Confronting the Endogeneity of Economy, Policy, and Politics: Inequality & Unemployment, Redistribution & Social Insurance, and Political Participation

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ABSTRACT: Conflicts of interest over the generosity and structure of redistribution and social insurance (jointly: *social policy*) include that between the relatively poor and wealthy—which yields the familiar result that median-voter demand for broad redistribution increases in the income skew—and that between the safely employed and the unemployed or precariously employed—in which, instead, 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 the less fortunate, which latter affects the identity and so the income and job-security status of the median voter. Previous literature has generally emphasized one of these causal connections to the exclusion of the others, but their combination unavoidably indicates a system of endogenous relations between economic performance (unemployment/income-distribution), social policy (redistribution/social-insurance), and political participation. This paper represents an attempt to elaborate the nature of these endogenous relationships, to suggest plausible identification conditions derived from relevant theory and substance, and to offer empirical estimates of the resulting system of equations.

I. Introduction

One familiar line of political-economic theory emphasizes how the median voter, being poorer than average, favors broad-based income-redistribution; indeed, the median's desired amount of redistribution increases in the skew of the income distribution (Meltzer & Richard 1978, 1981). Another, more recent strand of thought stresses instead the conflicting interests between the safely employed and the non- or precariously employed (Moene & Wallerstein 2001, Rueda 2005); from this perspective, inequality (i.e., poorer medians) reduces median-voter demand for social insurance, insurance being a normal good. In either case, though, the generosity and structure of redistribution and social insurance (call these jointly: *social policy*) will simultaneously directly affect distributional outcomes in the labor market (Atkinson et al. 1995, Danziger & Gottschalk 1995, Gottschalk & Smeeding 1997, Smeeding et al. 1990), and thereby indirectly affect the efficiency of the labor market as well (e.g., Layard et al. 1990). Furthermore, these economic outcomes (Franzese 2002, ch. 2) and these social policies (Hobolt & Klemmenson 2006) will both simultaneously affect political participation by society's less fortunate, which in turn affects the identity and so the income and job-security status of the median voter. In sum, economic outcomes affect social policies and political participation; social policies affect economic outcomes and political participation; and political participation affects social policies.[1] Previous literature has generally emphasized one of these causal connections to the exclusion of the others, but their combination unavoidably indicates a system of endogenous relations between economic performance (unemployment/income-distribution), social policy (redistribution/social-insurance), and politics (here

[1] The only omitted path among the six possible reflects the likelihood that political participation does not affect economic outcomes except through its impact on policies.

summarized by political participation). This paper represents our attempt to confront this previously ignored gorilla in the room, i.e., to elaborate these endogenous relationships, to derive plausible identification conditions from relevant substantive theory, to estimate empirically the resulting system, and to interpret and discuss those estimates.

II. Summary of Theoretical Conclusions

In previous work (Franzese & Hays 2008c), we began with the Moene & Wallerstein (2001) (M&W) model of inequality, unemployment, and median-voter demand for redistribution (defined as public benefits going universally to all citizens) and social insurance (defined as public benefits targeted solely to the jobless without incomes). We first showed how the classic Meltzer & Richards (1981) (M&R) model, connecting the median-voter's desired redistribution directly to the skew of the income distribution, obtains as a special case of the M&W model with full employment (and so also no distinction between universal and targeted benefits). With unemployment but without targeting of benefits, some insurance motivation for those universal benefits arises, but the equilibrium remains otherwise identical to M&R. Thus, both unemployment and the ability to target benefits thereto are keys to the M&W model.

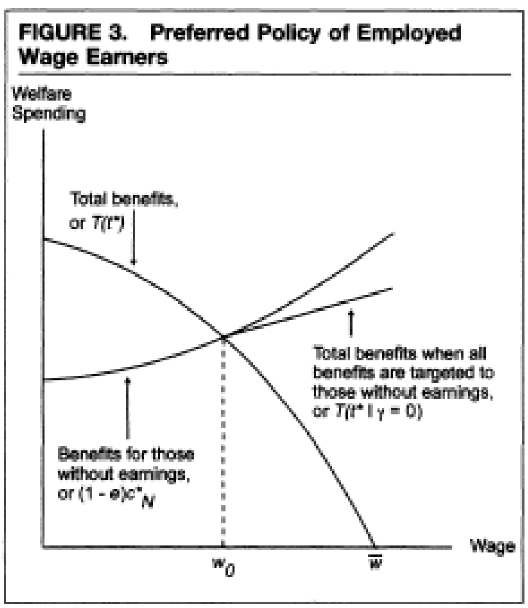
In that M&W model, population shares σ_0, σ_H, and σ_L are, respectively, the permanently unemployed; high-income (w_H) earners who face no appreciable employment risk; and low-income (w_L) workers who face some risk, α, of losing their income (job). Job-losers have probability β of regaining employment, giving respective steady-state (un)employed population-shares of $e=\sigma_H+\frac{\beta}{\alpha+\beta}\sigma_L$ and $u=\sigma_0+\frac{\alpha}{\alpha+\beta}\sigma_L$. Governments levy a proportionate income-tax at rate t, all revenue from which, T, is spent, yielding $T=\tau(t)e\overline{w}$, where $\overline{w}\equiv\frac{1}{e}\left[\sigma_H w_H+\frac{\beta}{\alpha+\beta}\sigma_L w_L\right]$ are average wages and $\tau(t)$ is revenue as a share of earnings. Strictly concave $\tau(t)$ incorporates deadweight losses, with $\tau'(0)=0$ and $\tau(0)=\tau(1)=0$. Finally, a share, γ, of revenues (*cum* expenditures), T, goes to current earners, with the remaining $(1-\gamma)T$ going to the unemployed. For our purposes, the most important results from the M&W model are these:

- With exogenous targeting (γ fixed), a mean-preserving increase in income skew (a reduction in w_L

holding $\overline{w}$ fixed) raises the median voter's[2] preferred social-policy generosity (t^*) if all benefits go to the employed ($\gamma=1$) and lowers her preferred safety-net if all benefits go to the unemployed ($\gamma=0$). I.e., inequality increases broad redistribution but decreases targeted social-insurance.

- With endogenous targeting (both γ and t^* chosen democratically), a mean-preserving increase in income skew (a reduction in w_L holding $\overline{w}$ fixed) increases the median voters' preferred targeting of benefits to the employed (γ). Unconstrained desired-redistribution is increasing, and desired-insurance is decreasing, in inequality. With desired-insurance rising and the desired-total declining with equality, however, at some point all spending is targeted to the unemployed ($\gamma=0$). At this point, denoted $w_m=w_0$, funding of the desired insurance becomes constraining. The net implications are:
    - A monotonic-positive relationship of equality to insurance (safety-net) spending, although with a kink at w_0 and a flatter positive relationship as wages-*cum*-equality rise beyond w_0;
    - A weakly monotonic-negative relationship of equality to redistribution spending, being strictly negative through w_0 but flat at greater equality.
    - A non-monotonic relationship of equality to total social-policy spending (social insurance + redistribution), with the sum declining as equality increases to w_0, kinking there, and then rising as wages-*cum*-equality increase further.

M&W Figure 3 (reprinted with permission) illustrates these conclusions graphically:



The figure reads as follows. All considerations are of *mean-preserving* movements in inequality, which M&W consider as movements of w_L relative to *fixed* $\overline{w}$. As w_L increases (skew decreases), the desired, unconstrained level of benefits to the unemployed strictly increase (the smoothly upward-sloping curve)

[2] M&W consider three classes, {H,L,0}, of which they assume L the median.

and that of total social-spending strictly declines (the downward-sloping curve). The unconstrained, desired share of spending targeted to the unemployed/employed (the ratio of the preceding two curves) also strictly increases/decreases. However, beyond some wage-*cum*-equality level, w_0, unconstrained desired insurance exceeds the unconstrained desired total, so the constraint binds. Beyond this w_0, all spending targets the unemployed, and this insurance-*cum*-total spending remains upward-sloping in wages-*cum*-equality, although with the desire to restrain total taxes dampening the slope. In equilibrium: (*i*) targeted social-insurance strictly rises with w_L (equality), albeit with a kink at w_0 and more slowly thereafter; (*ii*) total social-spending (insurance+redistribution) 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.

M&W discuss only mean-preserving skew-increases, which they consider as falling median-incomes and fixed mean-incomes. In previous work, we extended M&W to consider median-preserving skew-increases, conceived as rising mean with fixed median incomes, i.e., as "yachts outpacing tugboats and tugboats,"[3] far the more-common case empirically. In Figure 3, raising $\overline{w}$ holding w_i fixed are shifts of the curves rather than moves along them. The $T(t^*)$ curve shifts outward as the base for the median to tax increases while her own income stays fixed. Accordingly, she wants greater social spending at whatever w_i she has stagnated. The larger tax-base also enables the median to increase safety-net consumption, and, insurance being a normal good, she will. Thus, both curves shift outward; i.e., median-preserving skew-increases raise safety-net and total social-policy spending. Using the explicit equations graphed in Figure 3 (but not given here), we showed that the share of spending on the employed, γ, and so its level, must also increase. Finally, with both curves shifting upward but the total-spending curve more so, the kink point, w_0, beyond which wage (equality) level all spending is insurance-targeted, must also shift outward (to a higher wage). Therefore, in the equilibrium with $\gamma^* < 1$, median-preserving skew-increases raise total social-policy spending, insurance (unemployed-targeted) spending, redistribution (employed-targeted) spending, and the share of redistribution in the total; and this unconstrained equilibrium applies through greater equality-levels. These notable differences between the effects of *top-pulled* and *bottom-*

[3] We heard the catchy phrase from, and attribute it to, Tim Smeeding, whose work is among that establishing its commonality.

dragged increases in skew, given the empirical prevalence of the former, imply that empirical results should differ greatly depending on whether the average income-level is controlled. With/without such control, we would expect to find effects of mean-/median-preserving increases in skew, respectively.

Our previous extensions also included replacing M&W's three discrete classes with continuous voter heterogeneity and exploring correlation of unemployment-risk to income. The main implications were a flattening of the upward-sloping curve relating w_i to insurance spending in Figure 3 because the income-effect, which alone had operated and which had induced the median's desired insurance to decline as she grew poorer, is now offset by a substitution effect as her unemployment-risk rises in tandem. Assuming that the median is employed the majority of her life, this flattening does not switch sign of the slope nor does it alter that this curve will cross the (essentially unchanged) downward-sloping total-spending curve at some $w_0 < \overline{w}$ and continue upward, flatter still, thereafter. Thus, the equilibria as previously described remain qualitatively accurate, but the flattening of the curve likely also implies that w_0 shifts rightward, expanding the range of income skews over which the simpler unconstrained results hold.

Penultimately, consider that some citizens participate more and/or more effectively politically. The the relevant population in democratic policy-choice, obviously, are *voters* (more generally: the *politically active*), and, in these models, specifically the <u>*median*</u> *voter* (or *effective-participant*). Moreover, that the relatively wealthy have higher propensity to vote than the relatively poor is well established empirically (e.g., Verba et al. 1978, Wolfinger & Rosenstone 1980, Harrop & Miller 1987). Generally (see Franzese 2002:72-4), this implies that the median *voter* will be poorer (and closer to the median *person*) as voter participation increases. In Figure 3, as participation declines, one should read median-*voter* preferences from a wage higher than the population median; i.e., both curves flatten. If unemployment risk also declines with income, the insurance-spending curve will shift downward as well.[4] Again, this all means w_0, and the associated kinks in the redistribution/insurance-skew relationships, shift outward. Voting, finally, can serve here to summarize effective political participation for two reasons. First, as voting declines, the relative prevalence and influence of other participatory modes likely increases. Second,

[4] Intuitively, in the limit, with no effective political participants, i.e., in pure autocracy, both curves are flat (at zero), and policy is completely insensitive to societal interests.

socioeconomic status correlates even more strongly with extra-electoral participation—most obviously, sizably, and notoriously: contributions: "[C]lass differences in mobilization typically aggravate rather than mitigate the effects of class differences in political resources," Rosenstone & Hansen (1993:241; Verba et al. 1978, 1995). Therefore, not only does electoral representation of the poor and high-unemployment-risk decline as turnout falls, but the extent and influence of extra-electoral participation also rise and disadvantaged groups are still less-well represented there.

