***The Multiple Effects of Multiple Policymakers*: Veto Actors Bargaining in Common Pools**

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ABSTRACT: When considering the implications for policy outcomes of the dispersion of policymaking authority across multiple actors, recent veto-actor scholarship has emphasized its potential to privilege the *status quo* and thus retard policy-adjustment rates. In similar contexts, however, others have stressed collective-action and common-pool issues that arise when multiple policymakers share authority over policies. Still others have highlighted bargaining and compromise in policymaking with multiple actors. This paper offers a synthetic discussion of these *multifarious* effects of the number and diversity of policymaking actors, thereby placing veto-actor considerations in broader theoretical context, and it offers an empirical approach to modeling these manifold effects of multiple policymakers distinctly and effectively. It then offers an initial exploration of this synthetic-theoretical and structured-empirical approach in a study of the evolution of fiscal policy in developed democracies since the 1950s and 1960s.

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I. Veto-Actor, Common-Pool, and Bargaining Effects of Multiple Policymakers: A Synthetic Theoretical Discussion

This paper discusses the multifarious effects of multiple policymakers—veto-actor, common-pool, and bargaining-compromise effects—seeking to distinguish as sharply as possible from the respective theories the specific aspects of multiple policymakers that are to affect outcomes and the specific manner in which those aspects are to affect outcomes so that, empirically, we can operationalize measures and specify models of policymaking that reflect these theorized aspects and manners precisely enough to afford accurate estimation of these multiple effects distinctly.

A. Veto Actors: Deadlock, Delayed Stabilization, and Policy-Adjustment Retardation

In a *tour de force* of modern political-science theory, George Tsebelis introduced and elaborated (see, esp., 1995b, 1999, 2000, 2002) the powerful *veto-actor* (*veto-player*[1]) approach to the study of comparative politics and policymaking. He and coauthors have extensively explored and substantiated this approach empirically, especially in the contexts of bicameral and European Union policymaking (Tsebelis 1994, 1995a, 1996; with Money 1995ab, 1997; with Garrett 1996ab, 1997ab, 1999ab, 2000, 2001abc; with Kreppel 1998, 1999; with Jensen et al. 2001; with Yataganas 2002).[2] Studies with Hug (2002) and with Chang (2004) consider referendum politics and fiscal policy in developed democracies, finding further support. The essential argument of

[1] These terms are synonyms; I prefer *veto actors*. *Veto points* differ from *veto actors/players*. *Veto points* are positions in the policymaking process from which a veto may be cast. I.e., *veto points* are essentially placeholders for potential *veto actors*.

[2] Later work adds *conditional agenda-setters*, the theoretical complement of *veto actors*. Agenda-setting power depends on (1) the size of the winset of the *status quo*, *W(SQ)*, which is inversely related to the number and/or polarization of veto actors, (2) the centrality of the agenda-setter's ideal point within those of the veto actors, and (3) the institutional provisions that permit some to make proposals and prevents others from amending them (Tsebelis & Aleman 2004).

veto-actor theory is that the number and/or interest-ideological polarization of *policymaking actors whose approval is required to alter the policy status quo*—i.e., of *veto actors*—reduces the probability of (agreement upon enacting) policy change and/or the (maximum possible) magnitude of policy change. That is, as the size of the winset of the *status quo*, *W(SQ)*, shrinks, which it generally does as the number and/or polarization of veto actors increases (see below, and, for fuller elaboration, Tsebelis 2002), the range of possible policy-movements from the *status quo* shrinks. This yields an empirical prediction of a form illustrated in Figure 1 (Tsebelis 2002, p. 33, Figure 1.7). As the winset of the *status quo* expands (i.e., the number and/or polarization of veto actors declines), veto-actor theory predicts a greater range of *possible* policy-changes, *suggesting* that the mean or expected policy-change increases and, *perhaps*, that the variance of policy and policy-change grows.[3] Conversely, as the winset shrinks (i.e., the number and/or polarization of veto actors expands), the theory offers an increasingly deterministic prediction of smaller and smaller policy-change.

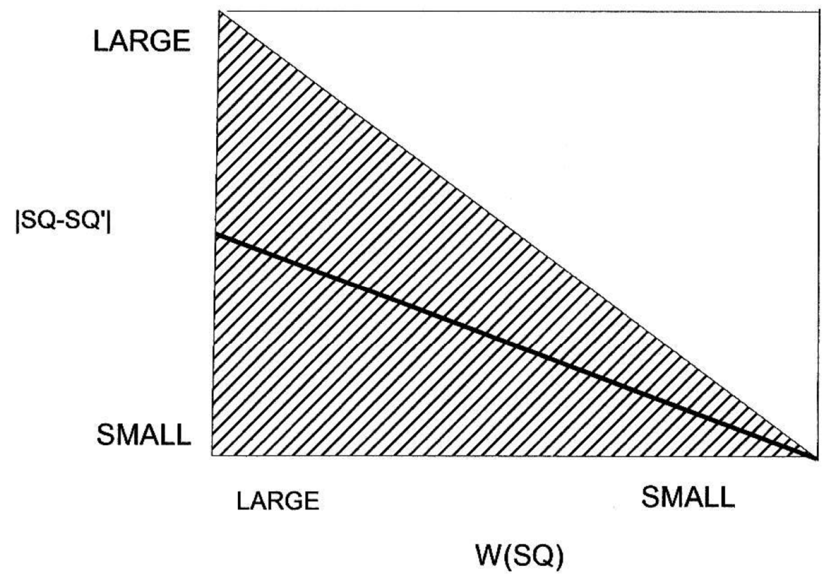

Figure 1: *Distance of New Policy from Status Quo as a Function of the Size of W(SQ)*

The dispersion of policymaking authority across multiple actors, especially insofar as those

[3] Only *suggesting* greater mean and, *possibly*, variance of policy because, in its base form, the theory does not predict where within the winset policy will actually end, only that it will lie somewhere within the winset. Deriving mean and variance predictions requires knowledge of the identity and location of agenda setter(s) and those with amendment power and of the *status quo* relative to all these veto actors' ideals. Without such information, predictions regarding the mean and variance of policy-change only emerge if one assumes that each case analyzed amounts to a random draw from those possible conditions (i.e., possible locations and allocations of proposal and amendment powers and *status quos*) so a large sample of cases will average across possible values of these conditions. If one assumes further that the distributions from which these conditions are drawn are symmetric, then the expected policy-change is the mean of the bounds of *W(SQ)* as in the example in Figure 1. Variance predictions likewise require further, more-restrictive assumptions about the distribution of these other conditions, although symmetry specifically is not required.

