the *Redistribution* equation. Only *skew* and not *unemployment* affects redistributive spending in the M&W model, and our elaborations modified this conclusion only in the slope of this relationship and in extending its empirically relevant range.

For different reasons, one could argue that *Unemployment* does not enter the *Skew* equation either, at least not strongly directly. *Unemployment* implies a set of individuals with zero wages and thus directly affects mean wages, the denominator of *skew* by definition. This direct effect *via* mean wages is likely small though: 10% unemployment, e.g., lowers average wages by just 0.1 times the (likely low) wages when working of the currently unemployed. Furthermore, because percentiles, such as the median, are not directly affected by what happens at extremes above and below them, and because the unemployed come mostly from the lower end of the wage/income distribution, we can evade much of even this small direct simultaneity by using percentile ratios rather than median-to-mean ratios, especially if we can use higher percentiles. That is, 90-50 ratios provide stronger basis for some of the exclusion restrictions we intend to impose than the 90-10 ratios more commonly used. Since either equally effectively summarizes

¹⁴ Importantly, the validity of any empirical procedure applied to identify an endogenous system, and so the credibility and creditability of the estimation results, ultimately rest on the strength of the theoretical/substantive arguments that produced the identifying restrictions. In other words, identification, i.e., just-identifying assumptions, i.e., endogeneity vs. exogeneity, cannot be tested empirically. Over-identifying restrictions, however, can be; i.e., *given some assumptions that suffice to identify a system*, we can test whether additional restrictions, which would enhance efficiency if also true but would render estimates inconsistent if false, can be tested. Such *tests of over-identifying restrictions*, furthermore, are only asymptotic and are usually weak in small samples, i.e., in practice. The phrasing “test for endo/exo-geneity”, therefore, should be avoided.

the distribution, we use 90-50.¹⁵ However, unemployment does add labor-supply competitors and so will indirectly affect wages at all percentiles, but this too should mostly affect lower percentiles that compete most directly with the unemployed, giving further argument for using the higher-percentile 90-50 ratio.

Contrarily, *Unemployment* does belong in the two remaining equations: in *Participation* because the unemployed tend to drop not only from workforce but also from political participation, and obviously in *Welfare-targeted* (social-insurance) spending, the unemployed being the latter's target. As obviously and centrally analytically, *income Skew* belongs in both the *Redistribution* and the *Welfare* equations, as seen in [14] and [15], and in the *Participation* model too sections *I.G* and *I.H* discuss. *Skew* perhaps does not affect *Unemployment*, however, except through and insofar as it affects these other outcomes. That is, we argue that income distribution does not, by itself, affect *Unemployment*—some causality likely runs the other way, as already noted, but we argued that our empirical specification evades most of that also—except perhaps through some of the other outcomes in this system, the policy variables in particular.

Turning now to the policy variables, *Redistribution* clearly belongs in the *Skew* equation, especially insofar as *Skew* reflects the post-public-taxation-and-expenditure income distribution, such an effect being the policy's intent (and its achievement: Atkinson et al. 1995, Danziger and Gottschalk 1995, Gottschalk and Smeeding 1997, Smeeding et al. 1990). Even if *Skew* is measured pre-tax-and-transfer, *Redistribution* will indirectly affect it by altering market functioning, that of labor markets especially, e.g., by raising reservation wages. *Redistribution* will also enter the *Unemployment* equation because these policies affect market, especially labor-market, efficiency too and not solely distribution. Although *Redistributive* spending does not affect *Welfare* spending in these theoretical models,¹⁶ *R* may belong in *W* if net substitution or complement effects operate across these policies, though, which seems likely even if this theoretical model ignores the possibility. Lastly, we might argue that *Redistributive* spending

¹⁵ Indeed, the median-to-mean ratios that most-directly derive from the theory (but are less widely available empirically), will relate more tightly to 90-50 than 50-10 or 90-10 ratios under realistic conditions since the 90th-percentile numerator tracks the mean much more tightly than the does the 50th and since the denominator is the desired measure exactly.

¹⁶ *R* does affect *W* and vice versa in these theoretical models, but only past some critical level of equality, w_0 , at which *W* exhausts revenue, constraining *R* to zero. No developed-democratic society has ever produced such a policy mix, and not remotely so in our sample. Thus, perhaps we can safely ignore this theoretical complication, empirical experience having perhaps demonstrated that the degree of equality that produces it, even as refracted by unequal participation, has never obtained. Were we nonetheless to consider the possibility, we might better estimate w_0 (parametrically if we can specify an equation or measures for it; semi-parametrically otherwise) than to include *R* in *W* and *W* in *R* in simply linear-additively.

should affect *Participation* only through its effect on the recipient's socio-economic status, i.e., here, only via *Unemployment* and *Skew*, but Hobolt and Klemmensen (2006) have argued strongly otherwise, that recipients of public spending—perhaps responding to some sense that policy regards, and so politics involves, them—do have greater propensity to vote even controlling for their (post-tax-and-transfer) socio-economic status. Their supportive evidence does not address the endogeneity concerns raised here, so specifying our system to follow them in this regard enhances the empirical test of their proposition.

Penultimately, *Welfare*-targeted spending, by definition, directly affects only the lower end of the income distribution, so, in analogy to our percentiles-based arguments regarding *Unemployment* not affecting *Skew*, *W* will not affect *Skew* insofar as the directly targeted and the indirectly affected population remains below the 50th percentile. On the other hand, analogously to the market-inefficiency arguments regarding *Redistribution*'s effect on *Unemployment*, *Welfare* too should enter the *U* equation. Likewise, the same substitutability/complementarity argument that placed *R* in *W* places *W* in *R*, and the same argument that might keep *R* from *P*, namely that redistribution should affect political participation only through its effect on the recipients' socioeconomic status, would exclude *W* from *P*. However, as noted, we find Hobolt and Klemmensen (2006) persuasive and wish to pursue further evidence on their proposition allowing for the endogeneity emphasized here, so we include *W* in *P*.

Political *Participation*, finally, only directly affects the policy variables, *R* and *W*; an effect on economic outcomes that did not work through policy is hard to imagine.

We have now reduced the system to the following:

$$\begin{aligned}
 S &= s(R, \varepsilon_S) \\
 U &= u(W, R, \varepsilon_U) \\
 R &= r(S, W, P, \varepsilon_R) \\
 W &= w(U, S, R, P, \varepsilon_W) \\
 P &= p(U, S, R, W, \varepsilon_P)
 \end{aligned}
 \tag{19a}$$

C. Identification by Exclusions among the Exogenous Variables

We started in [19] with 20 parameters to identify and have reduced that with 6 exclusions to 14 in [19a] so far. We next introduce other potential right-hand-side variables and discuss their exclusion or

inclusion in the equations, before proceeding to specify the precise manners in which all the endogenous and exogenous variables enter the equations to be estimated and then to consider appropriate estimation methods. Potentially exogenous regressors include variables related to demographics, **D**, like the age distribution; socio-economic institutional and interest structure, **SIS**, like unionization and corporatism, female labor-force participation, trade exposure and structure, and stock-market capitalization and performance; domestic political institutions, **DPI**, like federalism, presidentialism, district magnitude, and other important electoral and governmental institutions; and current political contexts, **CPC**, like government partisanship, fragmentation, and polarization, and electoral cycles and competitiveness. Additionally, we might find some identification leverage in the international interdependence of the economic- and policy-outcome dependent variables, i.e., in economic conditions and policies abroad, which we will write U_{-i} , S_{-i} , R_{-i} , and W_{-i} . This suggests further elaboration of the system of equations to:

$$\begin{aligned}
 S &= s(R, S_{-i}, \mathbf{D}, \mathbf{SIS}, \mathbf{DPI}, \mathbf{CPC}, \varepsilon_S) \\
 U &= u(W, R, U_{-i}, \mathbf{D}, \mathbf{SIS}, \mathbf{DPI}, \mathbf{CPC}, \varepsilon_U) \\
 R &= r(S, W, P, R_{-i}, \mathbf{D}, \mathbf{SIS}, \mathbf{DPI}, \mathbf{CPC}, \varepsilon_R) \\
 W &= w(U, S, R, P, W_{-i}, \mathbf{D}, \mathbf{SIS}, \mathbf{DPI}, \mathbf{CPC}, \varepsilon_W) \\
 P &= p(U, S, R, W, \mathbf{D}, \mathbf{SIS}, \mathbf{DPI}, \mathbf{CPC}, \varepsilon_P)
 \end{aligned}
 \tag{19b}$$