Finally, we turn at last to the previously ignored gorilla in the room: endogeneity. The distributional and employment outcomes that are the key explanators in these political-economic models of social policy, skew and unemployment-risk, are themselves affected by the redistribution and social-insurance policies aimed at ameliorating them. If income and income-skew are measured post-tax-and-transfer, then obviously social policies affect them as much as vice versa. However, even considering pre-tax-and-transfer skew or unemployment, these social policies have important disincentive and distortionary effects. Indeed, these effects are the subject of huge literatures in welfare economics. Likewise, political participation should condition these relations of economic outcomes to policies, yet it, too, is endogenous to economic conditions whose effects on social policies we argue it moderates.[5] Therefore, empirical exploration of the theoretical propositions above simply must confront the endogeneity of economy, policy, and politics. We will adopt a simultaneous system-of-equations approach, attempting to identify the five endogenous outcomes by theoretically/substantively motivated restrictions.

III. Confronting the Gorilla: An Empirical System of Equations for Inequality & Unemployment, Redistribution & Social Insurance, and Political Participation

A. Identifying the System of Equations

Our system involves two economic conditions, U=unemployment and S=skew; two social policies, I=social insurance and R=redistribution; and P=political participation:

$$S = s(U,R,I,P,\bullet,\varepsilon_s);\quad U = u(S,R,I,P,\bullet,\varepsilon_U);\quad R = r(S,U,I,P,\bullet,\varepsilon_R);\quad I = i(S,U,R,P,\bullet,\varepsilon_I);\quad P = p(S,U,R,I,\bullet,\varepsilon_P) \qquad \textbf{[1]}$$

In general, to identify a system of M simultaneous equations—here, M=5—we must "tie down" $M(M-1)$

[5] Notice that the expected mutually positive feedback in equality, unemployment, redistribution, insurance, and participation raises the possibility of multiple political-economic equilibria, with two basins of attraction—one of high and one of low political participation, insurance and redistribution, unemployment and equality—consonant with Alesina and Angeletos' (2005ab) social-policy multiple-equilibria, but of political-participation rather than of societal-preference provenance.

terms—here: 5*x*4=20—by sufficient restrictions on the equations deriving from some *extra-empirical* information (Greene 2003:378-95). We follow the most-common strategy of providing such identifying information, that of imposing exclusions, i.e., that some variables from among these five endogenous ones and/or the other regressors (represented by • in [1]) are excludable from some equations. Each excluded right-hand-side variable reduces the number of parameters to estimate by one per variable per equation. In words, exclusion assumptions/arguments are statements like: "Variable *z* affects one or some set of the endogenous variables but does not affect others except in so far as it affects (causes) the first one or set." If, for example, we could find five variables that *enter*, in this sense, only one unique equation each, then each would give four restrictions (namely, that the coefficient on each variable in the other four equations is zero), yielding the minimum 5*x*4=20 needed, *just-identifying* the system. Finding more than the minimum additional outside information, i.e., *over-identifying* the system, adds efficiency ("ties down the system more firmly") and opens the possibility of testing over-identifying restrictions.

B. Identification by Exclusions among the Endogenous Variables

Consider the endogenous variables, *S*, *U*, *R*, *I*, and *P*, first. Starting with the economic outcomes, the M&W model indicates that *S*kew and not *U*nemployment enters the *R*edistribution equation, and our elaborations modified this conclusion only by extending its empirically applicable range. We argue that *U*nemployment does not enter our *S*kew equation either, at least not strongly directly. The zero wages of the unemployed do directly affect mean wages, *S*kew's theoretical denominator, but this effect is likely small: e.g., 10% unemployment lowers mean wages by 0.1 times the (likely low) wages when working of the jobless. Further, because extremes do not directly affect percentiles, such as the median (50^{th}), and because the jobless come mostly from lower ends of wage/income distributions, we can evade much of even this small direct simultaneity by using percentile ratios instead of median-to-mean ratios to measure *S*kew, especially if we use higher percentiles. That is, 90-50 ratios provide stronger basis for some of the exclusion restrictions we intend to impose than median-to-mean ratios or the 90-10 ratios commonly used. Then, too, *U*nemployment adds labor-supply competitors and so affects all percentiles' wages, but again mostly the lower percentiles that compete more directly with the jobless. Finally, the median-to-mean ratios of the theory, which are less widely available empirically, will relate more tightly to 90-50 than 50-10 or 90-10 ratios since the 90th-percentile numerator more heavily influences the mean than the does the 50th and since the denominator is the desired measure exactly. *U* does enter the other equations though: *P*articipation because the unemployed tend to drop from political as well as economic activity, and *I*nsurance, obviously, the unemployed being its target. Also obviously and analytically central, *S*kew enters both the *R*edistribution and *I*nsurance equations in the M&W model, and, by our discussion, the *P*articipation equation too. Finally, *S*kew should not affect *U*nemployment except *via* its policy effects.

Turning to the policy variables, *R*edistribution clearly enters the *S*kew equation, especially insofar as our *S* measure reflects the post-tax-and-transfer income-distribution, such being the intent (and effect: Atkinson et al. 1995, Danziger & Gottschalk 1995, Gottschalk & Smeeding 1997, Smeeding et al. 1990). *R*edistribution indirectly affects even pre-tax-and-transfer *S*kew though, and also *U*nemployment, as it alters labor-market functioning, e.g., by raising reservation wages. The same argument places *I*nsurance in the *U*nemployment equation, but it would not enter our 90-50 *S*kew as the safety net directly aids only the jobless, lowest (wage-zero) end of the distribution. Next, although *R*edistribution and *I*nsurance correlate in the M&W model only because both relate to *S*kew,[6] we nonetheless enter each in the other's equation in recognition of likely (unmodeled) policy-substitute or -complement effects. Lastly, following Hobolt & Klemmensen (2006), who argue and find (albeit without redressing the endogeneity problems stressed here) that social-spending recipients have higher propensity to vote even controlling for their post-tax-and-transfer SES—perhaps responding to a sense that policy regards, and so politics involves, them—we include both social policies and both economic outcomes in the participation equation.

Political *P*articipation, finally, should affect the policy variables, *R* and *I*, but any effect on economic outcomes would surely work through policy. The remaining system is thus:

$$S = s(R, \bullet, \varepsilon_S);\quad U = u(R, I, \bullet, \varepsilon_U);\quad R = r(S, I, P, \bullet, \varepsilon_R);\quad I = w(S, U, R, P, \bullet, \varepsilon_I);\quad P = p(S, U, R, I, \bullet, \varepsilon_P) \qquad \textbf{[1a]}$$

C. Identification by Exclusions among the Exogenous Variables

[1a] reflects imposition of the six exclusions so far, reducing the coefficients to identify from twenty to fourteen. We introduce next some potentially exogenous regressors and discuss their in/exclusions. These regressors relate to demographics: **D** (e.g., the age distribution); socio-economic institutional and

[6] *R* and *I* relate directly only past some critical equality-level, w_0, at which *I* exhausts revenue.

interest structure: **SIS** (e.g., trade exposure and structure); domestic political institutions: **DPI** (e.g., governmental and electoral systems); and current political contexts: **CPC** (e.g., government partisanship and electoral competitiveness). Additionally, we might find further (imperfect) identification leverage in the international (i.e., spatial) interdependence of the economic-outcome and policy dependent-variables, i.e., in economic conditions and policies abroad, which we will write $U_{\sim i}$, $S_{\sim i}$, $R_{\sim i}$, and $I_{\sim i}$. Thus:

$$\begin{gathered} S=s\left(R,S_{\sim i},\mathbf{D},\mathbf{SIS},\mathbf{DPI},\mathbf{CPC},\varepsilon_S\right);\; U=u\left(R,I,U_{\sim i},\mathbf{D},\mathbf{SIS},\mathbf{DPI},\mathbf{CPC},\varepsilon_U\right) \\ R=r\left(S,I,P,R_{\sim i},\mathbf{D},\mathbf{SIS},\mathbf{DPI},\mathbf{CPC},\varepsilon_R\right);\; I=i\left(S,U,R,P,I_{\sim i},\mathbf{D},\mathbf{SIS},\mathbf{DPI},\mathbf{CPC},\varepsilon_I\right) \\ P=p\left(S,U,R,I,\mathbf{D},\mathbf{SIS},\mathbf{DPI},\mathbf{CPC},\varepsilon_P\right) \end{gathered} \quad \textbf{[1b]}.$$

1. Spatial Interdependence: Insofar as economic conditions diffuse across borders by investment and trade flows, and international competition in general, economic conditions abroad, $S_{\sim i}$ and $U_{\sim i}$, can enter the *S*kew and *U*nemployment equations as regressors that would plausibly affect the others only through these *domestic* economic outcomes. Analogously, a nation's competitors'/partners' policies affect the costs and benefits of its domestic policies (e.g., Hallerberg & Basinger 2004; Franzese & Hays 2003, 2006b, 2007ab, 2008a), so $R_{\sim i}$ and $I_{\sim i}$ may enter the *R*edistribution and *I*nsurance equations. (Cross-national dependence of mass participation seems rather unlikely: Kayser 2007.) As Franzese & Hays (2004, 2006a, 2007cd, 2008ab) explain and explore, such spatial-lag regressors raise endogeneity issues of their own; if, e.g., France affects Germany and Germany affects France, then the spatial lag, being a weighted average of the dependent variable in the other (~*i*) units, is endogenous. However, this *spatial-simultaneity* bias may be small enough and/or redressed effectively enough by our time-lagging it (an imperfect stratagem), and the identification leverage that these spatial lags offer upon the simultaneity of central interest here (outcome and regressor simultaneity *within* units) large enough, to render usage of spatial lags as *quasi-instruments* (see Bartels 1991) advantageous.

Each quasi-instrumental spatial-lag enters one equation and so brings four exclusions, 16 more in total, two more than the 14 remaining to fulfill the *necessary* rank condition for identifying our system. The order condition, however, which is necessary and sufficient with the rank condition, and which requires that the exclusions equaling or exceeding *M(M-1)* (here: 20) are distributed across the equations such that each is *tied down* by at least one unique exogenous aspect of its specification, is not satisfied yet. The *P*articipation equation as-yet lacks such unique exogenous component, and so is unidentified, whereas the *I*nsurance equation is just-identified, basically by its quasi-instrumental spatial-lag, and the *S*kew, *U*nemployment, and *R*edistribution equations are all over-identified, having both their own unique quasi-instrumental spatial-lags and three, two, or one further exclusions, respectively, from among the endogenous variables. We would also not want to rest system identification solely on quasi-instrumental variables, so we turn now to find further leverage in some of the other exogenous regressors.

2. *Demographics*: Demographic variables, **D**, may provide some regressors the exogeneity of which is more certain.[7] Unfortunately, though, most demographics relevant to one of the outcome variables would also affect most or all the others. The over-65 share of the population, *Pop65*, for instance, should affect *R*edistribution and/or *I*nsurance (insofar as public pensions and other age-dependent spending, like health and child care, comprise those measures), but age-demographics like these certainly affect employment and income-distribution outcomes directly also (see, e.g., Smeeding & Sullivan 1998). Age also has among the most robust and sizable known effects on voter participation, so *Pop65* likely enters all the equations and so, while exogenous, provides no identification leverage for any of them (unless we could determine that it enters them differently, which we cannot). The under-15 population share, *Pop14*, also causally relates to economic outcomes, surely *U*nemployment and perhaps *S*kew, but, again, social-policy spending clearly depend on *Pop14* too—e.g., education and related spending programs. Perhaps, *P*articipation being a share of the eligible-age (i.e., over-15) population, might exclude *Pop14*.