actors preferences are polarized, thus: (a) privileges the *status quo*, thereby retarding policy-adjustment rates and (b) reduces the range of possible policy-changes (first- and second-moment implications, respectively, as Figure 1 illustrates). The reduction in the range of possible policy-changes may also imply smaller expected policy-change and/or variance of policy change (see note 3). Regarding deficits and debts, for example, Roubini & Sachs (1989ab) argue and find evidence that more fractionalized and polarized governments respond less and/or less rapidly to macroeconomic shocks requiring fiscal adjustment. Alesina & Drazen (1991) and Drazen & Grilli (1993) formalize and generalize this intuition to *delayed stabilization* of economic policies. Spolaore (2004) provides fuller theoretical consideration, evaluating the relative policy-responsiveness of single-party governments against multiparty-coalition governments or systems of institutionally divided policymakers with checks and balances, either of which requires consensus among the multiple policymakers. Spolaore's model finds that single-party governments tend to respond too much, too quickly, and too often, whereas governments comprised of multiple policymakers tend to respond too little, too late, and too rarely.

Initially, empirical support for these propositions regarding fiscal policy, specifically public deficits and debts, was mixed (Roubini & Sachs 1989ab; Grilli *et al.* 1991; Edin & Ohlsson 1991; DeHaan & Sturm 1994, 1997; Alesina & Perotti 1995; Borelli & Royed 1995; Heller 1997, 2001; DeHaan, Sturm, & Beekhuis 1999).[4] However, most of these studies failed to model the core theoretical insight of the veto-actor argument accurately. Their empirical models include government fragmentation and/or polarization measures simply as one in a set of *linear-additive* determinants of policy rather than as measures of political conditions that modify (specifically: that *dampen*) policy adjustment-rates and, perhaps, reduce the magnitude of policy-responses to other factors and/or reduce policy variance. Also analyzing fiscal deficits and debts, Franzese

[4] Roubini & Sachs (1989ab) find *government fragmentation* raises debt, measuring *fragmentation* by crude ranking of single-party majority, multi-party majority, single-party minority, multi-party minority government. Edin & Ohlsson (1991) apply separate indicators and find deficits correlate with minority governments only. De Haan & Sturm (1994, 1997), Borrelli & Royed (1995), and DeHaan et al. (1998) find not even this, but Heller (1997) finds bicameralism, especially with the chambers' partisan control differing, increases deficits. Alesina & Perotti (1995) conclude similarly from their case studies that single-party governments implement fiscal adjustment better than do coalitions.

(2002b) found specifications that properly reflect these *delayed-stabilization/adjustment-retardation* implications yield strong empirical support that (a) government fragmentation/polarization retards policy-adjustment rates (i.e., here, delays fiscal stabilization) and, specifically, that (b) empirical measures of fragmentation/polarization that follow Tsebelis' veto-actor framework to count *raw* numbers of policymakers, rather than *effective* (i.e., size-weighted) numbers, and to measure the *range* of those veto actors' preferences, rather than using (size-weighted) *variance* or *standard deviation* measures, statistically dominated. I.e., measures based on *veto-actor* conceptions of the unanimity among multiple, polarized policymakers required to change policy as opposed to *weighted-influence* conceptions of policy-adjustment processes performed better. Likewise, in other fiscal- or monetary-policy contexts, Alt & Lowry (1994, 2000, 2003), Lowry et al. (1998), Treisman (2000), Lowry & Alt (2001), Hallerberg (2002), Basinger & Hallerberg (2004), Tsebelis & Chang (2004), and others find strong support for the core veto-actor propositions—that greater numbers and/or polarization of veto actors retard policy-adjustment, delay stabilization, and reduce the magnitude and/or frequency of policy change, as illustrated in Figure 1—in empirical models properly constructed to reflect one or more of those propositions.

In sum, veto-actor theory makes no prediction about the *levels* of policies (much less of outcomes); such predictions require information about the identity, powers, and preferences of *agenda setters* (i.e., *proposers*) and *amenders* and about the location of *status quos* in specific instances, across which conditions veto-actor theory aims to generalize. Rather, *veto-actor* theory regards the *probability, pace*, or *magnitude* of policy *change*: greater numbers and/or polarization of veto actors retard policy adjustment, delay stabilization, and reduce the frequency and/or magnitude of policy change. Empirical models specified correctly to reflect these propositions, rather than incorrectly relating policymaker fractionalization and/or polarization to policy *levels*, generally find strong support in fiscal-policy and other policymaking contexts. Moreover, the veto-actor view of policymaking with multiple policymakers rests explicitly and emphatically on unanimity and so rejects weighted-influence notions of policymaking. By definition, *veto actors* are agents whose agreement is essential to change policy, so *all* veto actors must agree to change policy for adjustment from the *status quo* to occur. Accordingly, the appropriate empirical measures of policymaker fractionalization from this view are *raw*, and *not effective* (i.e., size-weighted), numbers of veto actors; and the appropriate measures of policymaker polarization are absolute maximum *ranges* between the extremes, and *not* *variances* or *standard deviations* (those being size-weighted measures), of those veto actors' preferences. Moreover, veto-actor theory generally emphasizes polarization over fragmentation as crucially affecting the net resistance to policy change, although both are important in multidimensional policymaking.[5]

B. Collective Action and Common Pools in Fiscal Policy with Multiple Policymakers

Other scholars, however, have stressed various collective-action and common-pool issues that arise when multiple actors share policymaking authority. For example, Weingast, Shepsle, & Johnsen (1981: *WSJ*) ask why representative legislatures routinely pass budgets that manifestly overemphasize distributive or *pork-barrel* projects. Their answer stresses the division of democratic polities into electoral districts, noting that all democratic representation involves some "districting mechanism that divides the economy into n disjoint political units called districts" (p. 643), and defining *distributive policy* as "a political decision that concentrates benefits in a specific geographic constituency and finances expenditures through generalized taxation" (p. 644). They assume further that each district elects one representative to the collective policymaker, the legislature. Given these definitions, and assuming these legislators/policymakers follow some universalist log-rolling norm, *WSJ* show that overemphasis on distributive policies, i.e., on pork-barrel projects, is an increasing function of the number of electoral districts, i.e., the number of policymakers, which are the same in this model given their assumptions.