1. Spatial Interdependence

Insofar as economic conditions diffuse across borders due to trade (goods and services flows) and investment (capital flows) and to international competition more broadly, economic conditions abroad, S_{-i} and U_{-i} , can provide some regressors that enter the *Unemployment* and *Skew* equations but that affect the other endogenous variables only through domestic economic outcomes. Analogously, the economic policies of a nation's competitors and partners affect the costs and benefits of its domestic policies (see, e.g., Hallerberg and Basinger 2004; Franzese and Hays 2006b, 2007b), so R_{-i} and W_{-i} may belong in the *Redistribution* and *Welfare* equations. As Franzese and Hays (2004, 2006a, 2007ab) explain and explore, such spatial-lag regressors entail their own endogeneity issues, namely that if, e.g., France affects Germany and Germany affects France, then the spatial lag, a weighted average of the dependent variable in the other ($\sim i$) units is endogenous. However, this *spatial-simultaneity* bias may be small enough or

may be redressed effectively enough by certain estimation strategies (orthogonal to our central interests here: see Franzese and Hays 2004, 2006a, 2007ab) and the identification leverage that these spatial lags offer upon the simultaneity of central interest here (outcome and regressor simultaneity *within* a spatial unit) large enough, to render usage of spatial lags as *quasi-instruments* (see Bartels 1991) effective.

These quasi-instrumental spatial-lags enter just one equation each, so each brings four exclusions, sixteen more in total, two more than the remaining fourteen needed. Insofar as the quasi-instrumentality of these spatial lags approaches true instrumentality, then, they more than suffice to fulfill the *necessary* rank condition for identification of the system. However, the order condition, which is necessary and sufficient with the rank condition, and which essentially requires that the necessary exclusions, equaling or exceeding $M(M-1)$ (here: 20), are distributed across the M equations such that each is “tied down” by at least one unique exogenous aspect of its specification, is not satisfied yet. The *Participation* equation as-yet lacks such unique exogenous component, and so is unidentified, whereas the *Welfare*-spending equation is just-identified, basically by its quasi-instrumental spatial-lag, and the *Skew*, *Unemployment*, and *Redistribution* equations are all over-identified, having both their own unique quasi-instrumental spatial-lags and three, two, or one further exclusions (in S , U , and R , respectively) from among the endogenous variables. Furthermore, we would not want to rest identification of the system solely on quasi-instrumental variables, and we can find further leverage in some of the other exogenous regressors.

2. *Demographics*

Demographic variables, **D**, especially the age distribution, might provide some regressors whose exogeneity is more certain (perhaps not entirely unproblematic because, for example, “retirement age” insofar as it enters pensioner-targeted spending, for example, is politically determined and the setting of that age may, for example, reflect the size and costs of *Welfare* spending). Unfortunately, however, most demographic considerations that we might consider relevant to the determination of one of the dependent variables will also belong in most, if not all, of the other equations. For example, the over-65 share of the population, *Pop65*, clearly should impinge upon *Redistribution* and/or *Welfare*-targeted spending (insofar as public pensions and other age-dependent spending, like health and child care, comprise those

measures), but the sizes of age-demographic groups like this equally clearly affect employment and income-distribution outcomes directly as well (see, e.g., Smeeding and Sullivan 1998). Age also has among the most robust and sizable known effects on voter participation. *Pop65*, therefore, likely belongs in all the equations, and so, while exogenous, will provide no identification leverage for any of them (unless we could determine that it entered those equations differently, which we have not). The under-15 population share, *Pop14*, also causally relates to economic outcomes, surely unemployment and possibly skew. Again, Redistributive and/or Welfare-targeted spending would equally clearly depend on *Pop14*—e.g., education and related spending programs—but Participation, being measured as a share of the eligible-age (i.e., over-15, usually over-18) population, might not. This updates our system to:

$$\begin{aligned}
 S &= s\left(\underline{R}, \underline{S}_{-i}, \underline{Pop65}, \underline{Pop14}, \underline{SIS}, \underline{DPI}, \underline{CPC}, \varepsilon_S\right) \\
 U &= u\left(\underline{W}, \underline{R}, \underline{U}_{-i}, \underline{Pop65}, \underline{Pop14}, \underline{SIS}, \underline{DPI}, \underline{CPC}, \varepsilon_U\right) \\
 R &= r\left(\underline{S}, \underline{W}, \underline{P}, \underline{R}_{-i}, \underline{Pop65}, \underline{Pop14}, \underline{SIS}, \underline{DPI}, \underline{CPC}, \varepsilon_R\right) \\
 W &= w\left(\underline{U}, \underline{S}, \underline{R}, \underline{P}, \underline{W}_{-i}, \underline{Pop65}, \underline{Pop14}, \underline{SIS}, \underline{DPI}, \underline{CPC}, \varepsilon_W\right) \\
 P &= p\left(\underline{U}, \underline{S}, \underline{R}, \underline{W}, \underline{Pop65}, \underline{SIS}, \underline{DPI}, \underline{CPC}, \varepsilon_P\right)
 \end{aligned}
 \tag{19c}$$

Excluding *Pop14* from the Participation equation provides the missing unique exogenous aspect to that equation. Our system is now identified if we credit the quasi-instrumentality of the spatial lags. In [19c], we have begun to indicate our situation vis-à-vis identification by placing arcs over endogenous variables, double-underlining regressors that appear in only one equation, which suffice to identify that equation's left-hand-side variable for inclusion on the right-hand-side of other equations, and single-underlining regressors that do not appear in all equations, which provide at least some leverage on those left-hand-side variables from which they are excluded.

3. Socio-Economic Institutional and Interest Structures

Next, consider socio-economic institutions and interest structures, like unionization and corporatism, trade exposure and structure, female labor-force participation, and stock-market capitalization and outcomes. Unions serve in great part to enhance and protect members' wages, and evidence that they do indeed affect the wage and income distributions is rife (see, e.g., Freeman 1991). Union density, *UDen*,

therefore certainly enters the *Skew* equation (directly if the percentiles used in the measure involve unionized segments of the population, or indirectly because wages in any segment affect those in others). Then, largely as consequence of this aim and effect, unionization is often argued to exacerbate insider-outside conflicts that can spur unemployment, so *UDen* enters the *Unemployment* equation too. Strong unionization also represents likely effective political influence that would spur both *Redistribution* and *Welfare* spending, and union members, in strongly empirically supported theory, have greater propensity to participate politically, so *UDen* enters that equation also. Thus, unfortunately, *UDen* provides no identification leverage (without further information/expectations about the shape of these relationships, which we do not have). Likewise corporatism, *Corp*, or the coordination or centralization of labor organization, centrally affects wage and employment outcomes including, relevantly for us, *Skew* and *Unemployment*, and the balance of political influence surrounding *Redistribution* and *Welfare*. However, corporatism seems unlikely to affect voter participation (beyond the positive effect already accounted by unionization) except insofar as it affects these policies and outcomes, and so we may perhaps exclude *Corp* from the *Participation* equation. Its role in identifying our system thus parallels *Pop14*.

By the Stolper-Samuelson theorem and related international-trade theories, trade exposure, *TExp*, and especially exposure to trade with developing (i.e., labor-rich, capital-scarce) economies, *TExpD*, should increase some combination of *Skew* and *Unemployment*. Specifically, Stolper-Samuelson holds that (unskilled) labor in developed (human-and-physical-capital-rich, labor-scarce) countries, which will presumably occupy income percentiles around the denominator of most skew measures, loses by trade, more so the more that trade occurs with countries having opposite endowment-ratios to greater extents. The unemployment impact arises if and insofar as some alternative to the Stolper-Samuelson assumed perfect competition and full-employment obtains, such as some real-wage or -price inflexibility due to monopoly union or firm power.¹⁷ Many have argued by similar reasoning that openness, and trade with the developing world in particular, would also shape demand for, and possibly supply of, *Redistribution* and *Welfare* (e.g., Cameron 1984, Katzenstein 1985, Rodrik 1998). However, insofar as these policy

¹⁷ That is, in economic theory in general, insofar as quantities as well as prices adjust to clear markets, here employment as well as wages, the price (wage) implications of equilibria that assume market clearing solely by prices (wages) will be shared between prices (wages) and quantities (employment).

effects of trade occur because of, i.e., through, the Stolper-Samuelson and related effects on employment and wage outcomes, we can exclude these trade-structural variables from the policy outcomes. Likewise, trade structure may affect *Participation*, if at all, only through these economic outcomes and policies. Most theory would cast international financial exposure, *FinExp*, in an identical role to trade exposure.