Our system is now identified (if we credit the quasi-instrumentality of the spatial lags):

$$\begin{gathered}
S = s\left(\widehat{R}, \underline{\underline{S_{\sim i}}}, Pop65, \underline{Pop14}, \mathbf{SIS}, \mathbf{DPI}, \mathbf{CPC}, \varepsilon_S\right);\ U = u\left(\widehat{I}, \widehat{R}, \underline{\underline{U_{\sim i}}}, Pop65, \underline{Pop14}, \mathbf{SIS}, \mathbf{DPI}, \mathbf{CPC}, \varepsilon_U\right) \\
R = r\left(\widehat{S}, \widehat{I}, \widehat{P}, \underline{\underline{R_{\sim i}}}, Pop65, \underline{Pop14}, \mathbf{SIS}, \mathbf{DPI}, \mathbf{CPC}, \varepsilon_R\right);\ I = i\left(\widehat{U}, \widehat{S}, \widehat{R}, \widehat{P}, \underline{\underline{I_{\sim i}}}, Pop65, \underline{Pop14}, \mathbf{SIS}, \mathbf{DPI}, \mathbf{CPC}, \varepsilon_I\right) \\
P = p\left(\widehat{U}, \widehat{S}, \widehat{R}, \widehat{I}, Pop65, \mathbf{SIS}, \mathbf{DPI}, \mathbf{CPC}, \varepsilon_P\right)
\end{gathered} \qquad \textbf{[1c]}.$$

In **[1c]**, we 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 of others, and single-underlining regressors that do not appear in all equations, which provide leverage on those outcomes from which we exclude them.

3. Socio-Economic Institutional and Interest Structures: Next, consider **SIS** factors, like unionization

[7] Even demographics are not entirely unproblematic because, to give just one example, *retirement age* affects pensioner-targeted spending, is politically determined, and may be set in response to the amount and costs of *I*nsurance spending.

and corporatism, trade exposure/structure, stock-market capitalization/outcomes, and female labor-force participation. Unions serve to enhance and protect members' wages, and evidence that they affect wage and income distributions is rife (e.g., Freeman 1991). Union density, *UDen*, enters the *S*kew equation, and, largely as consequence of this aim and effect, unionization exacerbates insider-outside conflicts that can spur unemployment, so *UDen* enters the *U*nemployment equation too. High *UDen* also represents likely effective political influence favoring *R*edistribution and *I*nsurance spending, and union members, in strongly empirically supported theory, have greater propensity to participate politically. Thus, *UDen* enters all equations, yielding no identification leverage. Likewise corporatism, *Corp*, or the coordination or centralization of labor organization, centrally affects wage and employment outcomes including *S*kew and *U*nemployment, and the balance of political influence on *R*edistribution and *I*nsurance. However, *Corp* seems unlikely to affect voter participation beyond the positive effect already accounted by *UDen* except via its policy and outcome effects, so we exclude *Corp* from the *P*articipation equation.

By Stolper-Samuelson and related trade theories, trade exposure, *TExp*, and especially exposure to trade with developing (labor-rich/capital-scarce) economies, *TExpD*, should increase some combination of *S*kew and *U*nemployment. The impact concentrating in the latter/former to the extent real-wage or -price inflexibility/flexibility exists (e.g., due to monopoly union or firm power). By similar reasoning, openness and, especially, trade with developing countries would also shape *R*edistribution and *I*nsurance demand (e.g., Cameron 1984, Katzenstein 1985, Rodrik 1998). However, insofar as these policy effects of trade occur because of, i.e., through, the Stolper-Samuelson and related employment and wage effects, we can exclude these trade-structural variables from the policy outcomes. Likewise, trade structure may affect *P*articipation, 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 in these regards.

Huber & Stephens (2001) argue that historical Social-Democratic, Christian-Democratic, or Secular-Conservative governance (*SDG*, *CDG*, *SCG*) shapes the generosity and structure social policy. As such, these factors enter 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 that *SDG* and *CDG*, but not *SCG*, legacies involve strong social-insurance generosity. Conversely, neither the *SCG* nor the *CDG* legacies involve the generous general *R*edistribution of *SDG*. Accordingly, we can capture these hypotheses succinctly by including just *SCG* in the *I*nsurance equation, expecting a negative coefficient, and just *SDG* in the *R*edistribution equation, expecting a positive one.[8]

Next, female labor-force participation, *FLFP*, may operate analogously to demography in shaping *S*kew and *U*nemployment and may spur both demand for and supply of *R*edistribution and *I*nsurance. Indeed, the policy-response to *FLFP*[9] likely depends on whether *SDG*, *CDG*, or *SCG* historical legacy predominates because both the latter two have supported *FLFP* far less (Huber & Stephens 2001). We suspect also that *FLFP*, or more exactly its societal and other roots, may affect *P*articipation as well—i.e., what favors female labor-force participation likely favors female electoral participation as well—but its interaction with *SDG* is unlikely to affect *P*articipation except through its effects on policy.

Finally, stock-market capitalization, *SMC*, stock-market returns (i.e., percentage increases in indices), *SMR*, and their interaction, *SMC*×*SMR*, seems likely to affect income *S*kew in a "yachts outpacing tugboats and tugboats" phenomenon. Such outpacing is likely proportionate to stock-market (and other investment) returns and should affect income-skew more the greater is capitalization (actually, ideally: domestic stock-ownership prevalence). Less directly, more speculatively, stock-market capitalization, reflecting an emphasis on a particular form of corporate finance, may have implications for wages and employment (Hall & Soskice 2001). This likely has the obvious implications for interest and political-influence distributions as well, so we suspect *SMC* to enter the policy equations too. Current returns and the interaction should be less relevant (directly) to these policy variables, though, and such financial-market terms seem unlikely to affect *P*articipation. This brings the system-specification to this state:

$$\begin{aligned}
&S = s\left(\widehat{R}, \underline{\underline{S_{\sim i}}}, Pop65, \underline{Pop14}, UDen, \underline{Corp}, \underline{FinExp}, \underline{TExp}, \underline{TExpD}, FLFP, \underline{SMC}, \underline{SMR}, \underline{SMC \cdot SMR}, \mathbf{DPI}, \mathbf{CPC}, \varepsilon_S\right) \\
&U = u\left(\widehat{I}, \widehat{R}, \underline{\underline{U_{\sim i}}}, Pop65, \underline{Pop14}, UDen, \underline{Corp}, \underline{FinExp}, \underline{TExp}, \underline{TExpD}, FLFP, \underline{SMC}, \underline{SMR}, \underline{SMC \cdot SMR}, \mathbf{DPI}, \mathbf{CPC}, \varepsilon_U\right) \\
&R = r\left(\widehat{S}, \widehat{I}, \widehat{P}, \underline{\underline{R_{\sim i}}}, Pop65, \underline{Pop14}, UDen, \underline{Corp}, FLFP, \underline{\underline{SDG}}, \underline{FLFP \cdot SDG}, \underline{SMC}, \mathbf{DPI}, \mathbf{CPC}, \varepsilon_R\right) \\
&I = i\left(\widehat{U}, \widehat{S}, \widehat{R}, \widehat{P}, \underline{\underline{I_{\sim i}}}, Pop65, \underline{Pop14}, UDen, \underline{Corp}, FLFP, \underline{\underline{SCG}}, \underline{FLFP \cdot SDG}, \underline{SMC}, \mathbf{DPI}, \mathbf{CPC}, \varepsilon_I\right) \\
&P = p\left(\widehat{U}, \widehat{S}, \widehat{R}, \widehat{I}, Pop65, UDen, FLFP, \mathbf{DPI}, \mathbf{CPC}, \varepsilon_P\right)
\end{aligned} \qquad \textbf{[1d]}.$$

4. Domestic Political Institutions: Two important **DPI** here are (the natural log of) district magnitude,

[8] However, due caution regarding interaction terms (Brambor et al. 2006; Kam & Franzese 2007) adds SDG to both.
[9] Policy programs in response to *FLFP* may also bolster *FLFP*, which suggests a further endogeneity not explored here.

DMag, and presidentialism, *Pres*, which a long history of political-science research and some recent, influential political-economy formalizations (Persson & Tabellini 2000 offer textbook exposition) have connected to (re)distributive policies. These theories expect more broad redistributive and less targeted spending in more proportional, i.e., larger district-magnitude, systems, and more total public-spending in parliamentary than in presidential systems. Further, district magnitude and other electoral-law features, notably the onerousness of registration requirements, *RegReq*, and mandatory voting (abstention fines), *MandVote*, play theoretically long-noted and empirically well-established large roles in *P*articipation. Presidentialism may also affect *P*articipation, negatively if presidential and other elections stagger, thus diffusing relevant policymaking authority across multiple elections and reducing the importance of each, with null or positive effect otherwise. Other institutions that diffuse authority across elections, *EleDiff*, like bicameralism, federalism, or frequent referenda, should have similar effects. These institutions likely affect policy also, but *U*nemployment or *S*kew solely through policy. Likewise, the degree of intra-party competition, *IPC*, which plurality, majority, and especially transferable-vote systems strengthen, may affect participation and policy is unlikely to affect economic outcomes except thereby. Specifically, *IPC* may spur participation if that competition inspires voters but, more likely, dampens it by weakening party-discipline, which eases voters' electoral-information burdens and by fostering wasted votes. As for policy, *IPC* favors targeted (insurance) over broader (redistribution) tools, similarly to *DMag* (Shugart & Carey 1992, Cox & Rosenbluth 1995, Ariga 2006). Mandatory voting and registration burdens, finally, should affect policy only by affecting participation. These **DPI**, especially the electoral-law features, provide crucial identification leverage on *P*articipation, which had been relatively lacking heretofore:

$$
\begin{aligned}
S &= s\left(\widehat{R},\underline{\underline{S_{\sim i}}},Pop65,\underline{Pop14},UDen,\underline{Corp},\underline{FinExp},\underline{TExp},\underline{TExpD},FLFP,\underline{SMC},\underline{SMR},\underline{SMC\cdot SMR},\mathbf{CPC},\varepsilon_S\right)\\
U &= u\left(\widehat{I},\widehat{R},\underline{\underline{U_{\sim i}}},Pop65,\underline{Pop14},UDen,\underline{Corp},\underline{FinExp},\underline{TExp},\underline{TExpD},FLFP,\underline{SMC},\underline{SMR},\underline{SMC\cdot SMR},\mathbf{CPC},\varepsilon_U\right)\\
R &= r\left(\widehat{S},\widehat{I},\widehat{P},\underline{\underline{R_{\sim i}}},Pop65,\underline{Pop14},UDen,\underline{Corp},FLFP,\underline{\underline{SDG}},\underline{FLFP\cdot SDG},\underline{SMC},\underline{Pres},\underline{DMag},\underline{IPC},\underline{EleDiff},\mathbf{CPC},\varepsilon_R\right)\\
I &= i\left(\widehat{U},\widehat{S},\widehat{R},\widehat{P},\underline{\underline{I_{\sim i}}},Pop65,\underline{Pop14},UDen,\underline{Corp},FLFP,\underline{\underline{SCG}},\underline{FLFP\cdot SDG},\underline{SMC},\underline{Pres},\underline{DMag},\underline{IPC},\underline{EleDiff},\mathbf{CPC},\varepsilon_I\right)\\
P &= p\left(\widehat{U},\widehat{S},\widehat{R},\widehat{I},Pop65,UDen,FLFP,\underline{Pres},\underline{DMag},\underline{IPC},\underline{EleDiff},\underline{\underline{MandVote}},\underline{\underline{RegReq}},\mathbf{CPC},\varepsilon_P\right)
\end{aligned}
\tag*{[1e].}
$$

5. Current Political Contexts: Lastly, we consider **CPC** like incumbent-government characteristics—majority status, *GMaj*, fragmentation, *GFrag*, polarization, *GPol*, and partisanship along a left-right axis, *GPart*, or by *SDG*, *CDG*, or *SCG* classifications—and current-electoral conditions, like election-year indicators, E, and competitiveness, *Comp*. We gauge current-government ideology by *CDG* and *GPart*, which allows policy to relate to ideology linearly, roughly curvilinearly, or linearly but with Christian Democracy lying off the direct line from left (*SDG*) to right (*SCG*) ideologically (see, e.g., Swank 2002). All of these **CPC** factors should affect the policy variables directly; only competitiveness should affect participation directly;[10] and none should affect economic outcomes except *via* policy or participation.