To see this common-pool problem formally, first index the electoral districts $i=\{1..n\}$. Define pork-barrel/distributive projects as those with benefits, B, concentrating in district i (for analytic clarity, entirely so); then stipulate, plausibly, that benefits increase with project size or cost, C_i,

[5] In unidimensional contexts, in fact, only polarization, and not fractionalization (numbers), of veto actors matters.

with diminishing returns: $B_i=f(C_i)$ with $f'>0$ and $f''<0$. Completing the definition of distributive spending, let those costs, C_i, accrue more uniformly across all n districts (again, for analytic clarity: entirely so): $C_i=C/n$. Then, the optimal project-size, C^*, from the individual representative's view, is given implicitly by $\underset{C}{Max}\left\{f(C)-C/n\right\} \Rightarrow f'(C^*)=1/n$. Thus, legislators' incentives to overspend on distributive projects increase with the number of districts.

Individual legislators do not pass policies, though; the collective legislature does. *WSJ* argue that legislators adopt universalistic log-rolling norms where all legislators vote for all distributive bills ("I'll vote for yours; you vote for mine"), which would imply that legislatures pass the district-by-district optimal, yielding pork-barrel overspending proportional to (log) the number of districts. Under universalism, in other words, total public revenue is a *common pool* for all n representatives (policymakers), which they overuse proportionally to n in distributing benefits. If legislatures decide democratically, though, without log-rolling, universalistic norms, or side-payments, then all pork-barrel projects would *lose* legislative votes by a margin of $(n-1)$ to 1 because only receiving districts derive net benefits, $f(C)-C/n$, whereas all others only pay costs, C/n. Only projects that inherently, i.e., without sidepayments, produced net benefits for at least a majority of districts would pass, yielding far less overspending—indeed, likely underspending—and not necessarily proportional to n.[6] As Riker (1962) showed, though, coalition-building strategies for distributive policy in majority-rule legislatures will optimally, opportunistically entail side-payments sufficient to induce bare-majority support, i.e., minimum-winning coalitions (*MWC*), meaning that $(n-1)/2$ other legislators must receive $C/n+\varepsilon$. This also implies overemphasis on pork directly proportional to the number of districts, albeit at a notably lesser rate that under universalism. Specifically, log-rolling legislatures pass all projects with $B>C/n$; legislatures with majority-rule and side-payments

[6] Without side-payments or log-rolling, all projects passed must *inherently* provide net benefits to at least ½ the districts plus one, rather than just to one district as under universalism, and rather than just to generate sufficient total net benefit to pay half-plus-one of the legislature, as under *MWC* majoritarianism (see below). Accordingly, many projects that would surpass $(n+1)/2n$ times C in total benefits (the *MWC* minimum; the lower universalistic minimum is $1/n$) would fail because positive net benefits did not accrue *naturally* across enough districts. This implies less overspending than by the other rules. Indeed, projects with total benefits exceeding costs, the utilitarian-optimal criterion, may also fail, i.e., *underspending* occur, if benefits are too concentrated. Finally, whether spending remained proportional to n in any manner under these conditions would depend on the distributions (across districts) from which potential projects' benefits and costs are drawn.

pass only projects with $B>[(n+1)/2n]\times C$.[7] Under universalism, total revenue is a common-pool for the whole *n*-member legislature that each legislator may exploit unilaterally, so project benefits need only exceed *1/n* of costs to pass. Under *MWC* majoritarianism, project benefits must suffice to provide *1/n* to the agenda setter *and* to the *(n-1)/2* other legislators receiving side-payments, so the pool of revenues is effectively common to one-half-plus-one of legislators. As Figure 2 illustrates, therefore, common-pool problems manifest under *MWC* decision-making as under universalistic and they worsen with *n* in both cases, albeit at the lesser rate of $-\partial\{(n+1)/2n\}/\partial n$ under *MWC* than the $-\partial\{1/n\}/\partial n$ rate under universalism.

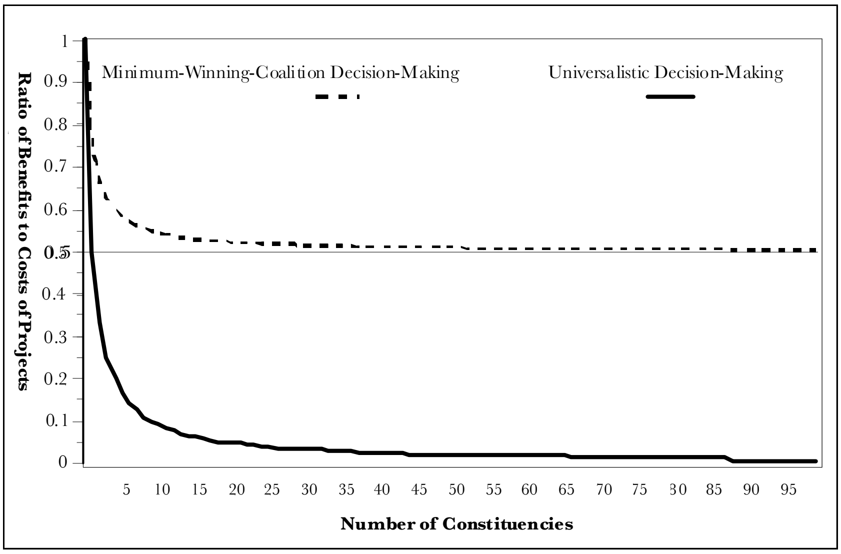

Figure 2: *Ratio of Benefits to Costs of Minimally Passable Distributive Projects under Universalism vs. MWC-Majoritarianism*

Actual democratic policymaking likely operates somewhere between pure universalism and pure *MWC*-majoritarianism. Indeed, later scholarship deduced several reasons to expect *super-majoritarian* legislative decision-making. With uncertainty over future membership in the *MWC*, for example, Shepsle & Weingast (1981) noted that super-majoritarian legislative norms can be strategically sustainable (to insure against being among the losers too often). Luebbert (1986) and Strom (1990) argue similarly regarding parliamentary government-formation that uncertainty

[7] *MWC* majoritarianism implies that *(n-1)/2* will receive side-payments infinitesimally greater than their *1/n* tax burdens, with remaining benefits of at least that much going to the proposer. Thus, half of *n* must get at least *1/n*, so projects would always require benefits at least ½ of costs, so one might object that policy does not depend on *n* under majoritarianism. This seems true, but it ignores that *n* must be an integer, so the minimum amount by which benefits must exceed ½ costs declines in *n*; obtaining support from 3 of 5 is more costly than 4 of 7, etc. Essentially, the "plus one" of the "one-half plus one" becomes cheaper to buy as *n* increases (see Ehrlich 2004).