Huber and Stephens (2001) argue that historical Social-Democratic, *SDG*, Christian-Democratic, *CDG*, or Secular-Conservative, *SCG*, governance, which we consider an aspect of socio-economic structure (as opposed to incumbent-government partisanship, which we consider a **Current Political Context**), importantly shapes the generosity and structure social policy. Accordingly, these factors belong in the policy equations, but not the outcome or participation equations, wherein their effects, if any, should arise only through the policies. In particular, Huber and Stephens argue, essentially, that Social-Democratic and Christian-Democratic, but not Secular-Conservative, social policies involve strong *Welfare*-targeted generosity. Conversely, neither Secular-Conservative nor Christian-Democratic policy paradigms involve the generous general *Redistribution* of Social-Democracy. Accordingly, we can capture these hypotheses succinctly by including just *SCG* in the *Welfare* equation, expecting a negative coefficient, and just *SDG* in the *Redistribution* equation, expecting a positive one.¹⁸

Another socio-economic factor of considerable importance to wage and employment outcomes may be female labor-force participation, *FLFP*, which, on the one hand, may operate analogously to the demographic variables in shaping *Skew* and *Unemployment*, and, on the other hand, may spur demand for and supply of public spending of either or both the *Welfare*-targeted and non-targeted *Redistributive* varieties. Indeed, the type of spending responding to *FLFP*¹⁹ likely depends on other aspects of the political economy, most especially whether governments have historically been of the Social-Democratic variety because both the Christian-democratic and Secular-Conservative policy paradigms have been far less supportive of *FLFP* (Huber and Stephens 2001). *FLFP*, or more exactly its societal and other roots, may affect *Participation* as well—i.e., we suspect that what favors female labor-force participation likely favors female electoral participation as well—but its interaction with Social-Democratic Governance is

¹⁸ However, as argued next, proper caution regarding terms involved in interactions will insert *SDG* in both.

¹⁹ Policy programs in response to *FLFP* may also bolster *FLFP*, which suggests a further endogeneity not explored here.

unlikely to affect *Participation* except through its effects on policy.

Finally, we expect that stock-market capitalization, *SMC*, stock-market returns (i.e., percentage increases in indices), *SMR*, and their interaction, *SMC·SMR*, will strongly affect income Skew, first and most directly by the common phenomenon of “yachts outpacing tugboats and rowboats” (see note 10). Such outpacing is likely proportionate to stock-market (and other investment) returns and should be of greater relevance to economy-wide income-skew the greater is stock-market capitalization (actually, ideally: domestic stock-ownership prevalence). Less directly, and with stronger neoliberal counter-argument, stock-market capitalization, reflecting an emphasis on a particular form of corporate finance, may have implications for wages and employment (Hall and Soskice 2001). This likely has the obvious implications for interest and political-influence distributions as well, so we also suspect stock-market capitalization to enter the policy equations. Current returns and the interaction, however, should be less relevant (directly) to these policy variables, and none of these financial-market terms seem likely to affect participation directly, if at all. Thus, we know have the five-equation system specified to this level:

$$\begin{aligned}
 S &= s\left(R, \underline{S}_{-i}, \text{Pop65}, \text{Pop14}, \text{UDen}, \text{Corp}, \text{FinExp}, \text{TEExp}, \text{TEExpD}, \text{FLFP}, \text{SMC}, \text{SMR}, \text{SMC} \cdot \text{SMR}, \text{DPI}, \text{CPC}, \varepsilon_S\right) \\
 U &= u\left(W, R, \underline{U}_{-i}, \text{Pop65}, \text{Pop14}, \text{UDen}, \text{Corp}, \text{FinExp}, \text{TEExp}, \text{TEExpD}, \text{FLFP}, \text{SMC}, \text{SMR}, \text{SMC} \cdot \text{SMR}, \text{DPI}, \text{CPC}, \varepsilon_U\right) \\
 R &= r\left(S, W, P, \underline{R}_{-i}, \text{Pop65}, \text{Pop14}, \text{UDen}, \text{Corp}, \text{FLFP}, \text{SDG}, \text{FLFP} \cdot \text{SDG}, \text{SMC}, \text{DPI}, \text{CPC}, \varepsilon_R\right) \\
 W &= w\left(U, S, R, P, \underline{W}_{-i}, \text{Pop65}, \text{Pop14}, \text{UDen}, \text{Corp}, \text{FLFP}, \text{SCG}, \text{FLFP} \cdot \text{SDG}, \text{SMC}, \text{DPI}, \text{CPC}, \varepsilon_W\right) \\
 P &= p\left(U, S, R, W, \text{Pop65}, \text{UDen}, \text{FLFP}, \text{DPI}, \text{CPC}, \varepsilon_P\right)
 \end{aligned} \tag{19d}$$

4. Domestic Political Institutions

Two important domestic political institutions here are (the natural log of) district magnitude, *DMag*, and presidentialism, *Pres*, which a long line of political-science research and some recent, influential political-economy formalizations have connected to redistributive and distributive policies (Persson and Tabellini 2000 offer textbook exposition). These theories expect greater redistributive (and less targeted) spending in more proportional, i.e., larger district-magnitude, systems, and less general public-spending in presidential than in parliamentary systems. Further, district magnitude and other key electoral-law features, notably the onerousness of registration requirements, *RegReq*, and mandatory voting (i.e., abstention fines), *MandVote*, play theoretically long-noted and empirically well-established large roles in

determining participation. Presidentialism may also affect *Participation*, negatively if presidential and other elections are staggered, thereby diffusing relevant policymaking authority across multiple elections and reducing the importance of each individual election, positively or with no effect otherwise. This logic suggests including other institutions that diffuse policymaking power across elections, such as federalism, bicameralism, frequent referenda: *Diffuse*. The effects may also depend on the staggering or simultaneity of elections, but crucial here is that such diffusion should affect *Unemployment* or *Skew* solely via their effects on policy. Obviously the diffusion of policymaking authority, and certain other electoral-law features, such as the degree of intra-party competition, *IPC*, which plurality, majority, and especially transferable-vote systems tend to strengthen, would likely affect policy directly (i.e., not solely through participation), as district magnitude and presidentialism do. In particular, *IPC* should enhance targeted distribution and diminish broader redistribution, in a manner very similar to *DMag* (see, e.g., Cox and Rosenbluth 1995, Shugart and Carey 1992, and Ariga 2006). Mandatory voting and registration burdens, however, should affect policy only by affecting participation. Thus, we now have this system:

$$\begin{aligned}
S &= s\left(R, \underline{S}_{-i}, \text{Pop65}, \text{Pop14}, \text{UDen}, \text{Corp}, \text{FinExp}, \text{TExp}, \text{TExpD}, \text{FLFP}, \text{SMC}, \text{SMR}, \text{SMC} \cdot \text{SMR}, \text{CPC}, \varepsilon_s\right) \\
U &= u\left(W, R, \underline{U}_{-i}, \text{Pop65}, \text{Pop14}, \text{UDen}, \text{Corp}, \text{FinExp}, \text{TExp}, \text{TExpD}, \text{FLFP}, \text{SMC}, \text{SMR}, \text{SMC} \cdot \text{SMR}, \text{CPC}, \varepsilon_u\right) \\
R &= r\left(S, W, P, \underline{R}_{-i}, \text{Pop65}, \text{Pop14}, \text{UDen}, \text{Corp}, \text{FLFP}, \text{SDG}, \text{FLFP} \cdot \text{SDG}, \text{SMC}, \text{Pres}, \text{DMag}, \text{IPC}, \text{PowDiff}, \text{CPC}, \varepsilon_r\right) \\
W &= w\left(U, S, R, P, \underline{W}_{-i}, \text{Pop65}, \text{Pop14}, \text{UDen}, \text{Corp}, \text{FLFP}, \text{SCG}, \text{FLFP} \cdot \text{SDG}, \text{SMC}, \text{Pres}, \text{DMag}, \text{IPC}, \text{PowDiff}, \text{CPC}, \varepsilon_w\right) \\
P &= p\left(U, S, R, W, \text{Pop65}, \text{UDen}, \text{FLFP}, \text{Pres}, \text{DMag}, \text{IPC}, \text{Diffuse}, \text{MandVote}, \text{RegReq}, \text{CPC}, \varepsilon_p\right)
\end{aligned} \tag{19e}$$

Notice that the domestic political institutions, especially the electoral-law features, provide crucial identification leverage on *Participation*, which had been relatively lacking heretofore.