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

$$
\begin{aligned}
S &= s\left(\widehat{R},\underline{\underline{S_{\sim i}}},Pop65,\underline{Pop14},UDen,\underline{Corp},\underline{FinExp},\underline{TExp},\underline{TExpD},FLFP,\underline{SMC},\underline{SMR},\underline{SMC\cdot SMR},\varepsilon_S\right)\\
U &= u\left(\widehat{I},\widehat{R},\underline{\underline{U_{\sim i}}},Pop65,\underline{Pop14},UDen,\underline{Corp},\underline{FinExp},\underline{TExp},\underline{TExpD},FLFP,\underline{SMC},\underline{SMR},\underline{SMC\cdot SMR},\varepsilon_U\right)\\
R &= r\begin{pmatrix}\widehat{S},\widehat{I},\widehat{P},\underline{\underline{R_{\sim i}}},Pop65,\underline{Pop14},UDen,\underline{Corp},FLFP,\underline{\underline{SDG}},\underline{FLFP\cdot SDG},\underline{SMC},\underline{Pres},\underline{DMag},\\ \underline{IPC},\underline{EleDiff},\underline{GMaj},\underline{GFrag},\underline{GPol},\underline{GPart},\underline{CDG},\underline{E},\underline{Comp},\underline{E\cdot Comp},\varepsilon_R\end{pmatrix}\\
I &= i\begin{pmatrix}\widehat{U},\widehat{S},\widehat{R},\widehat{P},\underline{\underline{I_{\sim i}}},Pop65,\underline{Pop14},UDen,\underline{Corp},FLFP,\underline{\underline{SCG}},\underline{FLFP\cdot SDG},\underline{SMC},\underline{Pres},\underline{DMag},\\ \underline{IPC},\underline{EleDiff},\underline{GMaj},\underline{GFrag},\underline{GPol},\underline{GPart},\underline{CDG},\underline{E},\underline{Comp},\underline{E\cdot Comp},\varepsilon_I\end{pmatrix}\\
P &= p\left(\widehat{U},\widehat{S},\widehat{R},\widehat{I},Pop65,UDen,FLFP,\underline{Pres},\underline{DMag},\underline{IPC},\underline{EleDiff},\underline{\underline{MandVote}},\underline{\underline{RegReq}},\underline{Comp},\varepsilon_P\right)
\end{aligned}
\qquad \textbf{[1f]}.
$$

Notice that theory and substance allow us to offer empirical models that strongly distinguish (identify) the three outcome-types: economy, policy, and politics. *S*kew and *U*nemployment alone have the trade- and financial-exposure and stock-return regressors, which should be strong exogenous explanators. The economic outcomes also exclude *P*articipation, whereas the policies do not. Similarly, *R*edistribution and *I*nsurance have unique exogenous regressors in **CPC** (competitiveness excepted), which should strongly predict policies, and *P*articipation uniquely responds to two electoral-law features known to predict it well. However, the two economic and two policy outcomes seem less sharply distinguished from each other. The economic outcomes are distinguished only by their unique spatial lags and that *I*nsurance spending affects *U*nemployment but not *S*kew. *R*edistribution and *I*nsurance policies are distinguished by their unique spatial lags, in *U*nemployment affecting I but not R, and that *SCG* and *CDG* legacies similarly negatively affect R whereas *CDG* and *SDG* legacies similarly positively affect I. These perhaps weaker distinctions may nonetheless offer sufficient empirical leverage because the spatial lags likely have strong explanatory bite for the economic outcomes while important partisan historical legacies may adequately compensate for what might prove weaker interdependence among nations' social policies.

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

Plus, as seen below, further useful distinctions arise in precisely how each factor enters each function.

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

A. Empirical-Model Specification

Our theories generally lack the precision to suggest specific functional forms, so we assume the usual linear-additivity here. We have suggested above certain interactions among some of the regressors: between *SMC* and *SMR* in economic outcomes, and between *FLFP* and *SDG* and between elections and competitiveness in policies. As we convert **[1]** to specific regression models, and add dynamics to those models, two more interactions emerge. As argued above (see also Franzese 2002, ch. 2), *P*articipation interacts with *S*kew to shape effective political demand for social policies, and then *GFrag*, *GPol*, and *GMaj* will interact with the lagged dependent-variables in the policy equations to reflect veto-actor effects (Tsebelis 2002) as policy-adjustment retardation (see Franzese 2002, ch. 3).[11] These interactions and the dynamics add several further over-identifying exclusions to the system, yielding the specific equations with which we would ideally like to begin our empirical explorations and evaluations as these:

$$S=\begin{cases}\alpha_0^i+\alpha_1\underline{\underline{S_{t-1}}}+\alpha_2\underline{\underline{S_{\sim i}}}+\alpha_3\widehat{R}+\alpha_4 Pop65+\alpha_5\underline{Pop14}+\alpha_6 UDen+\alpha_7\underline{Corp}+\alpha_8\underline{FinExp}\\+\alpha_9\underline{TExp}+\alpha_{10}\underline{TExpD}+\alpha_{11}FLFP+\alpha_{12}\underline{SMC}+\alpha_{13}\underline{SMR}+\alpha_{14}\underline{SMC\cdot SMR}+\varepsilon_S\end{cases}\tag*{[2a]}$$

$$U=\begin{cases}\beta_0^i+\beta_1\underline{\underline{U_{t-1}}}+\beta_2\underline{\underline{U_{\sim i}}}+\beta_3\widehat{I}+\beta_4\widehat{R}+\beta_5 Pop65+\beta_6\underline{Pop14}+\beta_7 UDen+\beta_8\underline{Corp}\\+\beta_9\underline{FinExp}+\beta_{10}\underline{TExp}+\beta_{11}\underline{TExpD}+\beta_{12}FLFP+\beta_{13}\underline{SMC}+\beta_{14}\underline{SMR}+\beta_{15}\underline{SMC\cdot SMR}+\varepsilon_U\end{cases}\tag*{[2b]}$$

$$R=\begin{cases}\gamma_0^i+\gamma_1\underline{\underline{R_{t-1}}}+\gamma_2\underline{\underline{GFrag\cdot R_{t-1}}}+\gamma_3\underline{\underline{GPol\cdot R_{t-1}}}+\gamma_4\underline{\underline{R_{\sim i}}}+\gamma_5\widehat{S}+\gamma_6\widehat{P}+\gamma_7\widehat{S}\cdot\widehat{P}+\gamma_8\widehat{I}\\+\gamma_9 Pop65+\gamma_{10}\underline{Pop14}+\gamma_{11}UDen+\gamma_{12}\underline{Corp}+\gamma_{13}FLFP+\gamma_{14}\underline{SDG}+\gamma_{15}\underline{FLFP\cdot SDG}\\+\gamma_{16}\underline{SMC}+\gamma_{17}\underline{Pres}+\gamma_{18}\underline{DMag}+\gamma_{19}\underline{IPC}+\gamma_{20}\underline{EleDiff}+\gamma_{21}\underline{GFrag}+\gamma_{22}\underline{GPol}+\gamma_{23}\underline{GPart}\\+\gamma_{24}\underline{CDG}+\gamma_{25}\underline{E}+\gamma_{26}\underline{Comp}+\gamma_{27}\underline{E\cdot Comp}+\varepsilon_R\end{cases}\tag*{[2c]}$$

$$I=\begin{cases}\phi_0^i+\phi_1\underline{\underline{I_{t-1}}}+\phi_2\underline{\underline{GFrag\cdot I_{t-1}}}+\phi_3\underline{\underline{GPol\cdot I_{t-1}}}+\phi_4\underline{\underline{I_{\sim i}}}+\phi_5\widehat{U}+\phi_6\widehat{S}+\phi_7\widehat{P}+\phi_8\widehat{S}\cdot\widehat{P}+\phi_9\widehat{R}\\+\phi_{10}Pop65+\phi_{11}\underline{Pop14}+\phi_{12}UDen+\phi_{13}\underline{Corp}+\phi_{14}FLFP+\phi_{15}\underline{SDG}+\phi_{16}\underline{FLFP\cdot SDG}\\+\phi_{17}\underline{\underline{SCG}}+\phi_{18}\underline{SMC}+\phi_{19}\underline{Pres}+\phi_{20}\underline{DMag}+\phi_{21}\underline{IPC}+\phi_{22}\underline{EleDiff}+\phi_{23}\underline{GFrag}+\phi_{24}\underline{GPol}\\+\phi_{25}\underline{GPart}+\phi_{26}\underline{CDG}+\phi_{27}\underline{E}+\phi_{28}\underline{Comp}+\phi_{29}\underline{E\cdot Comp}+\varepsilon_I\end{cases}\tag*{[2d]}$$

$$P=\begin{cases}\omega_0+\omega_1\underline{\underline{P_{t-1}}}+\omega_2\widehat{U}+\omega_3\widehat{S}+\omega_4\widehat{R}+\omega_5\widehat{I}+\omega_6 Pop65+\omega_7 UDen+\omega_8 FLFP+\omega_9\underline{Pres}+\omega_{10}\underline{\underline{PProx}}\\+\omega_{11}\underline{DMag}+\omega_{12}\underline{IPC}+\omega_{13}\underline{EleDiff}+\omega_{14}\underline{\underline{MandVote}}+\omega_{15}\underline{\underline{RegReq}}+\omega_{16}\underline{Comp}+\varepsilon_P\end{cases}\tag*{[2e]}$$

[11] We measure fragmentation and polarization to reflect how the current government's majority status relates *GFrag* and *GPol* to policy-retardation, so *GMaj* need not enter directly as a regressor. We did explore the possibility anyway, finding some indications, weak and not robust across specifications, that majority status may speed policy-adjustment and/or reduce insurance-spending levels beyond the role our *GFrag* and *GPol* measures allow it.

Notice that additional identification leverage for each equation arises if we assume or can establish theoretically/substantively that the predetermined nature of the temporal lags ensures exogeneity. We do assume so, although without full confidence, especially for the very slow moving *S*kew.[12] Notice also the *i* superscripts on the constants of the economic and policy, but not the participation, equations, indicating use or omission of country fixed-effects. Coefficient estimates and the implied stationarity of the outcomes seemed more empirically sensible allowing fixed-effects, but the participation equation excludes them because several key explanators in that model, like *MandVote* and *RegReq*, hardly vary over time.[13] (We do allow the country dummies as instruments in all models though: see below.) Finally, notice that regressors in **[2]** involving trade exposure to developing countries, *TExpD*, or electoral competitiveness, *Comp*, are grayed; unfortunately, this signifies that we have not yet found measures of sufficient cross-country-time coverage to include them in our current estimation models.[14]

B. Data and Measurement

For empirical estimation of the system, **[2]**, we assembled (building from the work, and thanks to the generosity, of others) a database (available at www.umich.edu/~franzese) covering 23 developed democracies[15] over 44 years, 1960-2003, although much less than that has ultimately proven usable.

*S*kew is usually the limiting factor, inequality data being notoriously spotty, the laudable and fruitful efforts of the *Luxembourg Income Studies* (Smeeding et al. 1990, Atkinson et al. 1995) notwithstanding. We use data on earnings by population decile, generously provided by David Rueda (Pontusson & Rueda 2000), to construct ratios of the 90th to the 50th deciles' incomes. By linear interpolation of a few missing country-years (28 of the 360 total assembled),[16] we obtain unbroken annual series of at least some years for 19 of 23 countries.[17] S_{t-1} is a one-year time-lag; and, $S_{\sim i}$, as with all the spatial lags, is the unweighted average of that variable, that year, in the other dataset countries. Standardized unemployment rates, *U*,

[12] Time precedence will fail to ensure exogeneity given instantaneous (i.e., within observational-period) endogeneity or some failure of the empirical model to capture the dynamics fully (e.g., as when expectations are important and not or inadequately modeled). Here, the extremely smooth and slow dynamics of skew raise serious doubts whether our measurement precision suffices for deviations from the modeled AR(1) to have adequate signal-to-noise even to judge meeting of this condition.
[13] Plümper and Tröger (2007) offer an alternative strategy that could have been fruitfully applied here.
[14] Even to define *Comp* comparably across our heterogeneous sample of democracies is very daunting (but see Ariga 2006).
[15] Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, U.K., and U.S.
[16] We extend available data aggressively, merging multiple data sources on several variables and by linear-interpolation and trend autoregression (more rarely), but this adds almost no usable data here beyond these few added to *S*kew.
[17] Greece, Iceland, and Luxembourg drop, and Spain remains with just one observation, 1995.

are from the OECD *via* Armingeon et al. (2005) (*ALMP*). Where possible, we expand coverage of these 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, suggesting a trustworthy data-coverage extension.