over legislative support, due to secret balloting or party ill-discipline for instance, would push coalition builders to seek supermajorities (oversized coalitions). Stressing legislative procedures, Carruba & Volden (2000) generalize these and similar results to show that, in fact, all coalitions from minimum-winning to universal may form, depending on amendment openness and other rules. For instance, Baron (1991) had found universalism on distributive bills to be unlikely, but that over-provision increases in n still, albeit to a degree mitigated (toward the *MWC* minimum shown in Figure 2) by procedural openness. Similarly, McCarty (2000a) and Bradbury & Crain (2001) argue, respectively, that presidents or bicameralism dampen the $1/n$ effect (again toward the *MWC* minimum), by—I infer—adding a legislative step in which veto or amendment may occur. To these considerations, Franzese and Nooruddin (2004) add that, if voters are rationally ignorant, C/n may be too small for the voters in non-receiving districts to notice even while receiving-district voters readily appreciate their much larger net benefit, $f(C)-C/n$. Thus, rational ignorance among voters allows legislators more easily to sustain universalist or super-majoritarian pacts to support each other's pork-barrel bills by cooperative solutions to their iterated prisoners-dilemma.[8] Voters' rational ignorance facilitates side-payments to build supermajorities behind distributive policies because legislators will demand smaller payments to support others' pork-barrel projects the less their own voters' notice. In the limit, rational ignorance revives universalist scenarios of district-by-district maximization of pork-barrel benefits. Moreover, the total size of distributive inefficiencies or side-payment excesses about which voters may rationally remain ignorant also rises with the number of districts over which such costs distribute.

In sum, distributive politics generally and pork-barrel spending specifically increase with the number of districts, more strongly so as legislative behavior tends more universalistic and less minimum-winning, which tendency, in turn, heightens as rational ignorance, winning-coalition uncertainty, or legislative-rule closure to amendment or veto rises. Thus, as the numbers of policymaking players increase, not only does the potential for deadlock and policy-adjustment

[8] Moreover, such cooperation is especially likely because legislators number relatively few, have relatively homogenous interests in this regard, and interact repeatedly and indefinitely (Axelrod 1984).

retardation increase, as veto-actor theory stresses, but collective-action and common-pool problems also intensify and, thereby, the bite of the *law of 1/n*, as it is sometimes called, increases.

Such common-pool issues manifest myriad ways in multi-actor policymaking. For example, germane to the empirics considered below, Velasco (1998, 1999, 2000) shows that a common-property issue arises with respect to the intertemporal totality of public revenues, meaning that policymakers' incentives regarding deficits and debts also follow the *law of 1/n*, with over-drawing (i.e., over-borrowing or excessive deficits) directly proportional to *n* *equal-sized* actors:

> Two distortions are present if *n* agents share the stock of the resource. First, each agent uses the whole stock and not one-*n*th of it as the basis for consumption and spending decisions. [This is *WSJ*'s static *law of 1/n*.] Second, the return on savings as perceived by one agent is the […total…] rate of return…minus what the other *n-1* agents take out. Hence…each agent undersaves (overspends in the case of fiscal policy, overexploits in the case of natural resources). This means that deficits are incurred and debts accumulated even [without economic-welfare] incentive... [This is the new intertemporal *law of 1/n*.] In short, the model exhibits a "deficit bias" (p. 5).

Similarly, Peterson and co-authors (with Rabe & Wong 1986; with Rom 1991, 1995), Treisman (1999ab), Rodden (with Eskeland & Litvack2003; 2006) show, in very different substantive contexts and with varying emphases, how federalism, by endowing multiple actors with taxation authority, creates several *common-pool* problems. For example, inter-jurisdictional competition (with high factor mobility) makes a common pool of investment resources, and so induces over-fishing: there, excessively *low* taxes. Contrarily, a central government that explicitly promises to serve as lender-of-last-resort for subnational jurisdictions, or is held implicitly to do so, creates another common pool—of the federal guarantee and the funds backing it—that induces excessive borrowing (i.e., either or some combination of excessively low taxes and/or high spending)—by the subnational units. Others have stressed similar common-pool issues in the European Union context, especially regarding the single currency, where the ECB becomes the guarantor of last-resort and the member-countries the fishers from its common pool or reserves and/or credibility (see, e.g., Calmfors 1998; Ozkan et al. 1998; Sibert 1998; Sibert & Sutherland 1999).

The severity of such fiscal common-property problems, as always the case in the ubiquitous collective-action/common-pool scenarios of which they are an example, increases in the number of policymakers *but diminishes* as some (one or more) of these policymakers become larger-than-equal shares of the whole, i.e., as some actor(s) become(s) more *encompassing* in the Olsonian (1965) sense. Notice at one limit of Figure 2, for example, that, with only one policymaker, that single, wholly encompassing policymaker internalizes all of any project's costs, so benefits-costs ratios must exceed one (i.e., the utilitarian minimum: benefit>cost) for proposals to pass. Likewise, policymakers representing constituencies comprising greater shares of their nation's fisc will internalize more of the common pool:[9] *Implication 5* of Olson's logic of collective action (1982, pp. 47-53). When counting actors to gauge the severity of common-pool problems, fiscal policymakers representing constituencies comprising, for instance, 49%, 49%, and 2% of the fisc are much closer to $n=2$ than to $n=3$. In other words, the n in the quote above, in the *law of 1/n*, and in which collective-action and common-pool problems worsen, is properly the *size-weighted* or *effective* number of policymakers, unlike the properly unweighted n in veto-actor theory.

Collective-action and common-pool effects are as endemic to multiple-policymaker contexts as are veto-actor effects, and, like the policy inaction of the latter, collective-action/common-pool *problems* need not always harm, and could even benefit, society. Collective-action problems among policymakers can be boons for citizens. Goodhart (2002), for example, explains how incumbents suffer a collective-action problem in responding to their shared (common-pool of) incentives to *electioneer* (i.e., to manipulate economic policies for opportunistic, electoral effect; see Franzese 2002a). The greater the number of policymakers with a hand in policymaking, the more voters must divide credit (blame) for anything delivering benefits (costs) among those incumbents (see also note 9). As the *size-weighted* number (i.e., effective number) of incumbents grows, their incentives to *electioneer* diminishes, and so opportunistic policy-manipulation timed to the electoral calendar (Tufte 1978) fades. An initial empirical exploration below focuses on this implication of common-pool mitigated electoral cycles. More generally, though, for elected, representative

[9] This and later statements choose the generic term, *fisc*, advisedly because, for the specific common-pool problem in fiscal policy emphasized by *WSJ* and Velasco to emerge in the precise form argued, the (unequally sized) hypothetical constituencies must each comprise its same share on the revenue and expenditure side of the *fisc*. Mismatch between constituency representation on the expenditure and the revenue sides of fiscal policymaking can exacerbate these over-spending/over-borrowing problems, mitigate them, or even over-compensate for them to induce problems of excessively (suboptimally) high taxes or low spending or borrowing. See also Primo & Snyder (2005).

policymakers, these collective-action/common-pool problems (increase in their *effective* number and) induce over-indulgence (common-pool over-fishing) in policies that would bring public discredit and (collective-action) under-investment in policies that would earn public credit.