5. Current Political Contexts:

Lastly, under Current Political Contexts, **CPC**, we consider incumbent-government characteristics—namely, majority status, *GMaj*, fragmentation, *GFRag*, polarization, *GPol*, and partisanship along a left-right axis, *GPart*, or by *SDG*, *CDG*, or *SCG* classifications as above—and current-electoral conditions, like election dates (for possible cycles), *E*, and competitiveness, *Comp*. We gauge current-government ideology by *CDG* and *GPart*, which allows the possibilities of policy relating to ideology linearly, roughly curvilinearly, or of Christian Democracy lying somewhat off the direct line from left (*SDG*) to

right (*SCG*) ideologically (see, e.g., Swank 2002). All of these current-political-contextual factors should affect the policy variables directly; only competitiveness should affect participation directly;²⁰ and none of these factors should affect the economic outcomes except through policy and participation effects.

This gives us the following (penultimate) specification of our system:

$$\begin{aligned}
 S &= s \left(R, \underline{S}_{-i}, \underline{Pop65}, \underline{Pop14}, \underline{UDen}, \underline{Corp}, \underline{FinExp}, \underline{TEExp}, \underline{TEExpD}, \underline{FLFP}, \underline{SMC}, \underline{SMR}, \underline{SMC} \cdot \underline{SMR}, \varepsilon_S \right) \\
 U &= u \left(W, R, \underline{U}_{-i}, \underline{Pop65}, \underline{Pop14}, \underline{UDen}, \underline{Corp}, \underline{FinExp}, \underline{TEExp}, \underline{TEExpD}, \underline{FLFP}, \underline{SMC}, \underline{SMR}, \underline{SMC} \cdot \underline{SMR}, \varepsilon_U \right) \\
 R &= r \left(\begin{array}{l} S, W, P, \underline{R}_{-i}, \underline{Pop65}, \underline{Pop14}, \underline{UDen}, \underline{Corp}, \underline{FLFP}, \underline{SDG}, \underline{FLFP} \cdot \underline{SDG}, \underline{SMC}, \underline{Pres}, \underline{DMag}, \\ \underline{IPC}, \underline{PowDiff}, \underline{GMaj}, \underline{GFrag}, \underline{GPol}, \underline{GPart}, \underline{CDG}, \underline{E}, \underline{Comp}, \underline{E} \cdot \underline{Comp}, \varepsilon_R \end{array} \right) \quad [19f]. \\
 W &= w \left(\begin{array}{l} U, S, R, P, \underline{W}_{-i}, \underline{Pop65}, \underline{Pop14}, \underline{UDen}, \underline{Corp}, \underline{FLFP}, \underline{SCG}, \underline{FLFP} \cdot \underline{SDG}, \underline{SMC}, \underline{Pres}, \underline{DMag}, \\ \underline{IPC}, \underline{PowDiff}, \underline{GMaj}, \underline{GFrag}, \underline{GPol}, \underline{GPart}, \underline{CDG}, \underline{E}, \underline{Comp}, \underline{E} \cdot \underline{Comp}, \varepsilon_W \end{array} \right) \\
 P &= p \left(U, S, R, W, \underline{Pop65}, \underline{UDen}, \underline{FLFP}, \underline{Pres}, \underline{DMag}, \underline{IPC}, \underline{Diffuse}, \underline{MandVote}, \underline{RegReq}, \underline{Comp}, \varepsilon_P \right)
 \end{aligned}$$

Notice that theory and substance have allowed us to offer empirical models that strongly distinguish (identify) each type of outcome—economic, policy, and participation. Skew and Unemployment alone have the trade- and financial-exposure and stock-return regressors, and these should be strong exogenous explanators of those outcomes. The economic outcomes also exclude *Participation*, whereas the policy outcomes do not. Similarly, *Redistribution* and *Welfare*, have unique exogenous regressors in the current-political-contextual factors (competitiveness excepted), and these should be strong predictors of such policies. *Participation* uniquely responds to two aspects of electoral law known to predict it well. The two economic and two policy outcomes seem less sharply distinguished from each other, though. The unique spatial lags and that *Welfare*-targeted policies affect *Unemployment* but not *Skew* distinguish the economic outcomes. The unique spatial lags, that *Unemployment* affects *Welfare*-targeted but not broad *Redistributive* spending, and that *SCG* and *CDG* legacies similarly (negatively) affect *Redistribution* whereas *CDG* and *SDG* legacies similarly (positively) affect *Welfare* distinguishes those two policies. These weaker distinctions may nonetheless offer sufficient empirical leverage, however, because the spatial lags likely have strong explanatory bite for the economic outcomes while the importance of partisan historical legacy may adequately compensate for what might prove weaker interdependence

²⁰ We smooth participation rates across election and non-election years, so the election date does not affect our measure.

among nations' social policies. Plus, further useful distinctions arise in specifying precisely how each factor enters each of these functions (see below), and then, following preliminary empirical estimations of the resulting system, we may discover further refinements that would allow more exclusions (although demanding fewer exclusions or otherwise suggesting respecification is also possible).

III. Empirical-Model Specification, Data, Estimation, and Results

A. Empirical-Model Specification

To begin to find this final empirical specification, we need now to describe more fully these five functions. Our theories lack the precision to suggest specific functional forms,²¹ so we assume the usual linear-additivity, accepting “best linear approximations” to what are likely nonlinear relationships. We have, however, been able to suggest above certain interactions (we assume them linear interactions) among some of the right-hand-side terms: between stock-market capitalization and stock-market returns in the economic-outcome equations, and between female labor-force participation and social-democratic government and between election dates and competitiveness in the policy equations. As we convert these general functions to specific regression equations, and add dynamics to those models, we will add two further crucial interactions. As argued above (see also Franzese 2002, ch.2) participation interacts with unemployment or skew in shaping the effective political demand for the corresponding policy, *Welfare-targeted* or *Redistributive* spending. Also, government fragmentation, polarization, and majority status will interact with the lagged dependent-variables in the policy equations, reflecting veto-actor arguments of policy-adjustment retardation (see Franzese 2002, ch. 3). These interactions and the dynamics add several further over-identifying exclusions to the system. Thus, in the end, the specific equations with which we would ideally like to begin our empirical explorations and evaluations are:

$$S = \begin{cases} \alpha_0^i + \alpha_1 \underline{S}_{t-1} + \alpha_2 \underline{S}_{-i} + \alpha_3 R + \alpha_4 \underline{Pop65} + \alpha_5 \underline{Pop14} + \alpha_6 \underline{UDen} + \alpha_7 \underline{Corp} + \alpha_8 \underline{FinExp} \\ + \alpha_9 \underline{TExp} + \alpha_{10} \underline{TExpD} + \alpha_{11} \underline{FLFP} + \alpha_{12} \underline{SMC} + \alpha_{13} \underline{SMR} + \alpha_{14} \underline{SMC} \cdot \underline{SMR} + \varepsilon_S \end{cases} \quad [20a]$$

$$U = \begin{cases} \beta_0^i + \beta_1 \underline{U}_{t-1} + \beta_2 \underline{U}_{-i} + \beta_3 W + \beta_4 R + \beta_5 \underline{Pop65} + \beta_6 \underline{Pop14} + \beta_7 \underline{UDen} + \beta_8 \underline{Corp} \\ + \beta_9 \underline{FinExp} + \beta_{10} \underline{TExp} + \beta_{11} \underline{TExpD} + \beta_{12} \underline{FLFP} + \beta_{13} \underline{SMC} + \beta_{14} \underline{SMR} + \beta_{15} \underline{SMC} \cdot \underline{SMR} + \varepsilon_U \end{cases} \quad [20b]$$

²¹ We do know that district magnitude enters reciprocally (or in logs) because its effects arise through proportionate reduction in the effective threshold for entry to parliament, which is approximately $\frac{1}{2DMag}$.