Following M&W, social insurance, *I*, is OECD Social Benefits, excluding Health and Pension, and so leaving primarily unemployment and welfare benefits. Redistributive spending, *R*, is total minus Social Benefits and Military spending. (*R* and *I* thus both exclude health and pensions.) We extend these data from M&W's 1980-99 in 18 countries, to cover 20 countries[18] and 1960-2002 in most (from 330± to 775± observations) by regressing M&W's original data on data from current OECD Social Benefits and Public Health datasets, plus current disbursements (i.e., total spending). This recreates M&W's described procedure, and yielded R^2 usually exceeding .9 and often near 1.0, indicating near-perfect replication.

We measure participation, *P*, using ALMP's *vturn*: voters' share of the eligible-age population. We smooth *P* by holding participation constant at the last election's rate until the next and then averaging the current, previous, and next-two years (capturing exactly one election-cycle *per* window in most cases).

Age-demographics, *Pop65* and *Pop14*, are also from the OECD, *via* ALMP. Union density, *UDen*, is active (i.e., excluding unemployed and retired) members as a share of employment, from Jelle Visser *via* ALMP and from Golden et al. (1997), and extended by regression on gross membership and the age demographics. The corporatism index, *Corp*, is Lane Kenworthy's.[19] Trade exposure, *TExp*, is from OECD sources *via* ALMP, and international-financial exposure, *FinExp*, sums current- and capital-account openness from Quinn and Inclan (1997). Female labor-force participation rates, *FLFP*, are from Huber & Stephens (2004). Our stock-market capitalization, *SMC*, and returns, *SMR*, measures are from the Global Financial Database,[20] using all-market December 31 closing values divided by nominal GDP in domestic currency for *SMC* and its year-on-year percentage change for *SMR*.

Our government fragmentation, *GFrag*, polarization, *GPol*, and partisanship, *GPart*, indices derive from Tom Cusack's rich, thorough, and usefully designed "Parties, Governments, and Legislatures"

[18] Greece, Iceland, Luxembourg, and Spain drop.
[19] See http://www.u.arizona.edu/~lkenwor/WageCoorScores.pdf.
[20] http://www.globalfinancialdata.com

dataset.[21] Using *GSppt*, the percentage legislative seat-share of governing (cabinet) parties,[22] we obtain *GFrag* for majority governments (*GSppt*>½) as the raw number of governing parties (counting non-partisans as half a party).[23] If *GSppt*<½ (minority government), *GFrag* is a *GSppt*-weighted count of the raw number of governing parties and the effective number of opposition parties.[24] *GPol* likewise adopts a veto-actor conception of polarization, using party ideological-ranges (size-unweighted) rather than standard-deviations or variances (size-weighted) (see notes 23 and 24). *GPol* measures the range of governing parties if *GSppt*>½ and the range across the whole legislature for minority governments.[25] To generate *GPart*, we 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 *GSppt*>½, we use the cabinet's score directly, and for *GSppt*<½, we use the *GSppt*-weighted average of the cabinet and the legislature's.

Our measures of cumulative Social Democratic and Secular Conservative Government, *SDG* and *SCG*, and of current Christian Democratic Government, *CDG*, from Huber and Stephens' data on cabinet and legislative seat-shares, using Cusack's *GSppt* to enhance those measures analogously to the procedures described for current governments. *Cumulative* refers to the sum from 1960.

Pres is 1 in presidential (Switzerland, US), 0.5 in semi-presidential (Finland, France, Iceland, and Portugal), and 0 in parliamentary systems. It and *DMag*, the natural log of (average) district magnitude, are from Golder (2005). Our intra-party competition index, *IPC*, is crude, as it merely sums indicators for plurality, majority, and transferable-vote electoral systems, again from Golder (2005).[26] Our measure of authority diffusion across elections, *EleDiff*, adds 'effective federalism' and 'provincial-election importance' measures, from Beck et al. (2001), to Lijphart's prevalent-referenda and effective-

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

[22] In bicameralism, "legislature" refers to the lower (more powerful) chamber. The US president's party is the cabinet party.

[23] Raw numbers represent Tsebelis' veto-actor conception of fragmentation more faithfully than effective (i.e., size-weighted) numbers (Franzese 2002, ch. 3) because, by that conception, any governing party, regardless of size, can veto policy-change since its presence in government indicates its necessity to that coalition.

[24] A minority coalition need not add all other parties to build a majority to change policy, so using raw numbers of opposition parties would exaggerate. Short of analyzing each parliamentary context at length, we construct a convenient proxy for the number of veto-acting opposition parties by weighing their counts by size (i.e., using effective numbers), reflecting the notion that larger parties are more often likely to be necessary partners in building legislative majorities.

[25] *GPol* exaggerates by thus implicitly assuming all legislative parties are veto actos. As with *GFrag*, *GPol* would do better to find some convenient generalization 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, in future work.

[26] We code the German mixed system, and the similar new ones in Italy, Japan, and New Zealand as 0.5, reflecting their part-plurality nature (although in Japan, the other part is transferable-vote, so *IPC* is 1).

bicameralism indicators. The measure of proximity of presidential to parliamentary elections, *Prox1*, is Golder's (2005). *MandVote* and *RegReq*, our compulsory-voting and registration-requirement measures derive from our own analysis of electoral-system data from the International Institute for Democracy and Electoral Assistance.[27] *MandVote* varies 0-1, according to the degree of enforcement indicated (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 provinces in which the law is in force. *RegReq* simply indicates (0,1) whether a national voter-registry exists or voters must self-register. All of these indices vary little or none-at-all over time within country.[28] Our pre-election-year indicator, *E*, finally, allocates sums of 1 to the 365 days before lower-house elections[29] (using ALMP's dating); it does time-vary.

B. Estimation Strategies

Estimation strategies for systems of equations are numerous and variegated, as are those for time-series cross-sections (TSCS), so the number and variety of methods potentially appropriate to estimate our system (of 5 equations, from data in 18 countries over, on average, 17-18 years) 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 heterogeneity (conditional on the model) exists can bias estimation (if the omitted conditional-means correlate with included regressors) and will induce inefficiency. Conversely, fixed effects debar direct recovery of the effects of any time-invariant explanators and can severely compromise estimation and complicate or obfuscate interpretation of the effects of slowly/rarely-moving regressors (Plümper & Tröger 2007), and random effects rely on questionable assumptions, especially in aggregate TSCS contexts. We must consider also whether other variables from among the regressors belong on our list of endogenous variables. Failing to acknowledge the endogeneity of some regressors 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 the remaining exogenous

[27] http://www.idea.int

[28] As noted above, we do not have *TExpD* and *Comp* measures at this time. *Pres* has no within-country variation, so we omit it from the fixed-effect equations. All other variables have at least some within-country variance, but several (as mentioned) have little or very little. Accordingly, their coefficients' estimates must be interpreted with extra caution (see note 13).

[29] *E* adds these unit-allocations in the rare cases of multiple elections within 365 days. The US case exceptionally allocates 7/9 (President, House, and 1/3 of Senate, each body being assumed 1/3 of government) to the 365 days before on-year elections and 4/9 to the 365 days before off-year elections (House plus 1/3 the Senate).

variables and to the researcher's difficulties finding viable instruments. Then we should consider also whether the TSCS data-structure might add other exogenous factors beyond the current set to the instruments, thereby gaining further identification and estimation leverage if the additional conditions are true but inducing otherwise avoidable bias if not. Lastly, we should consider whether and how to use cross-equation information (like error covariances) or instead to estimate the 5 equations separately. Estimating jointly can enhance efficiency notably; estimating separately forsakes these gains but insulates each equation's estimation from any specification or other problems in the others. All these considerations are additional to the many alternative plausible theoretical specifications.

The range of options we have explored include:

- Joint (3SLS), separate (2SLS), or exogenous (SUR) estimation of the system's equations;
- the inclusion or exclusion of fixed effects, deciding to include country dummies for outcomes and policies but not participation, which has several substantively core regressors that move very slowly/rarely;
- the inclusion or exclusion among the system's instruments of these country dummies, a full set of year dummies or both, choosing to include both country and year dummies as instruments;
- which regressors besides our five outcomes to consider endogenous, settling upon the interaction of *S*kew and *P*articipation as the only one, its endogeneity being most crucial substantively;[30]
- we also explored/reconsidered several theory-derived specification choices discussed above:
    - adding *I*nsurance to the *S*kew equation;
    - adding interactions of participation times unemployment to the policy equations;
    - adding interactions of of *GMaj* or *GSppt* times the lagged dependent variable to the policies;
    - treating the temporal and spatial lags as exogenous or endogenous; and
    - adding a control for real GDP growth and then treating it as exogenous or endogenous.

With one major exception, coefficient estimates were remarkably consistent across all combinations of these considerations and options. Without country dummies, the coefficients on *S*kew, *P*articipation, and their product in the policy equations reverse signs to negative, negative, positive. (Wilson & Butler 2007 noted a similar reversal of M&W results with fixed effects.) Regardless of whether skew increases are *bottom-dragged* or *top-pulled*, either pattern at best partially supports either the M&W model or our extension thereof regarding the conditioning effects of participation. No other estimation-strategy option

[30] That then required expansion of the instrument set to products of those equations' instruments (see Kelejian 1971).

affects any of the coefficient estimates nearly so much. Therefore, since estimation with heterogeneous intercepts and more instruments is far more efficient, we report estimates obtained by (iterated) 3SLS, with country dummies in **[2a]**-**[2d]**, and both country and year dummies in the instrument list.

C. Estimation Results

Table 1: Empirical System of Skew, Unemployment, Redistribution, Social Insurance, & Participation: Estimation Results

	Skew	Unemployment	Redistribution	Social Insurance	Participation
Time-Lag	***0.8196*** *0.0361*	***0.6364*** *0.0318*	***0.9151*** *0.0322*	***0.8062*** *0.0484*	***0.9269*** *0.0208*
GFrag×Time-Lag	—	—	**0.0031** 0.0119	***0.0212*** *0.0110*	—
GPol×Time-Lag	—	—	**-0.0002** 0.0005	**-0.0002** 0.0006	—
Spatial-Lag	***0.0809*** *0.0308*	***0.2069*** *0.0450*	***0.1275*** *0.0575*	***0.2232*** *0.0595*	—
U	—	—	—	***-0.0577*** *0.0377*	**-0.0421** 0.0562
S	—	—	***12.1539*** *3.3458*	***8.4677*** *3.2131*	***1.9459*** *1.2057*
P	—	—	***0.2145*** *0.0871*	***0.2080*** *0.0842*	—
S×P	—	—	***-0.1201*** *0.0461*	***-0.1069*** *0.0433*	—
R	**0.0002** 0.0012	***0.0495*** *0.0331*	—	**0.0143** 0.0230	***0.0918*** *0.0468*
I	—	***0.3950*** *0.0470*	***-0.1077*** *0.0469*	—	**0.0571** 0.0796
Pop65	***-0.0048*** *0.0032*	**-0.1111** 0.0835	**0.0060** 0.0706	**-0.0022** 0.0685	***-0.1585*** *0.0747*
Pop14	***-0.0039*** *0.0020*	***-0.0907*** *0.0551*	**0.0078** 0.0470	**-0.0340** 0.0395	—
UDen	**-0.0005** 0.0005	**0.0025** 0.0131	**0.0049** 0.0133	**0.0074** 0.0115	***0.0301*** *0.0108*
Corp	***-0.0040*** *0.0019*	**-0.0371** 0.0502	***-0.0774*** *0.0441*	***-0.0508*** *0.0347*	—
FinExp	***0.0027*** *0.0016*	**0.0323** 0.0409	—	—	—
TExp	**-0.0003** 0.0003	***0.0381*** *0.0094*	—	—	—
SMC	**0.0000** 0.0001	***-0.0152*** *0.0025*	***-0.0092*** *0.0019*	***-0.0084*** *0.0017*	—
SMR	**-0.0001** 0.0001	**0.0007** 0.0026	—	—	—
SMC×SMR	**0.0000** 0.0000	**0.0001** 0.0001	—	—	—
FLFP	**0.0002** 0.0005	***-0.1001*** *0.0166*	**0.0011** 0.0153	***-0.0320*** *0.0133*	**-0.0147** 0.0133
CumSDG	—	—	***-0.1348*** *0.0888*	***-0.1172*** *0.0761*	—
CumSDG×FLFP	—	—	***0.0026*** *0.0013*	***0.0026*** *0.0011*	—
CumSCG	—	—	—	**0.0115** 0.0171	—
ln(DMag)	—	—	***-0.0676*** *0.0438*	***-0.1092*** *0.0328*	**-0.0072** 0.0763
IPC	—	—	**-0.1801** 0.3157	**-0.1561** 0.2442	***-1.1866*** *0.5831*
EleDiff	—	—	**-0.0037** 0.0998	**-0.0471** 0.0863	***-0.1322*** *0.0575*
GFrag	—	—	**0.0643** 0.1746	**-0.1366** 0.1059	—
GPol	—	—	**0.0012** 0.0069	**0.0014** 0.0049	—
GPart	—	—	***-0.0096*** *0.0028*	***-0.0056*** *0.0024*	—
CurrCDG	—	—	**0.2439** 0.4105	**0.0084** 0.3122	—
E	—	—	**-0.0016** 0.0821	**0.0255** 0.0620	—
Pres	—	—	—	—	***-1.5602*** *0.6080*
PresProx	—	—	—	—	***2.3025*** *0.4866*
MandVote	—	—	—	—	***1.8808*** *0.5580*
RegReq	—	—	—	—	***-1.3230*** *0.6651*
Summary Statistics for Equations					
# Obs. - # Coeffs. = ° Free	311 – 29 = 282	311 – 30 = 281	311 – 40 = 271	311 – 42 = 269	311 – 15 = 296
R^2	.9797	.9508	.9835	.9860	.9891

NOTES: Equations estimated with country fixed-effects (omitted) simultaneously by iterated 3SLS, with *S*×*P* and the 5 dependent variables treated as endogenous, and with year and country dummies in addition to all other regressors treated as instruments.