Thus, at least three aspects of the collective-action/common-pool effects of the dispersion of policymaking authority may help distinguish them theoretically and empirically from the veto-actor effects of the same dispersion. First, common-pool effects regard policy *levels* more directly, whereas veto-actor effects strictly relate to policy-adjustment (policy-*change*) *rates*, *magnitudes*, and *variability*. I.e., as policymakers' common-pool problems worsen, the *levels* of distributive spending, or of borrowing, etc., increase, and the *levels* of electioneering diminish. As the numbers (and polarization) of veto actors increase, the *rate*, *probability*, and/or *magnitude* of policy *adjustment* or *change* diminishes, and policy *volatility* or *variance* may increase. Relatedly, the predicted common-pool effects of government fractionalization include a policy *direction*, a positive sign for public "bads" and a negative sign for public "goods"; the predicted veto-actor effects of fragmentation and polarization do not. Second, whereas veto-actor effects arise from government fragmentation and polarization, i.e., from both numbers of and dissension among policymakers, common-pool effects derive more exclusively from fragmentation.[10] Third, collective-action/common-pool effects increase with *size-weighted* numbers of policymakers, whereas veto-actor effects increase with *raw numbers* and *ideological/interest spread*—i.e., absolute distance/spanned between the furthest extremes—of policymakers (Franzese 2002b). Size-weighted numbers are *effective* numbers; size-weighted polarization measures include standard deviations or variances; raw numbers are counts; and the total ideological/interest spread is called the *(maximum, absolute) range*.[11]

C. Delegation, Bargaining, and Compromise among Multiple Policymakers

Other scholars highlight delegation, bargaining, and compromise involved in multiple-actor

[10] Interest heterogeneity can complicate collective action, but this is different from exacerbating common-pool issues. The former statement implies delays or difficulties in taking collective action, more similarly to a veto-actor effects; the latter implies over-fishing or under-investment effects on collectively implemented action, i.e. a level effect.

[11] In one dimension, *range* is the distance (length) farthest-left-to-right among policymakers; in multiple dimensions, *range* is the area (2D), volume (3D), or hyper-volume (4D+) of the upper-contour set (i.e., of the figure drawn by connecting the outermost) of the policymakers' ideals. These last three depend on fragmentation and polarization both, so, as noted above, in multiple dimensions, fragmentation as well as polarization engenders veto-actor effects.

policymaking. The most advanced theoretical and empirical work in this vein analyzes extensive-form games designed to illuminate particular substantive contexts, often the U.S. Congress. These extensive-forms model the specific institutions and rules governing strategic policymaker relations in particular contexts, and, indeed, these micro-level specificities tend to receive central emphasis. McCarty & Poole (1995) and McCarty (2000b), for example, are archetypal explicit, extensive-form theoretical models reflecting specific rules and properties of US legislative and legislative-executive bargaining,[12] and empirical models designed to evaluate those specific forms. Huber & Lupia (2001) and Huber & McCarty (2001), e.g., do likewise for parliamentary bargaining;[13] Alt & Lowry (1994, 2000, 2003), Lowry et al. (1998), and Lowry & Alt (2001) do likewise for US-state legislature-executive bargaining. Snyder et al. (2004) similarly analyze bargaining in weighted-voting scenarios, their substantive and empirical application being parliamentary-government formation and policymaking. In a similar approach, Kiewet & McCubbins (1991), Bawn (1995), Epstein & O'Halloryn (1999), and Huber & Shipan (2002) analyze extensive-form theoretical models of specific bureaucratic-delegation venues (and motivations),[14] and some of these include evaluations of correspondingly particularized empirical specifications.

Franzese (1999, 2002b, 2003) follows a less context-specific strategy, one that, in other words, relies less on the specifics of any particular extensive-form game. For comparativists especially, the approach may offer valuable analytical benefits, although it does necessitate greater abstractions and simplifications, and thereby sacrifices some of the theoretical and empirical precision of an extensive-forms approach. The aim here is to offer instead a simple, less context-dependent model of delegation and bargaining that might more easily *travel*, so to speak, over the many specific contexts across which the comparativist wishes to generalize theoretically and from which s/he seeks to infer empirically. Luckily, the conclusions of most extensive-form models of bargaining

[12] Baron & Ferejohn (1989) and Romer & Rosenthal (1978) are the foundational legislative and legislative-executive models in this tradition; Cameron & McCarty (2004) give excellent review of legislative-executive bargaining models.

[13] Lupia & Strom (2004) is a very accessible survey of models of parliamentary bargaining in government formation; Huber & McCarty (2001) consider several alternative coalition decision rules for their extensive-form game.

[14] McCubbins et al. (1987) is the foundational work in this bureaucratic-delegation tradition.

and delegation, including those in the works cited above, share some important and useful common features. Most crucially, if a set of policymakers with different preferences over policies or outcomes must agree for a result to take effect, then, in virtually any game of bargaining or delegation, the resulting *status quo* or new policy (the equilibrium) will be some *convex combination*[15] of those policymakers' preferences.[16] It will lie, in other words, on the boundaries or somewhere within the set whose outer reaches are given by the policymakers' ideal points.[17] For two actors, the set of possible results is the line segment connecting (and including) their ideal points. In multiple dimensions with three or more actors, this possible set becomes the plane (area), volume, or hypervolume formed by connecting the outermost actors' ideal points.[18] In cooperative game theory, this *upper-contour set* of the policymakers' ideal points is called the *core*. As just argued, and as Osborne & Rubinstein (1994) review, wide classes of non-cooperative bargaining games have equilibria within the *core*. The core is also central to veto-actor theory, especially Tsebelis (2002), which shared from a theoretical-modeling perspective the same aim—to *travel* analytically by minimizing extensive-form specificities—as stressed from an empirical-modeling view here.

However, the empirical approach to bargaining and delegation suggested in Franzese (1999, 2002, 2003) and pursued here takes one more-restrictive step than veto-actor theory, yet also one less step than extensive-form modeling: namely, the empirical implementation effectively assumes *Nash Bargaining*.[19] In Nash Bargaining, the policy enacted by *n* players is a geometrically weighted-

[15] A *convex combination* is a linear-additive function with coefficients, π_i, such that $0\leq\pi_i\leq1$ and $\sum\pi_i=1$; (at least rough) synonyms include *weighted average* and *affine combination*.