$$R = \begin{cases} \gamma'_0 + \gamma_1 \underline{R}_{t-1} + \gamma_2 \underline{GFrag} \cdot \underline{R}_{t-1} + \gamma_3 \underline{GPol} \cdot \underline{R}_{t-1} + \gamma_4 \underline{R}_{-i} + \gamma_5 S + \gamma_6 P + \gamma_7 S \cdot P + \gamma_8 W \\ + \gamma_9 \underline{Pop65} + \gamma_{10} \underline{Pop14} + \gamma_{11} \underline{UDen} + \gamma_{12} \underline{Corp} + \gamma_{13} \underline{FLFP} + \gamma_{14} \underline{SDG} + \gamma_{15} \underline{FLFP} \cdot \underline{SDG} \\ + \gamma_{16} \underline{SMC} + \gamma_{17} \underline{Pres} + \gamma_{18} \underline{DMag} + \gamma_{19} \underline{IPC} + \gamma_{20} \underline{PowDiff} + \gamma_{21} \underline{GFrag} + \gamma_{22} \underline{GPol} + \gamma_{23} \underline{GPart} \\ + \gamma_{24} \underline{CDG} + \gamma_{25} \underline{E} + \gamma_{26} \underline{Comp} + \gamma_{27} \underline{E} \cdot \underline{Comp} + \varepsilon_R \end{cases} \quad [20c]$$

$$W = \begin{cases} \phi_0^i + \phi_1 \underline{W}_{t-1} + \phi_2 \underline{GFrag} \cdot \underline{W}_{t-1} + \phi_3 \underline{GPol} \cdot \underline{W}_{t-1} + \phi_4 \underline{W}_{-i} + \phi_5 U + \phi_6 S + \phi_7 P + \phi_8 S \cdot P + \phi_9 R \\ + \phi_{10} \underline{Pop65} + \phi_{11} \underline{Pop14} + \phi_{12} \underline{UDen} + \phi_{13} \underline{Corp} + \phi_{14} \underline{FLFP} + \phi_{15} \underline{SDG} + \phi_{16} \underline{FLFP} \cdot \underline{SDG} \\ + \phi_{17} \underline{SCG} + \phi_{18} \underline{SMC} + \phi_{19} \underline{Pres} + \phi_{20} \underline{DMag} + \phi_{21} \underline{IPC} + \phi_{22} \underline{PowDiff} + \phi_{23} \underline{GFrag} + \phi_{24} \underline{GPol} \\ + \phi_{25} \underline{GPart} + \phi_{26} \underline{CDG} + \phi_{27} \underline{E} + \phi_{28} \underline{Comp} + \phi_{29} \underline{E} \cdot \underline{Comp} + \varepsilon_W \end{cases} \quad [20d]$$

$$P = \begin{cases} \omega_0 + \omega_1 \underline{P}_{t-1} + \omega_2 U + \omega_3 S + \omega_4 R + \omega_5 W + \omega_6 \underline{Pop65} + \omega_7 \underline{UDen} + \omega_8 \underline{FLFP} + \omega_9 \underline{Pres} + \omega_{10} \underline{PProx} \\ + \omega_{11} \underline{DMag} + \omega_{12} \underline{IPC} + \omega_{13} \underline{PowDiff} + \omega_{14} \underline{MandVote} + \omega_{15} \underline{RegReq} + \omega_{16} \underline{Comp} + \varepsilon_P \end{cases} \quad [20e]$$

Notice first that we gain additional identification leverage on every equation if we can assume or can establish theoretically/substantively that the time-predetermined nature of the lagged dependent-variables used to model the temporal dynamics suffices to ensure statistical exogeneity. We do assume so for now, even though we do not trust that fully, especially in the very-slow moving Skew equation.²² For now at least, the set of estimated coefficients and the apparent stationarity of the dependent variables they imply both seem much more plausible when we apply this assumption, so we make it.

Notice next that the policy equations draw from veto-actor theory (Tsebelis 2002) to derive more specification precision and identification leverage by allowing current-government fragmentation and polarization to modify the policy-adjustment rate (Franzese 2002, ch. 3), expecting retardation according to those theories. We have measured fragmentation and polarization in ways that reflect how the current government's majority status affects *GFrag* and *GPol* and so need not (and perhaps should not) include *GMaj* directly on the right-hand side.²³ The modifying components of these new terms, *GFrag* and *GPol*, provide further leverage in their different alteration of those dynamics. That is, these entire new terms provide two additional exogenous regressors to the policy equations if we assert the *poor-man's*

²² In essence, contemporaneous endogeneity and some failure of the empirical specification to capture the dynamics fully (such as, famously in economics, when expectations are important and not or inadequately present in the empirical model) are the conditions under which time precedence will fail to ensure exogeneity. In this case, the extremely smooth and slow time-adjustment of skew leave serious doubts whether our measurement precision suffices for the deviations of *Skew* from the modeled AR(1) to have adequate signal to noise ratios for us to judge how well we might have met this condition.

²³ We did explore the possibility, however, finding some (weak, non-robust) indications that majority status may speed policy-adjustment and may reduce welfare/insurance-spending levels beyond the role our *GFrag* and *GPol* allow it.

exogeneity of time in the time-lagged dependent-variable component of the interactions; and, even if we had not made that assumption, that *GFRag* and *GPol* modify the simple, uniform-across-all-countries AR(1) dynamics, and how they do so, are unique to the policy equations.

Notice also that *i* superscripts the economic- and policy-outcome equations' constants, but not the participation constant. This indicates the country fixed-effects in all but the last; again, the coefficient estimates and the apparent implied stationarity of the dependent-variables seem much more empirically sensible allowing varying conditional means by country. The participation equation excludes these fixed effects, though, because several key explanators in that model, including some of core substantive interest on which we rely heavily for identification, like *MandVote* and *RegReq*, hardly vary over time.²⁴ (We allow these country dummies as exogenous instruments in all models though: see below.)

Finally, we have, as yet, not managed to compile measures of trade exposure to developing countries, *TExpD*, or of election competitiveness (a daunting task even to define the latter commonly across our heterogeneous sample of democracies). Accordingly, regressors in [20] involving those terms are grayed to signify that they are works in progress which do not yet exist to enter our current estimation models.

B. Data

For empirical estimation of the system [20], we assembled (building from the hard work and thanks to the generosity of others) a database covering 23 developed democracies²⁵ over 44 years, 1960-2003, although much less than that has ultimately proven usable (so far, without extensive imputation).

Skew is usually the limiting reagent, as inequality data is notoriously spotty, despite the Luxembourg Income Studies (Smeeding et al. 1990, Atkinson et al. 1995) and similar OECD efforts having improved matters greatly. We use data on earnings by population decile, generously given to us by David Rueda and to him by the OECD, Directorate for Education, Employment, Labour and Social Affairs (Pontusson and Rueda 2000), to construct 90-50 ratios as noted above. By linear interpolation of a few missing country-years (28 of the 360 total observations we assemble),²⁶ we gain unbroken annual series of at

²⁴ Plümer and Tröger (2007) offer an alternative strategy that could have been fruitfully applied here.

²⁵ Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Luxembourg, the Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, the U.K., and the U.S.

²⁶ We approach gathering and extending available data aggressively here and for all ensuing variables, by merging multiple

least a few years for 19 of 23 countries (Greece, Iceland, and Luxembourg drop, and Spain adds only 1995). S_{t-1} is the one-year time-lag of *Skew*; its spatial lag, S_{-i} , as with all the other spatial lags, is, for now, simply the unweighted average of that variable, that year, in the other countries in our dataset.

We obtain standardized unemployment rates, U , from the OECD via Armingeon et al.'s (2005: henceforth ALMP) impressive "Comparative Political Data Set, 1960-2003." Where possible, we expand coverage of these standardized unemployment-rate data (from 660 to 939 country-years) by country-specific linear regression on the unstandardized rates. The R^2 of these fitting models invariably exceed .9 (implying standardized rates relate to unstandardized ones within a country by a relatively fixed factor).

Following M&W, welfare/insurance spending, W , is OECD Social Benefits, excluding health and pension spending. Redistributive spending, R , is total spending minus that on all social benefits and military. We extend these data as generously provided to us by M&W, 1980-99 in 18 countries, to cover 1960-2002 almost fully (from 329 to 749 and 332 to 375 country-years for W and R), by regressing M&W's original data on the current Social Benefits and Public Health datasets from the OECD, plus current disbursements (total spending) from the OECD. This recreates M&W's procedure for the current, expanded-coverage dataset. The R^2 from these fitting models also usually exceed .9, approaching one (indicating perfect replication of M&W's procedure) in many cases.