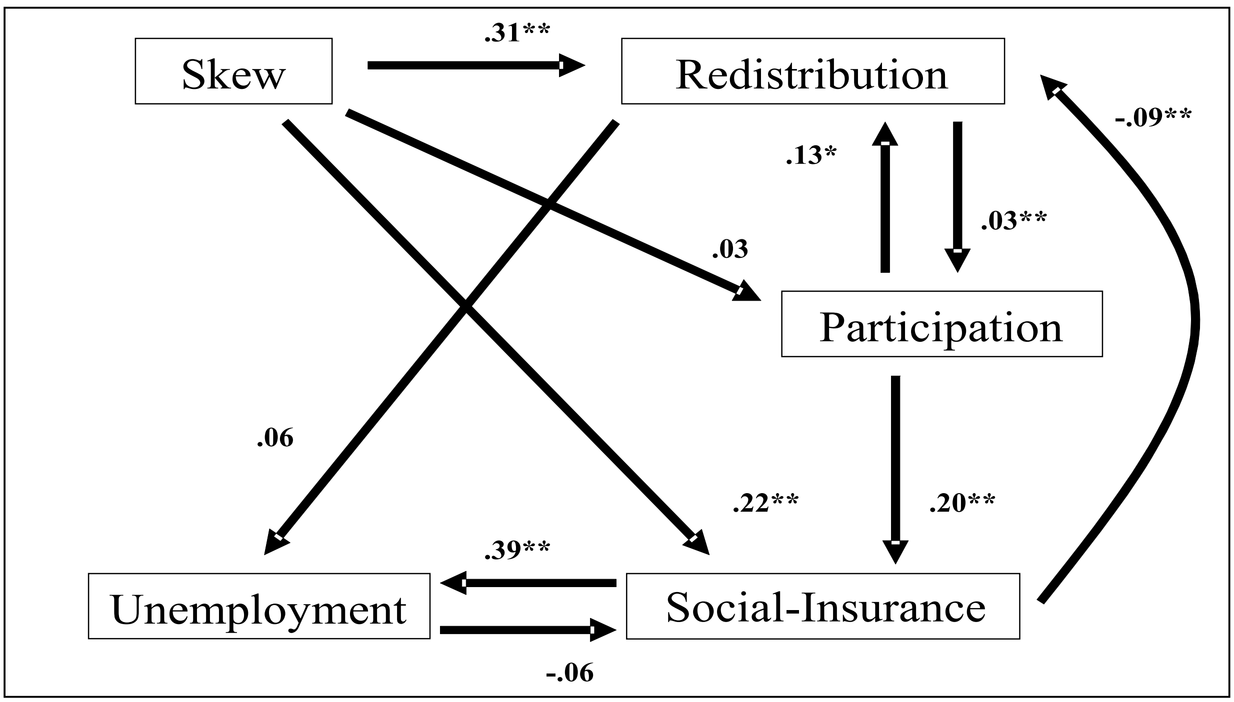
Table 1 gives estimated coefficients (in bold) and standard errors (below them); estimates significant or nearly so are in italics. The results contain strong support for some aspects of previous theory, our own additions, and/or conventional wisdom, but also many notable surprises. We will first briefly survey the estimated relationships of the exogenous explanators to the outcomes of our system before turning to our central interest in the estimated endogenous relationships among the outcomes.

In confirmatory results, we find slow temporal adjustment-rates for all five outcomes, and strong spatial interdependence for economic policies and outcomes. We find corporatism reduces income-skew; union density may do so too while it also, more surely, bolsters turnout. Smaller youth and pensioner, i.e., larger working-age, populations boost unemployment and inequality; *Pop65* also reduces turnout. Financial (but not trade) exposure seems to spur inequality, and trade (but maybe not financial) exposure seems to boost unemployment. Greater stock-market capitalization associates with less redistribution and social insurance. Social-democratic-government legacies and female labor-force participation interact positively to expand both social policies. Current-government partisanship has strong intuitive policy-effects, with little sign that Christian Democrats lie anywhere off that left-right line. Most impressive, though, is how well political-science theories can explain turnout variation. Authority diffusion across elections, electoral systems that foster intra-party competition, non-concurrent presidential elections, and onerous registration requirements all depress turnout, and, of course, mandatory-voting laws increase it.

In more-equivocal results, we find veto-actor retardation of social-insurance policy-adjustment rates *via* government fragmentation, but our polarization measure fares less well, and redistribution policy-adjustment rates seem impervious to either. Corporatism and union density relate to unemployment with their expected signs, but significance is marginal or lacking. The negative relation of district magnitude to both social-insurance and redistribution is unexpected, given emerging consensuses that larger DM's favor broadly targeted over narrowly targeted public-spending. However, this likely implies a positive association with the excluded health and pension spending, which one could read as more confirmatory. Finally, cumulative SCG is not strongly distinct from cumulative CDG in social-insurance policy, further suggesting no departure of Christian Democracy from a single left-right continuum.

We also find several null or contradictory results. Stock-market capitalization seems not to affect 90-50 skew and even to reduce unemployment, and market returns fail to register upon either. The signal-to-noise ratio in our returns measure, being closing price for a single, unusual day (December 31), may be low though, and capitalization may just be proxying GDP. That age demographics and *UDen* fail to affect social insurance, and that corporatism associates marginally significantly negatively with it, are surprising null results. Similar null findings emerge for *FLFP* and *DMag* in the participation equation (but note that *IPC* also distinguishes PR and SMD), and for electoral cycles in policy. The failure of electoral diffusion and intra-party competition, which have little and near-zero within-country variation, respectively, to register strongly in fixed-effect policy models is unsurprising. Lastly, the insignificant positive relation of *FLFP* to skew is surprising, and its significant negative relation to unemployment quite so, given the findings relating working-age population-share with *S* and *U*. However, we might best credit chance for this one variable of the 76 just discussed being significantly opposite of expectations.

Figure 1: Estimated Causal Relationships among the Endogenous Variables



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

Our central interests surround the causal relations among the endogenous variables of our system. Figure 1 summarizes the statistically significant of these estimates, facilitating comparisons by giving standardized coefficients with zero/one/two asterisk(s) indicating significance at the .15/.10/.05 level.

We have stressed that social policies, *R*edistribution and *I*nsurance, could affect economic outcomes, *S*kew and *U*nemployment, and, indeed, we do find both social policies affect unemployment. As critics allege, social-policy generosity does seem to undermine labor-market performance. Sensibly, the size and statistical significance of the effect from insurance to unemployment far exceed those of *R* to *U*. Benefits targeted to the jobless affect work-leisure decisions more strongly than non-contingent benefits. Scant evidence of *R* affecting *pre-tax-and-transfer* 90/50 *S*kew emerges, but recall that our use of pre-tax measures and of the 50th percentile denominator intentionally minimized such direct and indirect effects.

The policy effects of *S*kew and *P*articipation are indeed conditional, but not in the manner expected. We find higher participation to *attenuate* the relation of skew to social-policy generosity, and that the relations of participation to both social policies flatten with greater skew.[31] Nonetheless, at low political-participation and income-skew, increases in either variable significantly boost social-policy generosity, consistent with our theoretical discussion of median-preserving skew-increases. We also find some evidence of policy substitution from social insurance to redistribution but not in the other direction. This suggests that increases in insurance are met to some extent by cuts in redistribution, but increases in redistribution do not induce the converse reductions in social insurance, implying funding to greater extent by other cuts or revenue hikes. We also find that increases in unemployment may *decrease* social-insurance spending, which is quite surprising, but the substantive and statistical significance is marginal.

Finally, we find no evidence of negative relationships from unemployment or skew to participation, but we do find income skew to have a small, *positive*, marginally significant effect on participation. This could reflect high returns from redistribution for those at lower ends of income distributions, but, more likely, the marginal substantive and statistical significance deserves emphasis. The evidence for direct policy effects on political participation are stronger, supporting Hobolt & Klemmensen (2006); both redistribution and social-insurance seem to bolster participation, although the latter effect is insignificant.

Our system is implicitly nonlinear in the endogenous variables due to the spatiotemporal dynamics and explicitly by the interaction of participation and skew in the *R* and *I* models;[32] this greatly complicates the presentation and interpretation. To proceed, one might first rewrite the estimated system to express each outcome as an $N \times 1$ vector of variables across the N countries in each period, t:

[31] Note that these results, which account for endogeneity, use much new data, apply several different theories, and apply different methodologies and specifications, strongly discord with Franzese (2002, ch. 2).
[32] The system is also implicitly nonlinear in parameters on both accounts, which complicates point estimates for responses somewhat and would necessitate simulation or application of the delta method to calculate of certainty estimates.

$$
\begin{aligned}
&\mathbf{S}_t = \hat{\rho}_{sw}\mathbf{W}\mathbf{S}_t + \hat{\rho}_{sl}\mathbf{S}_{t-1} + \hat{\alpha}_{sr}\mathbf{R}_t + \mathbf{X}_{st}\hat{\boldsymbol{\beta}}_s + \mathbf{e}_s \\
&\mathbf{U}_t = \hat{\rho}_{uw}\mathbf{W}\mathbf{U}_t + \hat{\rho}_{ul}\mathbf{U}_{t-1} + \hat{\alpha}_{ur}\mathbf{R}_t + \hat{\alpha}_{ui}\mathbf{I}_t + \mathbf{X}_{ut}\hat{\boldsymbol{\beta}}_u + \mathbf{e}_u \\
&\mathbf{R}_t = \hat{\rho}_{rw}\mathbf{W}\mathbf{R}_t + \hat{\rho}_{rl}\mathbf{R}_{t-1} + \hat{\alpha}_{rs}\mathbf{S}_t + \hat{\alpha}_{rp}\mathbf{P}_t + \hat{\alpha}_{rsp}\mathbf{S}_t\mathbf{P}_t + \hat{\alpha}_{ri}\mathbf{I}_t + \mathbf{X}_{rt}\hat{\boldsymbol{\beta}}_r + \mathbf{e}_r \\
&\mathbf{I}_t = \hat{\rho}_{iw}\mathbf{W}\mathbf{I}_t + \hat{\rho}_{il}\mathbf{I}_{t-1} + \hat{\rho}_{ilf}\mathbf{I}_{t-1}\mathbf{G}_t + \hat{\alpha}_{iu}\mathbf{U}_t + \hat{\alpha}_{is}\mathbf{S}_t + \hat{\alpha}_{ip}\mathbf{P}_t + \hat{\alpha}_{isp}\mathbf{S}_t\mathbf{P}_t + \hat{\alpha}_{ir}\mathbf{R}_t + \mathbf{X}_{it}\hat{\boldsymbol{\beta}}_i + \mathbf{e}_i \\
&\mathbf{P}_t = \hat{\rho}_{pl}\mathbf{P}_{t-1} + \hat{\alpha}_{ps}\mathbf{S}_t + \hat{\alpha}_{pu}\mathbf{U}_t + \hat{\alpha}_{pr}\mathbf{R}_t + \hat{\alpha}_{pi}\mathbf{I}_t + \mathbf{X}_{pt}\hat{\boldsymbol{\beta}}_p + \mathbf{e}_p
\end{aligned}
\qquad \textbf{[3]}.
$$