[16] With full information (no uncertainty), the *virtually* is dispensable. With imperfect information/uncertainty, bargains can settle outside the extremes of the bargainers' preferences, but, even then, settlements would lie at or within those extremes *in expectation*, which is more the concern for the strategy suggested here. An example illustrates: some hard-bargainer with preferences not very near center of the bargainers' ideals, expecting certain things about the other bargainers' preferences or other unknowns or uncertainties, could take a position beyond the extrema of the actors' preferences in an attempt to get a settlement closer to her extreme ideal. These unknowns or uncertainties could resolve in some instances such that the outcome is beyond what the hard-bargainer wanted, indeed even outside the range of the bargainers' ideals. Even in this case, though, the hard-bargainer would not have taken a strategy that yielded an *expected* policy more extreme than her ideal unless her utility function was rather oddly asymmetric.

[17] This set is called the *upper-contour set;* (at least rough) synonyms include *convex set, affine set*, or *convex hull*.

[18] Again (see note 16), this assumes full information. Fully generally, the settlement could conceivably lie anywhere on or in the union of the bargainers indifference curves through the *status quo*, depending on the details of the specific game-context. Again, though, reasonable models generally predict *expected* outcomes within or at least near these sets.

[19] *Nash Bargaining*, from cooperative game theory, should not be confused with the *Nash Equilibria*, the concept at the foundation of all non-cooperative game theory, of non-cooperative bargaining and delegation games.

average of their optima, with weights reflecting their *relative bargaining-strengths*. Rubinstein (1982) showed that, although Nash Bargaining is cooperative game-theory, its outcomes coincide with the equilibria from several extensive-form, non-cooperative games of offers and counter-offers. In the specific non-cooperative, extensive-form models of delegation, veto, and legislative bargaining cited above, for example, the predicted outcomes do indeed lie between, i.e., are some convex-combination of, the ideal points of the bargainers.[20] We may conjecture that, theoretically, the Nash Bargaining solution amounts to or approximates an averaging or integrating over the range of specific micro-institutional details of extensive-form games of delegation and bargaining among multiple policymakers. If and insofar as this conjecture holds, therefore, bargaining among many players will tend, across a wide array of very specific circumstances, at least in expectation, to yield policies at or near the weighted-average of the policymakers' ideals, with the weights given by their bargaining powers (or some appropriate model thereof). Furthermore, in perhaps the most thorough-going comparison of its kind to date, the contributions to Thomson et al. (2006), which offer multiple alternative power-index-weighted and extensive-form bargaining models of European-Union decision-making, collectively demonstrate at least the empirical comparability and, more-often, *superiority* of simple Nash-bargain-style weighted-compromise models relative to these specific extensive-form alternatives (see Achen 2006 esp.). In sum, in addition to distinct and distinctly modelable veto-actor effects (policy-adjustment retardation, *etc.*) and common-pool effects (overfishing/underinvestment, *etc.*), multiple policymakers have distinct and distinctly modelable effects of bargaining and delegation, namely they induce weighted-averaging of outcomes relative to the preferences of those actors, i.e., compromise.

Specifically regarding fiscal policies, Cusack (1999, 2001; but, cf., Clark 2003) offers one interesting set of theoretical propositions that may offer some purchase in the application below on this bargaining-compromise effect of multiple policymakers. He argues that the desired fiscal policies of left and right parties differ not so much by the size of deficits as by the (Keynesian)

[20] However, many of these particular extensive-form, non-cooperative games seem to predict the bounds far more commonly than do cooperative-game bargaining models like Nash Bargaining and its non-cooperative analogues.

activism with which they respond (counter-cyclically) to (macro)economic conditions. As Hibbs (1987ab) demonstrated thoroughly, the natural constituency of the right and of the left, the *higher* and *lower* ends of socioeconomic hierarchies, have strongly differing relative distastes for unemployment and inflation (i.e., for real and nominal macroeconomic *bads*), objectively and subjectively, with the *lower/left* weighing unemployment more relative to inflation than do the *higher/right*. Responsive left-party policymakers will have ideal policies reflecting greater Keynesian activism than those of right-party policymakers. I.e., fiscal policy will respond more aggressively counter-cyclically to economic conditions under left than under right government; the right may even be procyclical.[21] When multiple parties share fiscal-policymaking control, as in coalition-government or divided-government contexts, e.g., bargaining models would suggest that the degree of activism of the resulting policy should be some geometrically weighted average of the optimum policies of those policymakers. A simply operationalized Nash-Bargaining model, e.g., might suggest that activism under a coalition government would be some function of the cabinet-seat shares of that coalition's parties; the empirical specification below reflects this conjecture.[22]

II. An Empirical Model of the Theoretical Synthesis

A. Specification of the Empirical Model

This paper first extends the empirical model of public debt from Franzese (2002b, ch. 3),[23] to demonstrate the possibility of estimating distinctly the veto-actor, common-pool, and bargaining-compromise effects of multiple policymakers. In particular, the model specification reflects (1) the different aspects of multiple policymakers' fragmentation, polarization, and partisanship that relate (a) to veto-actor effects: their raw numbers and ideological ranges, (b) to common-pool/collective-action effects: their effective numbers and ideological standard-deviations (or

[21] Always less clearly established has been why left or right would be particularly responsive to their core (as opposed to marginal) voters, who have no better electoral options. However, parties earn core constituencies by a reputation for serving them, and reputations are hard to build and sustain without some on-average truth behind them.

[22] Alternative models of policy-making influence could fruitfully replace the cabinet seat-share here. For instance, Powell (2000) suggests opposition influence weighting upward toward .5 as a function of legislative committee-rules, party-discipline, and the like. Powell's *ad hoc* suggested weights could be pre-specified or, ideally, weights could be estimated as a function of these legislative and party institutions, given a sufficiently well-specified empirical model with sufficient empirical power and sufficient and sufficiently distinct empirical variation of its components.