We obtain participation data, P , specifically voter turnout as a share of eligible-age population, from ALMP, and smooth their series, $vturn$, which holds participation constant at the last election's rate until the next, by averaging the current, previous, and next-two years.

The age-demographic variables, $Pop65$ and $Pop14$, are from the OECD, via ALMP again.

The union-density data, $UDen$, active union members (i.e., excluding unemployed and retired) as a share of employment, are from Jelle Visser via ALMP and Golden et al. (1997) extended by regression on gross membership and the demographic data. The corporatism index, $Corp$, is Lane Kenworthy's.²⁷

Trade exposure, $TExp$, is from OECD sources via ALMP, and international-financial exposure, $FinExp$, is the sum of current- and capital-account openness from Quinn and Inclan (1997).

data sources on identical or highly related variables and, in a few instances, by linear-interpolation and trend auto-regressions, but these moves add almost no usable data for the current project beyond these few added to the *Skew* measures.

²⁷ See <http://www.u.arizona.edu/~lkenwor/WageCoorScores.pdf>.

Female labor-force participation rates, *FLFP*, are self-explanatory and taken from Huber and Stephens' (2004) award-winning "Comparative Welfare States Data Set."

We constructed stock-market capitalization, *SMC*, and returns, *SMR*, data directly from the Global Financial Database,²⁸ using all-market December 31 closing values divided by nominal GDP in domestic currency for the former and the year-on-year percentage change thereof for the latter.

We construct our government fragmentation, *GFRag*, polarization, *GPol*, and partisanship, *GPart*, indices from Thomas Cusack's rich, thorough, and usefully designed PGL (Parties, Governments, and Legislatures) dataset.²⁹ Using *GSppt*, the percentage legislative seat-share of the governing (cabinet) parties,³⁰ we obtain *GFRag* for majority governments ($GSppt > 1/2$) as the raw number of governing parties (counting non-partisans as $1/2$ a party). Raw numbers are a more appropriate representation of Tsebelis' veto-actor conception of fragmentation than effective (i.e., size-weighted) numbers (see Franzese 2002, ch. 3) because, in veto-actor theory, any governing party, regardless of size, can veto policy-change by virtue of the fact/assumption that its presence in government indicates its necessity to that coalition. If $GSppt < 1/2$ (minority government), *GFRag* is a *GSppt*-weighted count of the raw number of governing parties and the effective number of opposition parties. A minority coalition need not add all other parties to build a majority for policy-change, so using the raw number of opposition parties would exaggerate. Short of analyzing each parliamentary context separately, we compromise on a convenient proxy for the number of veto-acting opposition parties by weighing their counts by size (i.e., using effective numbers), reflecting a contention that larger opposition parties are more often likely to be necessary for minority governments to build legislative majorities. *GPol* likewise adopts a veto-actor conception of polarization, using the partisan-ideological range (size-unweighted) rather than (size-weighted) standard deviations or variances. *GPol* is the ideological range from leftmost to rightmost governing party if $GSppt > 1/2$ and the analogous range in the whole legislature in the case of minority government.³¹ To generate *GPart*, we

²⁸ <http://www.globalfinancialdata.com>

²⁹ http://www.wz-berlin.de/mp/ism/people/misc/cusack/d_sets.en.htm

³⁰ The president's party represents the cabinet party in all the following discussion for the US case. "Legislature" here always refers to the lower (more powerful) chamber in cases of bicameralism.

³¹ In future, we intend to correct this measure for its implicit assumption here that all legislative parties are veto actors. As with *GFRag*, minority governments need some but not all opposition parties to effect change, so we need some convenient

use Cusack's processing of the Comparative Manifestos Dataset into left-right scores for parties and of those into cabinet and parliament average positions. For $GS_{ppt} > 1/2$, we use the cabinet's score directly, and for $GS_{ppt} < 1/2$, we use the GS_{ppt} -weighted average of the cabinet and the legislature's scores.

We derive our measures of cumulative Social Democracy, SDG , and Secular Conservatism, SCG , and of current Christian Democratic Government (which sums center and right Christian and Catholic varieties), CDG , directly from Huber and Stephens' data on cabinet and legislative seat-shares, using Cusack's GS_{ppt} to supplement that as detailed above. For minority-governments, the party-types seat shares are the GS_{ppt} -weighted average of cabinet and legislative seat-shares; for majority governments, they are just the cabinet seat-shares. "Cumulative" means "sum from 1960".

Our presidentialism measure, $Pres$, equals 1 in presidential (Switzerland and the US), 0.5 in semi-presidential (Finland, France, Iceland, and Portugal), and 0 in parliamentary systems. It is from Golder's (2005) "Democratic Electoral Systems around the World, 1946-2000," and unfortunately does not vary over time within country in our sample. The natural log of (average) district magnitude (i.e., the number of representatives divided by the number of districts), $DMag$, is from Golder also, and it does vary some (not much) within country. Our measure of intra-party competition, IPC , is crude, as it merely sums indicators for plurality, majority, and transferable-vote electoral systems, taken from Golder (2005). We code the German mixed system, and the new ones in Italy, Japan, and New Zealand as 0.5, reflecting their roughly half plurality nature, although in the new Japanese case, the other half is transferable vote, so the indicator remains 1. Our measure of policymaking-power diffusion across elections, $PowDiff$, sums measures of effective federalism and of provincial elections importance from the World Bank "Database of Political Institutions" (Beck et al. 2001) plus Lijphart's indicators of effective bicameralism and prevalent referenda (i.e., Switzerland). $PowDiff$ varies some (not much) within countries.

Our pre-election-year indicator, E , allocates sums of 1 to the 365 days before lower-house elections³²

generalization here too to reflect that larger opposition parties are likely more often in veto-acting positions than smaller ones. Cusack's data provide several useful indicators of governing and opposition fragmentation and key-party ideological locations that could improve our $GPol$ measure, and also enhance our $Gfrag$ simplification.

³² The variable sums these year-prior allocations in the rare cases of multiple elections within one year. The US case is an exception, allocating 7/9 over the 365 days before an on-year election (reflecting the President, the House, and 1/3 of the Senate being elected) and 4/9 to the 365 days before off-year elections (House plus 1/3 the Senate).

(ALMP). The participation model also includes a measure of proximity of presidential to parliamentary elections, *Prox1* (taken from Golder 2005). Finally, *MandVote* and *RegReq*, our measures of compulsory voting and registration-requirement burdens derive from our own analysis of electoral-system data from the International Institute for Democracy and Electoral Assistance.³³ *MandVote* varies continuously from 0 to 1, according to the degree of enforcement (none=0, weak=.5, strong=1) times the severity of punishments (none=0, nominal fine or other weak sanction=.5, appreciable fine=1) times the share of the country's provinces in which the law is in force. *RegReq* simply indicates (0,1) whether a national voter-registry exists or voters must self-register.³⁴ These measures do not vary over time within country.

The system we can actually estimate at this time omits *TExpD* and *Comp*, those being unavailable, and also omits *Pres*, which has no within-country variation, from the equations with fixed effects.³⁵

B. Estimation Strategies

Estimation strategies for systems of equations are numerous and variegated, as are those for time-series-cross-section data, so the number and variety of combinations potentially appropriate to estimate our system of five equations from data in 18 countries over 17-18 years (on average) are multiplicatively great. We must consider whether to allow unexplained cross-country differences in conditional means as fixed (or random) effects, recognizing that failing to do so when such heterogeneity (conditional on the rest of the model) exists can bias estimation (if these omitted conditional-mean differences correlate with included regressors) and will induce inefficiency. On the other hand, whether such heterogeneity exists or not, doing so prevents the direct recovery of the effects of any time-invariant explanators and can severely compromise the estimation and complicate or obfuscate interpretation of the effects of slowly or rarely moving regressors (see Plümper and Tröger 2007). We must consider also whether to add any other variables from the right-hand side of the system to our list of endogenous variables. Failing to acknowledge the endogeneity of some right-hand-side variables will bias results, but treating variables as endogenous that are not (or that are not too importantly so) adds to the empirical identification burden of

³³ <http://www.idea.int>

³⁴ Information on the site may allow finer granularity measures of registration ease based on assistance provided.