In **[3]**, we set small and insignificant coefficients to zero and gather exogenous explanators into one $\mathbf{X}\beta$ term for convenience. We intend the nonconformable products, $\mathbf{S}_t\mathbf{P}_t$ and $\mathbf{I}_{t-1}\mathbf{G}_t$, to mean element-by-element multiplication. Lastly, **W** is an $N\times N$ *spatial-weights* matrix, whose elements, w_{ij}, reflect the connectivity from country j to country i. In our estimation model, all countries are equally connected, so $w_{ij}=(N\text{-}1)^{-1}\ \forall i\neq j$, yielding $\mathbf{Wy}$ as the unweighted average of $\mathbf{y}$ in the other units. We can now solve out the spatial feedback and express the system as a temporally dynamic model in vector notation thus:

$$
\begin{aligned}
&\mathbf{S}_t = \left(\underline{\mathbf{I}}_N - \hat{\rho}_{sw}\mathbf{W}\right)^{-1}\left\{\hat{\rho}_{sl}\mathbf{S}_{t-1} + \hat{\alpha}_{sr}\mathbf{R}_t + \mathbf{X}_{st}\hat{\boldsymbol{\beta}}_s + \mathbf{e}_s\right\} \\
&\mathbf{U}_t = \left(\underline{\mathbf{I}}_N - \hat{\rho}_{uw}\mathbf{W}\right)^{-1}\left\{\hat{\rho}_{ul}\mathbf{U}_{t-1} + \hat{\alpha}_{ur}\mathbf{R}_t + \hat{\alpha}_{ui}\mathbf{I}_t + \mathbf{X}_{ut}\hat{\boldsymbol{\beta}}_u + \mathbf{e}_u\right\} \\
&\mathbf{R}_t = \left(\underline{\mathbf{I}}_N - \hat{\rho}_{rw}\mathbf{W}\right)^{-1}\left\{\hat{\rho}_{rl}\mathbf{R}_{t-1} + \hat{\alpha}_{rs}\mathbf{S}_t + \hat{\alpha}_{rp}\mathbf{P}_t + \hat{\alpha}_{rsp}\mathbf{S}_t\mathbf{P}_t + \hat{\alpha}_{ri}\mathbf{I}_t + \mathbf{X}_{rt}\hat{\boldsymbol{\beta}}_r + \mathbf{e}_r\right\} \\
&\mathbf{I}_t = \left(\underline{\mathbf{I}}_N - \hat{\rho}_{iw}\mathbf{W}\right)^{-1}\left\{\hat{\rho}_{il}\mathbf{I}_{t-1} + \hat{\rho}_{ilf}\mathbf{I}_{t-1}\mathbf{G}_t + \hat{\alpha}_{iu}\mathbf{U}_t + \hat{\alpha}_{is}\mathbf{S}_t + \hat{\alpha}_{ip}\mathbf{P}_t + \hat{\alpha}_{isp}\mathbf{S}_t\mathbf{P}_t + \hat{\alpha}_{ir}\mathbf{R}_t + \mathbf{X}_{it}\hat{\boldsymbol{\beta}}_i + \mathbf{e}_i\right\} \\
&\mathbf{P}_t = \hat{\rho}_{pl}\mathbf{P}_{t-1} + \hat{\alpha}_{ps}\mathbf{S}_t + \hat{\alpha}_{pu}\mathbf{U}_t + \hat{\alpha}_{pr}\mathbf{R}_t + \hat{\alpha}_{pi}\mathbf{I}_t + \mathbf{X}_{pt}\hat{\boldsymbol{\beta}}_p + \mathbf{e}_p
\end{aligned}
\qquad \textbf{[3a]},
$$

where $\underline{\mathbf{I}}_N$ is the $N\times N$ identity matrix. Next, if we assume whatever counterfactual we wish to trace occurs equally in all countries, then this particular **W**, reflecting uniform diffusion and resulting in unweighted averages of other units outcomes being the spatial lag, will have the extremely convenient feature that we can rewrite **[3a]** in a scalar notation that applies for each country thus:

$$
\begin{aligned}
&S_t = \left(1-\hat{\rho}_{sw}\right)^{-1}\left\{\hat{\rho}_{sl}S_{t-1} + \hat{\alpha}_{sr}R_t + \mathbf{x}'_{st}\hat{\boldsymbol{\beta}}_s + e_s\right\} \\
&U_t = \left(1-\hat{\rho}_{uw}\right)^{-1}\left\{\hat{\rho}_{ul}U_{t-1} + \hat{\alpha}_{ur}R_t + \hat{\alpha}_{ui}I_t + \mathbf{x}'_{ut}\hat{\boldsymbol{\beta}}_u + e_u\right\} \\
&R_t = \left(1-\hat{\rho}_{rw}\right)^{-1}\left\{\hat{\rho}_{rl}R_{t-1} + \hat{\alpha}_{rs}S_t + \hat{\alpha}_{rp}P_t + \hat{\alpha}_{rsp}S_tP_t + \hat{\alpha}_{ri}I_t + \mathbf{x}'_{rt}\hat{\boldsymbol{\beta}}_r + e_r\right\} \\
&I_t = \left(1-\hat{\rho}_{iw}\right)^{-1}\left\{\hat{\rho}_{il}I_{t-1} + \hat{\rho}_{ilf}I_{t-1}G_t + \hat{\alpha}_{iu}U_t + \hat{\alpha}_{is}S_t + \hat{\alpha}_{ip}P_t + \hat{\alpha}_{isp}S_tP_t + \hat{\alpha}_{ir}R_t + \mathbf{x}'_{it}\hat{\boldsymbol{\beta}}_i + e_i\right\} \\
&P_t = \hat{\rho}_{pl}P_{t-1} + \hat{\alpha}_{ps}S_t + \hat{\alpha}_{pu}U_t + \hat{\alpha}_{pr}R_t + \hat{\alpha}_{pi}I_t + \mathbf{x}'_{pt}\hat{\boldsymbol{\beta}}_p + e_p
\end{aligned}
\qquad \textbf{[3b]},
$$

Except for the interaction of the endogenous S and P, this system would be linear in variables. The long-run steady-state responses to permanent shocks to e or x are also straightforward from **[3b]**:

$$
\begin{aligned}
S_t &= \left(1-\hat{\rho}_{sw}-\hat{\rho}_{sl}\right)^{-1}\left\{\hat{\alpha}_{sr}R_t+\mathbf{x}'_{st}\hat{\boldsymbol{\beta}}_s+e_s\right\}\\
U_t &= \left(1-\hat{\rho}_{uw}-\hat{\rho}_{ul}\right)^{-1}\left\{\hat{\alpha}_{ur}R_t+\hat{\alpha}_{ui}I_t+\mathbf{x}'_{ut}\hat{\boldsymbol{\beta}}_u+e_u\right\}\\
R_t &= \left(1-\hat{\rho}_{rw}-\hat{\rho}_{rl}\right)^{-1}\left\{\hat{\alpha}_{rs}S_t+\hat{\alpha}_{rp}P_t+\hat{\alpha}_{rsp}S_tP_t+\hat{\alpha}_{ri}I_t+\mathbf{x}'_{rt}\hat{\boldsymbol{\beta}}_r+e_r\right\}\\
I_t &= \left(1-\hat{\rho}_{iw}-\hat{\rho}_{il}-\hat{\rho}_{ilf}G_t\right)^{-1}\left\{\hat{\alpha}_{iu}U_t+\hat{\alpha}_{is}S_t+\hat{\alpha}_{ip}P_t+\hat{\alpha}_{isp}S_tP_t+\hat{\alpha}_{ir}R_t+\mathbf{x}'_{it}\hat{\boldsymbol{\beta}}_i+e_i\right\}\\
P_t &= \left(1-\hat{\rho}_{pl}\right)^{-1}\left\{\hat{\alpha}_{ps}S_t+\hat{\alpha}_{pu}U_t+\hat{\alpha}_{pr}R_t+\hat{\alpha}_{pi}I_t+\mathbf{x}'_{pt}\hat{\boldsymbol{\beta}}_p+e_p\right\}
\end{aligned}
\qquad \textbf{[3c]}.
$$

In either case, the solution is quadratic, as substituting the first and last lines of **[3b]** or **[3c]** into third or fourth quickly reveals. To make further progress, we first define some new terms:

let $\mathbf{y}\equiv\begin{bmatrix}S & U & R & I & P\end{bmatrix}'$ be the 5×1 vector of endogenous variables;

let $\hat{\boldsymbol{\Gamma}}\equiv\begin{bmatrix}0 & 0 & \hat{\gamma}_{sr} & 0 & 0\\ 0 & 0 & \hat{\gamma}_{ur} & \hat{\gamma}_{ui} & 0\\ \hat{\gamma}_{rs}+\frac{1}{2}\hat{\gamma}_{rsp}P & 0 & 0 & \hat{\gamma}_{ri} & \hat{\gamma}_{rp}+\frac{1}{2}\hat{\gamma}_{rsp}S\\ \hat{\gamma}_{is}+\frac{1}{2}\hat{\gamma}_{isp}P & \hat{\gamma}_{iu} & \hat{\gamma}_{ir} & 0 & \hat{\gamma}_{ip}+\frac{1}{2}\hat{\gamma}_{isp}S\\ \hat{\gamma}_{ps} & \hat{\gamma}_{pu} & \hat{\gamma}_{pr} & \hat{\gamma}_{pi} & 0\end{bmatrix}$ be the 5×5 matrix of estimated coefficients thereupon;

let $\hat{\boldsymbol{\rho}}_w\equiv\begin{bmatrix}\hat{\rho}_{sw} & \hat{\rho}_{uw} & \hat{\rho}_{rw} & \hat{\rho}_{iw} & \hat{\rho}_{pw}\end{bmatrix}'$ be the 5×1 vector of estimated spatial-lag coefficients;

let $\hat{\boldsymbol{\rho}}_l\equiv\begin{bmatrix}\hat{\rho}_{sl} & \hat{\rho}_{ul} & \hat{\rho}_{rl} & \hat{\rho}_{il}+\hat{\rho}_{ifl}GFrag & \hat{\rho}_{pw}\end{bmatrix}'$ be the 5×1 vector of estimated temporal-lag coefficients;

let $\hat{\mathbf{M}}_s^t\equiv\begin{bmatrix}\left(1-\hat{\rho}_{sw}-\hat{\rho}_{sl}\right)^{-1}\\ \left(1-\hat{\rho}_{uw}-\hat{\rho}_{ul}\right)^{-1}\\ \left(1-\hat{\rho}_{rw}-\hat{\rho}_{rl}\right)^{-1}\\ \left(1-\hat{\rho}_{iw}-\hat{\rho}_{il}-\hat{\rho}_{ilf}G_t\right)^{-1}\\ \left(1-\hat{\rho}_{pl}\right)^{-1}\end{bmatrix}$ be the estimated spatiotemporal-LRSS multiplier, a 5×1 vector;

let $\hat{\mathbf{M}}_s^s\equiv\begin{bmatrix}\left(1-\hat{\rho}_{sw}\right)^{-1}\\ \left(1-\hat{\rho}_{uw}\right)^{-1}\\ \left(1-\hat{\rho}_{rw}\right)^{-1}\\ \left(1-\hat{\rho}_{iw}\right)^{-1}\\ 1\end{bmatrix}$ be the estimated spatial multiplier, a 5×1 vector; and

let $\mathbf{C}\equiv\begin{bmatrix}\mathbf{x}'_{st}\hat{\boldsymbol{\beta}}_s+e_s & \mathbf{x}'_{ut}\hat{\boldsymbol{\beta}}_u+e_u & \mathbf{x}'_{rt}\hat{\boldsymbol{\beta}}_r+e_r & \mathbf{x}'_{it}\hat{\boldsymbol{\beta}}_i+e_i & \mathbf{x}'_{pt}\hat{\boldsymbol{\beta}}_p+e_p\end{bmatrix}'$ be the 5×1 vector reflecting the counterfactual shocks (including estimated coefficients) to consider. **[3d]**.