[23] Specifically, the form of that model including country fixed-effects first published in Franzese (2000).

variances), and (c) to bargaining-compromise effects: weighted means of their ideologies; and to reflect (2) the different ways in which these three distinct effects manifest in policies (such as public debt): (a) veto-actors (primarily[24]) slow policy-adjustment/delay fiscal-stabilization; (b) collective-action/common-pools induce over-drawing of public resources from the future (larger deficits) and under-investing in policymakers' common properties (less electioneering); and (c) inter-partisan bargaining induces some convex-combinatorial, i.e., roughly, some compromise policies: left-activist/right-conservative Keynesian-countercyclical/conservative-procyclical fiscal-policy in proportion to the policymaking-influences/bargaining-powers of left and right. That is, the empirical model of fiscal policy should reflect the three distinct natures of multiple policymakers' fragmentation, polarization, and partisanship that can affect fiscal-policy outcomes and the three distinct manners by which this dispersion of fiscal policymaking authority across multiple actors affect those outcomes. Absolute numbers of *veto actors* and their ideological range should modify policy-adjustment rates (primarily, see note 24); effective numbers of *incumbent policymakers* and, possibly, standard deviations of ideological positions should affect the intensities of their *common-pool* problems with respect to debt levels and in exploiting their opportunistic incentives to electioneer; and some *compromise* among these partisan policymakers (e.g., a Nash-Bargaining process implies a simple weighted-influence conception) should determine what combination of their ideological interests the overall government's policy responsiveness to macroeconomic

[24] As discussed above, veto actors also reduce the maximum-possible policy-change and therefore perhaps the average policy-change, and they may also reduce policy volatility (variance). Ghandi and Przeworski (2004) show how to combine the average-policy-change effects with the policy-adjustment-retardation effects stressed here. Specifically, if policymakers target some level $Y_t^*=k-cX_t$ for outcome Y_t, with X_t some factor that affects their desired policy, such as their ideology, and if the number of policymaking veto-actors, V_t, retards their pursuit of that goal (linearly) at rate, a, then the change in policy will be $\Delta Y_t=(Y_t^*-Y_{t-1})/aV_t=(k-cX_t-Y_{t-1})/aV_t=(k/a)(1/V_t)-(c/a)(X_t/V_t)-(1/a)Y_{t-1}$. They find empirical support for this model where X is a measure of government ideology and Y the Gini-index of inequality. *Inter alia*, they conclude that, because veto actors dampen both the enactment-rate and the size of policy-change (although the implied *equally* is only an assumption), veto actors alter the time-path of outcome responses to explanatory factors but not the final level of the outcome-response. This conclusion does not hold, however, for all sorts of explanatory factors but only for those that reflect the effects of policy actions targeted in this fashion. Some explanatory factors, such as unemployment and growth in the public-debt empirical analysis below, affect the outcome *unless or until governments' policies adjust to them*. For these factors, as Franzese (2002, ch. 3) emphasized, veto-actor effects manifest only in the retardation of adjustment-rates, and so veto actors also affect the long-run levels of the dependent variable, greatly magnifying the long-run impact of such explanatory factors. Future research (see concluding section of this paper) will combine the two strategies, modified (a) to apply the Ghandi-Przeworski (2004) approach only to explanatory factors whose impact occurs through intentional target-seeking policymaking, (b) to apply the Franzese (2002) strategy to factors whose effects do not, and (c) to estimate the resulting model by non-linear least-squares, which will enable separate recovery of these effects (and of other factors).

conditions (i.e., the degree of Keynesian activism) will reflect.

Expressing these propositions as a (nonlinear) regression equation gives:

$$\begin{aligned} D_{it} = \alpha_i &+ \left(1 + \rho_n NoP_{it} + \rho_{ar} ARwiG_{it}\right) \times \left(\rho_1 D_{i,t-1} + \rho_2 D_{i,t-2} + \rho_3 D_{i,t-3}\right) \\ &+ \left(\beta_{\Delta Y} \Delta Y_{i,t} + \beta_{\Delta U} \Delta U_{i,t} + \beta_{\Delta P} \Delta P_{i,t}\right) \times \left(1 + \beta_{cg} CoG_{it}\right) \\ &+ \left(\gamma_{e1} E_{it} + \gamma_{e2} E_{i,t-1}\right) \times \left(1 + \gamma_{en} ENoP_{it} + \gamma_{sd} SDwiG_{it}\right) + \mathbf{x}'_{it}\boldsymbol{\eta} + \mathbf{z}'_{it}\boldsymbol{\omega} + \varepsilon_{it} \end{aligned} \quad (1),$$

where D_{it} is the debt (gross debt of consolidated central government as a percent of GDP) in country i and year t. (Note: as a partial-adjustment, autoregressive, or dynamic model of debt, i.e., as a model having lagged debt on the right-hand side, this is effectively a model of deficits and debt.) Unless otherwise noted, all data are from Franzese (2002b) and defined as therein.

NoP and *ARwiG* are the raw *N*umber *o*f governing *P*arties and the *A*bsolute partisan *R*ange *w*ith*i*n *G*overnment farthest left to farthest right. These fragmentation and polarization measures relate to the veto-actor conception of the effects of multiple policymakers and so enter the model multiplicatively/interactively with lagged dependent variables, thereby modifying the dynamics: i.e., the policy-adjustment rate. Veto-actor theory expects greater fragmentation and polarization to slow policy adjustment, so we hypothesize positive ρ_n and ρ_{ar}. Lacking any reason to expect fragmentation and polarization to alter adjustment-rates differently across the first-, second-, and third-order lags that this model requires empirically,[25] estimating a separate coefficient for each interaction of *NoP* or *ARwiG* with these three lags would be unnecessarily highly inefficient. That proportionate, rather than linear, increases in *NoP* or *ARwiG* would retard the policy-adjustment rate seems plausible, so we also consider specifications using the logs of *NoP* and of 1+*ARwiG*.

ΔY is real GDP growth; ΔU is the change in the unemployment rate; and ΔP is the inflation rate. Certainly, debt will respond to macroeconomic conditions: negatively, indicating fiscal improvement, to ΔY and ΔP and positively (fiscal deterioration) to ΔU. Government members

[25] Lagrange-multiplier tests do indicate some remaining first-order residual correlation (although Ljeung-Box Q-tests and partial correlations reveal only some inexplicable seventh-order correlation). This remaining residual correlation implies LS estimation of lagged-dependent-variable (LDV) models is biased. However, these residual correlations, and so the biases, are very small; and no simple ARIMA specification fully removed them consistently across the two specifications considered. Thus, the LDV results are reported to simplify exposition. (ARIMA results available upon request; a model with two lags of the dependent variable and AR(1) in residuals performs best.) Substantive inferences do not depend to any noteworthy extent on these precise dynamic-model specifications.

from more-left parties should push to magnify these automatically countercyclical fiscal responses; members from more-right parties should push less hard or even counteractively. *CoG*, the partisan *C*enter *o*f *G*ravity of government,[26] gauges parties 0-10 left to right, so negative β_{cg} would reflect lesser Keynesian countercyclicality, perhaps even classical procyclicality, from the right. Again, without strong reason to expect otherwise, the specification assumes partisanship will modify policy cyclicality equally with respect to each macroeconomic factor, greatly enhancing efficiency.