³⁵ All the other variables entering the first four equations have at least some within-country variance, but several (as discussed above) have very little. Accordingly, their coefficients' estimates should be interpreted with extra caution (see note 24).

the remaining exogenous variables and to the researcher's difficulties discovering viable instrument sets. We should consider also whether we can add any further exogenous variables to the instruments beyond the current set, thereby gaining further crucial identification and estimation leverage if the additional conditions are true but inducing otherwise avoidable bias if they are not. Lastly, we should consider whether and how to use information in the data about cross-equation relations (like error covariances) or whether instead to estimate the equations separately. Estimating jointly can enhance efficiency appreciably; estimating separately forsakes these gains but isolates each equation's estimation from any specification or other sorts of errors in the other equations. All these considerations are in addition to the alternative plausible theoretical specifications mentioned for [20] above.

The range of options we have explored so far are the inclusion or exclusion of fixed effects, settling on including country dummies for the first four policy and outcome equations but not for the fifth, participation equation, which contains several substantively interesting regressors that move very slowly or rarely. We also weighed whether to include among the system's instruments these country dummies, a full set of year dummies, both, or neither. Here we chose both country and year dummies. We add *Skew times Participation* as the only endogenous right-hand-side variable not explicitly appearing on the left, but that then raises whether we should expand the instrument set to some or all products of some or all exogenous regressors in those equations. Fearing over-fitting in the instrumentation stage and thereby reintroducing endogeneity (especially since we already use full sets of year and country dummies as instruments), we chose not to do so. Lastly, we have also explored/reconsidered several theory-derived specification choices discussed above: (1) adding *Welfare/insurance* spending to *Skew* equation, (2) adding to the policy equations interactions of participation times unemployment and/or of government majority status or parliamentary support times the lagged dependent variable and whether to add further multiplicative instruments for the latter, (3) whether to treat the temporal and spatial lags as exogenous, and (4) whether to add a control for real GDP growth and, if so, whether to treat it endogenous.³⁶

Coefficient estimates are remarkably consistent across all combinations of these considerations and

³⁶ This last was sparked by some initial results regarding a surprising appearance of benevolent distributional effects of stock-market capitalization. Adding GDP growth to those economic-outcome equations erases or even reverses that implausible estimated effect, lending support to our hunch that the preliminary favorable results reflected *SMC* proxying real GDP growth.

options, with one major exception: without the country dummies, the coefficients on Skew, Participation, and their product reverse sign to negative, negative, positive rather than the positive, positive, negative of the results with fixed effects. (Wilson and Butler 2007 notice a similar reversal of M&W results with fixed effects.) Either pattern supports participation flattening the relations between inequality and policy, but neither supports the M&W model directly. None of the other choices matter nearly so much to the coefficient estimates, and the specifications with heterogeneous intercepts and more instruments will clearly be more efficient. Accordingly, we report the model estimated as a system by 3SLS, with country dummies on the right-hand side of [20a]-[20d] and both country and year dummies in the instrument list.

C. Results

Tables 1-5 present our estimation results, with significant results highlighted. We omit the country fixed-effect estimates to conserve space, but they are available upon request, as are all details and data. The results contain some strong support for certain aspects of previous theory, our own additions, and/or conventional wisdom, but also many notable surprises.

<Tables 1-5 About Here>

We focus our discussion on the causal relationships among the endogenous variables in our system of equations. Figure 1 summarizes these relations, with the arrows representing the statistically significant ones. To facilitate comparisons across variables, the numbers are standardized (beta) coefficients. The coefficients with one and two asterisks are statistically significant at the conventional .10 and .05 levels, respectively, and the coefficients without asterisks are marginally significant at $p\text{-value} < .15$.

<Figure 1 About Here>

We begin with the determinants of income skew and unemployment. In specifying our system of equations, we stressed that these economic variables could be affected by policy—redistribution policy in the income-skew case and both targeted welfare and redistribution policies in the unemployment case. Empirically, we find support for causal relationships of the two policy variables to unemployment. As critics allege, social-policy generosity does seem to undermine labor-market performance, increasing the unemployment rate. Interestingly, the size and statistical significance of the relationship from targeted

welfare spending to unemployment are much greater than those from redistribution to unemployment. Of course, this makes sense if unemployment benefits affect an individual's decision to work more strongly than do benefits which are not contingent on employment status. We find scant evidence, though, that redistribution causally affects *pre-tax-and-transfer* 90/50 ratios. Recall that our measures intentionally avoid the direct effects of redistribution policy on post-tax-and-transfer income-distribution. We also intentionally side-stepped the indirect effects on pre-tax-and-transfer income for individuals at the lower end of the distribution, which may of course be stronger than those involved in the 90/50 ratio.

We turn next to the determinants of our policy variables. The policy effects of income skew and participation are conditional, as expected, but the nature of that interaction is unexpected. We find that higher participation attenuates the relationship between skew and policy generosity, and concomitantly that the relationship of participation to social-policy generosity flattens with greater skew.³⁷ Nonetheless, at low political participation and income skew, the effects on social policy generosity from exogenous increases in either variable is positive and statistically significant, consistent with our theoretical expectations for median-preserving increases in income inequality. Note that Figure 1's standardized coefficients assume low participation (39.4%) and skew (1.44). From these standardized estimates, we would conclude that participation "matters" more for targeted welfare/insurance policies than for broad redistribution ones. For income skew, the reverse holds; a standard-deviation increase in skew explains a greater proportion of the sample variance in redistribution than in welfare/insurance policy.

We find little evidence of policy complementarity or substitutability. Exogenous increases in targeted welfare policy may reduce redistribution, suggesting policy substitution, but the reverse does not hold.

We also find that increases in unemployment cause *decreases* in targeted welfare spending, which is quite surprising, although perhaps plausible with endogenous unemployment given the magnitude of the labor-market distortions apparently unearthed in this analysis.

Finally, we consider the determinants of political participation. With respect to economic conditions, we find more surprises. No evidence of the expected negative relationship between unemployment and

³⁷ Note that these results, which account for important endogeneities, and also use much new data, apply several theoretical advances, and apply different methodologies and specifications, nonetheless strongly discord with Franzese (2002), ch. 2.

participation emerges, but we do find that income skew has a small, *positive*, and marginally significant effect on participation. This might reflect the high returns from redistribution for those at the lower end of the income distribution. The evidence for direct policy effects on political participation partially supports Hobolt and Klemmensen (2006) in that increases in redistribution spur participation, but we do not find evidence for similar pro-participatory effects of targeted welfare spending.

IV. Conclusions

Conflicts of interest over the generosity and structure of social policy include that between the relatively poor and wealthy—which produces the famous median-voter result that democratic demand for broad redistribution increases in the income skew—and that between the safely employed and the unemployed and precariously employed—which yields a different theoretical result: that inequality reduces median-voter demand for social insurance. In each case, the generosity and structure of social policy may itself affect simultaneously the efficiency of the labor market and the political participation of society's less fortunate, which affects the income and job-security status of the median voter. These considerations imply several endogenous relationships between economic performance (distribution and employment/income level), social policy (redistribution and social insurance), and political participation.

We then elaborated the theoretical expectations regarding these endogenous relationships, suggested identification conditions that derive from the theory and substance, and offered empirical estimates of the resulting system of equations. Our empirical analysis thereby improves upon extant studies that ignore the endogenous relationships among these political, economic, and policy variables. Substantively, our results suggest that income inequality and political participation *are* important causes of social-policy generosity in the developed democracies. However, our empirical results also revealed several puzzling surprises. Clearly much work remains to refine the empirical specification and analysis and perhaps, also, to reconsider and advance our current theoretical understandings of this endogenous system of employment-risk and income inequality, redistribution and insurance policies, and effective citizen input.