Then we can rewrite the system once more to obtain three expressions for (1) the pre-spatiotemporal impulses to **y** from, (2) the first-period (i.e., pre-temporal but post-spatial dynamics) responses to, and (3) the spatiotemporal long-run-steady-state (LRSS) responses to, some counterfactual:

$$
\begin{aligned}
&\mathbf{y}_{i,t}=\hat{\boldsymbol{\rho}}_w\circ\overline{\mathbf{y}}_{\sim i,t}+\hat{\boldsymbol{\rho}}_l\circ\mathbf{y}_{i,t-1}+\hat{\boldsymbol{\Gamma}}\mathbf{y}_{i,t}+\mathbf{C}\\
&\quad\Rightarrow\ \text{pre-spatiotemporal: }\Delta\mathbf{y}=\left(\underline{\mathbf{I}}_5-\hat{\boldsymbol{\Gamma}}\right)^{-1}\left[\Delta\mathbf{C}\right]\\
&\quad\Rightarrow\ 1^{\text{st}}\text{-period (pre-temporal, post-spatial): }\Delta\mathbf{y}=\left(\underline{\mathbf{I}}_5-\hat{\mathbf{M}}_s^s\circ\hat{\boldsymbol{\Gamma}}\right)^{-1}\left[\hat{\mathbf{M}}_s^s\circ\Delta\mathbf{C}\right]\\
&\quad\Rightarrow\ \text{LRSS: long-run steady-state (post-spatiotemporal): }\Delta\mathbf{y}=\left(\underline{\mathbf{I}}_5-\hat{\mathbf{M}}_s^t\circ\hat{\boldsymbol{\Gamma}}\right)^{-1}\left[\hat{\mathbf{M}}_s^t\circ\Delta\mathbf{C}\right]
\end{aligned}
\qquad \textbf{[3e]}.
$$

where the symbol, ∘, means element-by-element multiplication. Since $\mathbf{\Gamma}$ involves some elements of the endogenous variables, $\mathbf{y}$, namely S and P in the conditional coefficients of the R and I equations, we can offer only linear-approximation estimates in the neighborhood of specific starting values of S and P.[33] Furthermore, unfortunately, the estimated system finds spatiotemporal unit-roots in R and I, implying explosive LRSS responses. The estimates are very nearly stationary, though,[34] so we brazenly assume the matter to arise due to some relatively minor misspecification—linear-regression approximation to what are surely nonlinear relationships, for instance—and, in any event, inconsequentially for the short run. For finite LRSS estimates, we crudely subtract an arbitrary 0.15 from each coefficient on the temporal lags. Both these considerations suggest strong caution with regard to our reported LRSS estimates, but perhaps we may credit the estimated pre-dynamic impulses and first-period responses more confidently.

Table 2: Empirical System of Skew, Unemployment, Redistribution, Social-Insurance, and Participation —Estimated Pre-Dynamic Impulses and First-Period and LRSS Responses to Exogenous +0.2 Shock to *S*kew

			Δ *S*kew	**Δ *U*nemp.**	**Δ *R*edist.**	**Δ *I*nsur.**	**Δ *P*artic.**
***S*=High** (sample mean + 1 s.d.: 1.96)	***P*=High** (92.2)	*Impulse*	0.200	0.365	1.295	0.762	0.537
		1^{st}-Period	0.218	0.625	1.590	1.056	0.604
		LRSS	0.830	50.485	35.381	34.765	21.168
	***P*=Mid** (79.5)	*Impulse*	0.200	0.426	1.435	0.898	0.555
		1^{st}-Period	0.218	0.730	1.759	1.245	0.626
		LRSS	0.832	56.648	37.783	39.250	22.158
	***P*=Low** (66.9)	*Impulse*	0.200	0.486	1.574	1.034	0.573
		1^{st}-Period	0.218	0.834	1.929	1.433	0.648
		LRSS	0.834	62.839	40.197	43.755	23.153
***S*=Mid** (sample mean: 1.77)	***P*=High** (92.2)	*Impulse*	0.200	0.367	1.301	0.767	0.537
		1^{st}-Period	0.218	0.630	1.597	1.064	0.605
		LRSS	0.831	52.798	36.282	36.449	21.540
	***P*=Mid** (79.5)	*Impulse*	0.200	0.428	1.440	0.903	0.556
		1^{st}-Period	0.218	0.734	1.766	1.253	0.627
		LRSS	0.833	59.075	38.729	41.016	22.548
	***P*=Low** (66.9)	*Impulse*	0.200	0.489	1.580	1.039	0.574
		1^{st}-Period	0.218	0.839	1.936	1.441	0.649
		LRSS	0.835	65.381	41.188	45.604	23.561
***S*=Low**	***P*=High** (92.2)	*Impulse*	0.200	0.370	1.306	0.772	0.538
		1^{st}-Period	0.218	0.634	1.603	1.072	0.606
		LRSS	0.831	55.194	37.216	38.192	21.925
	***P*=Mid** (79.5)	*Impulse*	0.200	0.431	1.446	0.909	0.556
		1^{st}-Period	0.218	0.738	1.773	1.260	0.628
		LRSS	0.833	61.589	39.709	42.845	22.952
	***P*=Low** (66.9)	*Impulse*	0.200	0.491	1.586	1.045	0.574
		1^{st}-Period	0.218	0.843	1.943	1.449	0.650
		LRSS	0.835	68.015	42.214	47.520	23.985

[33] In principle, for given starting values, we should be able to iterate these calculations to find fixed-point post-counterfactual values for S and P, i.e., ones consistent in the left-hand-side $\mathbf{y}$ and the right-hand-side $\mathbf{\Gamma}$ of **[3e]**. We have not tried this yet.
[34] Regarding I, closeness to stationarity declines as *GFrag* increases, but the unit remains within 15% at up to 5 parties.

Tables 2 and 3 give all three sorts of estimated responses, at nine starting values of participation and skew ({low, mid, high}×{low, mid, high}), to one counterfactual each: respectively, a 0.2 exogenous increase in the 90-50 skew-ratio, i.e., in e_s, which roughly equals the Italian or New Zealander experiences and 2/3 of the U.S. or Portuguese; and a 4.5 point increase in international financial exposure, *FinExp*, which roughly equals the average trend over the observed period.

Table 3: Empirical System of Skew, Unemployment, Redistribution, Social-Insurance, and Participation —Estimated Pre-Dynamic Impulses and First-Period and LRSS Responses to +4.5 Shock to *FinExp*

			Δ ***S*kew**	Δ ***U*nemp.**	Δ ***R*edist.**	Δ ***I*nsur.**	Δ ***P*artic.**
***S*=High** (sample mean + 1 s.d.: 1.96)	***P*=High** (92.2)	*Impulse*	0.012	0.164	0.079	0.037	0.026
		1st-Period	0.013	0.214	0.097	0.050	0.029
		LRSS	0.051	3.328	2.323	1.925	1.262
	***P*=Mid** (79.5)	*Impulse*	0.012	0.168	0.087	0.046	0.027
		1st-Period	0.013	0.221	0.108	0.061	0.030
		LRSS	0.051	3.704	2.470	2.198	1.322
	***P*=Low** (66.9)	*Impulse*	0.012	0.171	0.096	0.054	0.028
		1st-Period	0.013	0.227	0.118	0.073	0.031
		LRSS	0.051	4.081	2.617	2.473	1.383
***S*=Mid** (sample mean: 1.77)	***P*=High** (92.2)	*Impulse*	0.012	0.164	0.079	0.038	0.026
		1st-Period	0.013	0.214	0.098	0.050	0.029
		LRSS	0.051	3.466	2.377	2.025	1.284
	***P*=Mid** (79.5)	*Impulse*	0.012	0.168	0.088	0.046	0.027
		1st-Period	0.013	0.221	0.108	0.062	0.030
		LRSS	0.051	3.849	2.526	2.304	1.345
	***P*=Low** (66.9)	*Impulse*	0.012	0.172	0.096	0.054	0.028
		1st-Period	0.013	0.227	0.118	0.073	0.031
		LRSS	0.051	4.233	2.676	2.583	1.407
***S*=Low** (sample mean -1 s.d.: 1.59)	***P*=High** (92.2)	*Impulse*	0.012	0.164	0.080	0.038	0.026
		1st-Period	0.013	0.215	0.098	0.051	0.029
		LRSS	0.051	3.609	2.433	2.129	1.307
	***P*=Mid** (79.5)	*Impulse*	0.012	0.168	0.088	0.046	0.027
		1st-Period	0.013	0.221	0.108	0.062	0.030
		LRSS	0.051	3.999	2.585	2.413	1.369
	***P*=Low** (66.9)	*Impulse*	0.012	0.172	0.097	0.055	0.028
		1st-Period	0.013	0.227	0.119	0.074	0.031
		LRSS	0.051	4.390	2.737	2.698	1.432

The tables illustrate three general aspects of our estimated system. First, due to feedbacks among the endogenous variables, the counterfactual shocks, which have direct impact on the economic outcomes only, indirectly affect all five outcomes, including the policies and politics. Second, due to the glacial spatiotemporal adjustment rates of the outcomes, our crude adjustment for outright stationarity in the policies notwithstanding, the estimated LRSS effects of permanent shocks range from about 4 to 40 times their immediate impulses. Third, while participation and skew do seem to moderate each other's effects on policies, and thereby on the other outcomes, they do so in contrast to theoretical expectations (and Franzese 2002, ch. 2). Reading down the rows of varying participation rates within a level of skew, or down levels of skew at corresponding participation rates, the estimated effects of S and of P each increase as the other variable decreases. Because the feedbacks remain reinforcing—just decreasingly so—this reduces, but hardly eliminates, the previously mentioned probability of multiple equilibria (all-high/low inequality, unemployment, redistribution, social insurance, and participation).

To illustrate using one specific set of results, consider the first-period responses to the hypothetical +0.2 exogenous shock to skew. Due mostly to spatial feedback (because, regarding systemic feedbacks, only redistribution affects skew and only slightly), this ultimately engenders +.22 skew, mostly reflecting the almost 9% spatial multiplier for skew. This shock directly positively affects redistributive and social-insurance policies and, less so, political participation. Those direct effects diffuse and multiply spatially, induce indirect responses in the economic outcomes, which feedback to policies and politics. At sample mean participation and skew, the net result across all five outcomes' first-period responses are +.22 skew (i.e., a 22% "outpacing of tugboats by yachts"), + .73% unemployment, +1.77% and +1.25% of GDP in redistribution and in social insurance respectively (7-9% and 35-40% of their sample ranges and standard deviations respectively), and +.63% participation (1% of sample range and 5% of standard deviation).

IV. Conclusions

Conflicts of interest over the generosity and structure of social policy arise between the relatively poor and wealthy and between the precariously and the securely employed, suggesting theoretically that democratic demand for redistribution and social insurance should respond positively, respectively, to inequality and to inequality and unemployment. We found, empirically, direct effects from inequality (only) to both redistribution and social insurance. The generosity and structure of social policy, however, should theoretically simultaneously dampen labor-market efficiency, raising unemployment and (pre-tax-and-transfer) inequality, and, indeed, we found, empirically, direct effects of redistribution and (especially) social insurance on (only) unemployment. Theoretically, both inequality and unemployment and both redistribution and social insurance may also affect political participation, and so the identity and preferences of the median voter, and be affected by them. Again, we found considerable empirical support for at least some of this. Higher participation favors greater social insurance and redistribution both, and (especially) redistribution appreciably directly boosts participation. Economic outcomes are not directly affected by, and do not much directly affect, participation, but the theoretical circle is already indirectly closed empirically. At least indirectly, each of these five outcomes across economy, politics, and policy causally connects too and, specifically, increases, the others, raising the possibility of multiple political-economic equilibria, with higher/lower inequality and unemployment, public redistributive and social-insurance spending, and political participation working to reinforce each other.

This paper summarized the theoretical expectations regarding these endogenous relationships, suggested identification conditions derived from the theory and substance, and estimated and interpreted the resulting empirical system of equations. Our empirical analysis thus improves upon extant studies that ignore the gorilla in the room: the endogenous relationships among these political, economic, and policy variables. However, our empirical results also revealed some puzzling surprises. Clearly, much work remains to refine the empirical specification and analysis, and 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 in democracy.

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