Table 1. Skew (S) Equation

	Coefficient	Std. Err.	Pr(T> t)
S_{t-1}	0.8196	0.0361	0.0000
S₋₁	0.0809	0.0308	0.0090
R	0.0002	0.0012	0.8970
Pop65	-0.0048	0.0032	0.1370
Pop14	-0.0039	0.0020	0.0560
UDen	-0.0005	0.0005	0.3380
Corp	-0.0040	0.0019	0.0330
FinExp	0.0027	0.0016	0.1030
TExp	-0.0003	0.0003	0.3580
FLFP	0.0002	0.0005	0.6970
SMC	0.0000	0.0001	0.8960
SMR	-0.0001	0.0001	0.4490
SMC*SMR	0.0000	0.0000	0.4000

Summary Statistics for Equation

Observations	Parameters	RMSE	R-sq
311	29	0.0238	0.9797

Table 2. Unemployment (U) Equation

	Coefficient	Std. Err.	Pr(T> t)
U_{t-1}	0.6364	0.0318	0.0000
U₋₁	0.2069	0.0450	0.0000
W	0.3950	0.0470	0.0000
R	0.0495	0.0331	0.1350
Pop65	-0.1111	0.0835	0.1830
Pop14	-0.0907	0.0551	0.1000
UDen	0.0025	0.0131	0.8470
Corp	-0.0371	0.0502	0.4600
FinExp	0.0323	0.0409	0.4290
TExp	0.0381	0.0094	0.0000
FLFP	-0.1001	0.0166	0.0000
SMC	-0.0152	0.0025	0.0000
SMR	0.0007	0.0026	0.8000
SMC*SMR	0.0001	0.0001	0.2430

Summary Statistics for Equation

Observations	Parameters	RMSE	R-sq
311	30	0.6253	0.9508

Table 3. Redistribution (R) Equation

	Coefficient	Std. Err.	Pr(T> t)
R_{t-1}	0.9151	0.0322	0.0000
Gfrag*R_{t-1}	0.0031	0.0119	0.7930
GPol*R_{t-1}	-0.0002	0.0005	0.7560
R₋₁	0.1275	0.0575	0.0270
S	12.1539	3.3458	0.0000
P	0.2145	0.0871	0.0140
S*P	-0.1201	0.0461	0.0090
W	-0.1077	0.0469	0.0220
Pop65	0.0060	0.0706	0.9330
Pop14	0.0078	0.0470	0.8680
UDen	0.0049	0.0133	0.7100
Corp	-0.0774	0.0441	0.0790
FLFP	0.0011	0.0153	0.9420
CumSDG	-0.1348	0.0888	0.1290
CumSDG*FLFP	0.0026	0.0013	0.0480
SMC	-0.0092	0.0019	0.0000
ln(DMag)	-0.0676	0.0438	0.1230
IPC	-0.1801	0.3157	0.5680
PowDiff	-0.0037	0.0998	0.9710
Gfrag	0.0643	0.1746	0.7130
GPol	0.0012	0.0069	0.8650
GPart	-0.0096	0.0028	0.0010
CurrCDG	0.2439	0.4105	0.5520
E	-0.0016	0.0821	0.9840

Summary Statistics for Equation

Observations	Parameters	RMSE	R-sq
311	40	0.5072	0.9835

Table 4. Welfare/Insurance (W) Equation

	Coefficient	Std. Err.	Pr(T> t)
W_{t-1}	0.8062	0.0484	0.0000
Gfrag*W_{t-1}	0.0212	0.0110	0.0540
GPol*W_{t-1}	-0.0002	0.0006	0.7310
W_{-i}	0.2232	0.0595	0.0000
U	-0.0577	0.0377	0.1260
S	8.4677	3.2131	0.0080
P	0.2080	0.0842	0.0140
S*P	-0.1069	0.0433	0.0130
R	0.0143	0.0230	0.5360
Pop65	-0.0022	0.0685	0.9740
Pop14	-0.0340	0.0395	0.3900
UDen	0.0074	0.0115	0.5180
Corp	-0.0508	0.0347	0.1430
FLFP	-0.0320	0.0133	0.0160
CumSDG	-0.1172	0.0761	0.1230
CumSDG*FLFP	0.0026	0.0011	0.0220
CumSCG	0.0115	0.0171	0.5000
SMC	-0.0084	0.0017	0.0000
ln(DMag)	-0.1092	0.0328	0.0010
IPC	-0.1561	0.2442	0.5230
PowDiff	-0.0471	0.0863	0.5850
Gfrag	-0.1366	0.1059	0.1970
GPol	0.0014	0.0049	0.7770
GPart	-0.0056	0.0024	0.0180
CurrCDG	0.0084	0.3122	0.9790
E	0.0255	0.0620	0.6810

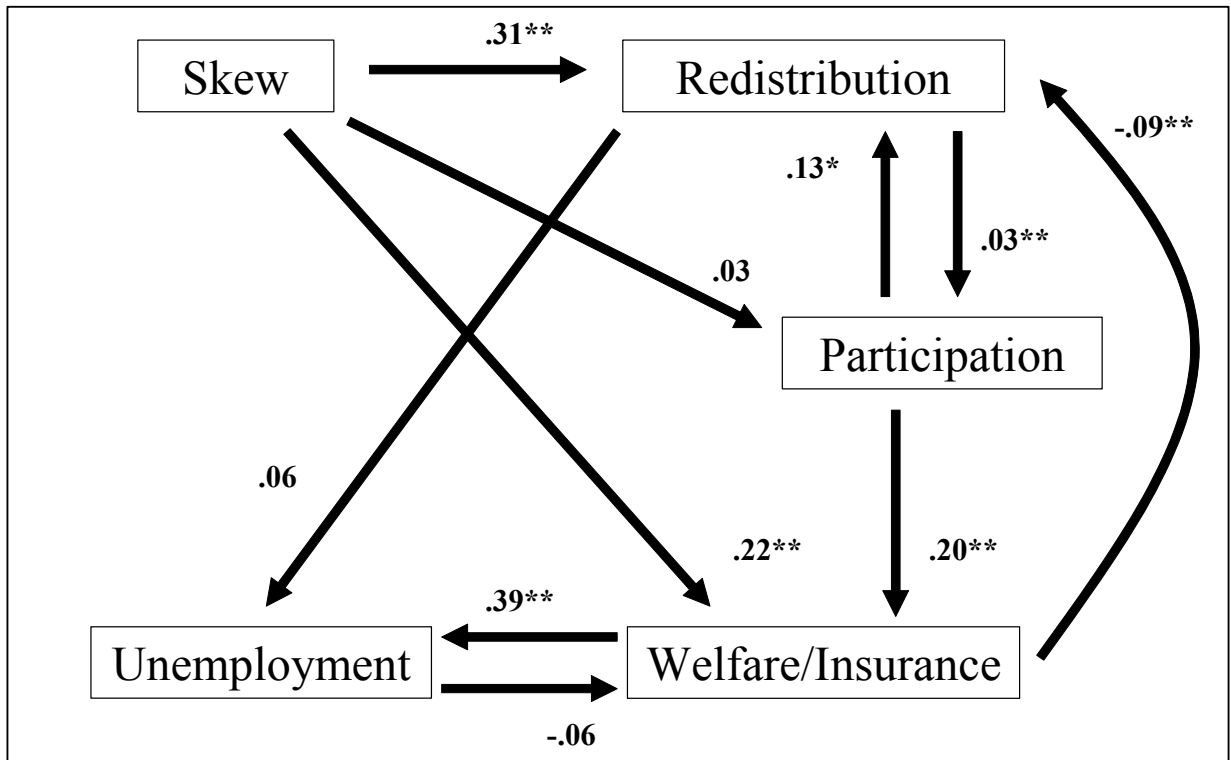
Summary Statistics for Equation

Observations	Parameters	RMSE	R-sq
311	42	0.3918	0.9860

Table 5. Participation (P) Equation

	Coefficient	Std. Err.	Pr(T> t)
P_{t-1}	0.9269	0.0208	0.0000
U	-0.0421	0.0562	0.4540
S	1.9459	1.2057	0.1070
R	0.0918	0.0468	0.0500
W	0.0571	0.0796	0.4730
Pop65	-0.1585	0.0747	0.0340
UDen	0.0301	0.0108	0.0060
FLFP	-0.0147	0.0133	0.2690
Pres	-1.5602	0.6080	0.0100
PresProx	2.3025	0.4866	0.0000
ln(DMag)	-0.0072	0.0763	0.9250
IPC	-1.1866	0.5831	0.0420
PowDiff	-0.1322	0.0575	0.0220
MandVote	1.8808	0.5580	0.0010
RegReq	-1.3230	0.6651	0.0470
Summary Statistics for Equation			
Observations	Parameters	RMSE	R-sq
311	15	1.4657	0.9891

Figure 1: Causal Relationships among the Endogenous Variables



Notes: The numbers are standardized coefficients. The conditional coefficients for skew and participation are calculated assuming low participation (39.4%) and low skew (1.44) respectively. *p-value < .10, **p-value < .05. Coefficients without asterisks are marginally significant at p-value < .15.

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