The term $\mathbf{x}'\boldsymbol{\eta}$ refers to a set of political-economic conditions (controls) the fiscal-policy response to which is not expected to be strongly partisan-differentiated: *dxrig*, the difference between expected real-interest and real-growth rates;[27] terms-of-trade shocks (ToT: terms of trade, *open*: trade exposure, and $ToT \cdot open$); and *oy*: the ratio of the over-65 to under-16 populations.[28]

ENoP and *SDwiG* are the *E*ffective *N*umber *o*f *P*arties in government and the *S*tandard *D*eviation *w*ith*i*n *G*overnment, i.e., the standard deviation of the party left-right scores for each government member. These fragmentation and polarization measures relate to the *weighted-influence* conception of the common-pool effects of multiple policymakers. Accordingly, these factors enter the model in ways that affect debt levels directly and that modify the expected electioneering of government, i.e., multiplicatively with pre-election- and post-election-year indicators E_t and E_{t-1}.[29] By the collective-action/common-pool theory regarding the policymakers' incentives to electioneer, fragmentation should dampen electoral cycles, as perhaps should polarization, although is not as strongly expected, so we hypothesize $\gamma_{en}<0$ and $\gamma_{sd} \leq 0$. This dampening should be proportionate for both the pre- and post-electoral surge, so, again, we assume equal coefficients on *ENoP* and *SDwiG* interacted with pre-electoral (E_t) and post-electoral (E_{t-1}) indicators. As with *NoP* and *ADwiG*, size-weighted counts (and standard deviations) of

[26] *Center of Gravity* and *CoG* are Cusack's term and mnemonic; the measure used here is from Franzese (2002) though.

[27] Since Franzese (2007), the variable *dxrig*, the difference between the expected real-interest and real-growth rates, has been enhanced to model expected growth-rates using country fixed-effects, two lags of growth, and one lag of real GDP per capita, of *oy*, *open*, ToT, and $open \cdot ToT$. These enhancements also ease interpretation of the model, ensuring that coefficients on these variables reflect their effects on debt exclusive of any path through expected future growth.

[28] Such factors are likely candidates regarding which to expect Franzese (2002) but not Ghandi and Przeworski (2004) type veto-actor effects (see note 24 and the concluding section of the paper).

[29] Franzese (1999, 2002, 2003, 2007) has repeatedly found that electioneering surges are at least as strong and statistically significant in post- as in pre-election years.

governing parties (ideologies) may proportionately rather than linearly induce common-pool effects, so specifications using natural logs of *ENoP* and 1+*SDwiG* are also considered.

The term $\mathbf{z}'\boldsymbol{\omega}$, finally, refers to constituent terms involved in the various interactions: *CoG*, *ENoP*, *SDwiG*, *NoP*, and *ARwiG*. Theoretically, positive coefficients on *ENoP* and *SDwiG* could reflect a common-pool effect on debt levels. As Velasco (1998, 1999, 2000) expounds most fully and clearly, though, the present government's share of the present value of all current and future revenues—a sort of intertemporal fractionalization—would be much more relevant in this regard than the current government's partisan fractionalization.[30] Substantively, a negative coefficient on *CoG* would indicate a level effect of smaller deficits under right governments at macroeconomic conditions of growth, inflation, and unemployment rates equal to zero. We do not have strong expectations about the effect of partisanship at this point of macroeconomic performance; we have strong expectations only that activism, i.e., responsiveness to macroeconomic conditions, varies with partisanship. Regarding *NoP* and *ARwiG*, veto-actor theory suggests no reason these terms should affect debt levels when debt is zero because they should affect only adjustment rates; i.e., the coefficients of these constituent terms should be zero. Substantively-theoretically, then, $\boldsymbol{\omega}$ could quite likely all be zero; indeed, theoretical and substantive expectations generally lean more toward than away from zero. We nonetheless include these terms, $\mathbf{z}$, at least to start, as a kind of prudent, practical application of *Occam's razor* (see Kam & Franzese 2007; *cf.* Brambor et al. 2006).

B. Estimation and Discussion of the Empirical Model and Results

Table 1 gives nonlinear-least-squares (NLS) estimates of this model—a methodological appendix offers simple introduction to NLS estimation—with heteroskedasticity-consistent standard errors, using data from 21 OECD countries from 1956± through 1995± (non-democratic country-years excluded), country fixed-effects, the full set of constituent terms, $\mathbf{z}$, and the raw forms of *NoP*, *ENoP*, *SDwiG*, and *ADwiG* as opposed to their logged values.[31]

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[30] Ideal measures for this effect would be party-by-party estimates of own expected lifetime share of policymaking.

[31] The most-favorable results, albeit by the slimmest of margins, to all the present arguments emerge in a model that logs the veto-actor measures, but not the common-pool ones (see Appendix 1). That specification emerging as best may make substantive-theoretical sense in that the weighted measures already reflect a certain proportionality, but

Table 1: *Nonlinear-Least-Squares Estimation of Equation (1)*

		Coeff.	Std. Err.	*t*-Stat.	Pr(*T*>|*t*|)
Lagged Dependent Variables	D_{t-1}	1.212	0.060	20.112	0.000
	D_{t-2}	-0.153	0.085	-1.792	0.074
	D_{t-3}	-0.121	0.045	-2.677	0.008
$\boldsymbol{\rho_n}$ (*veto-actor effect: fractionalization*)		**0.007**	**0.006**	**1.089**	**0.277**
$\boldsymbol{\rho_{ar}}$ (*veto-actor effect: polarization*)		**-0.000**	**0.006**	**-0.013**	**0.990**
Macroeconomic Conditions	ΔY	-0.336	0.111	-3.033	0.003
	ΔU	0.992	0.308	3.219	0.001
	ΔP	-0.188	0.063	-2.965	0.003
$\boldsymbol{\beta_{cg}}$ (*partisan-compromise bargaining*)		**-0.037**	**0.037**	**-0.988**	**0.323**
Controls	x_1 (*open*)	15.891	5.279	3.010	0.003
	x_2 (*ToT*)	0.388	1.744	0.222	0.824
	x_3 (*open·ToT*)	-10.681	5.156	-2.072	0.039
	x_4 (*dxrig*)	-0.036	0.066	-0.544	0.587
	x_5 (*oy*)	2.064	1.094	1.886	0.060
Pre- and Post-Electoral Indicators	E_t	0.687	0.568	1.210	0.227
	E_{t-1}	1.490	0.645	2.310	0.021
$\boldsymbol{\gamma_{en}}$ (*common-pool effect: fractionalization*)		**-0.547**	**0.182**	**-3.001**	**0.003**
$\boldsymbol{\gamma_{sd}}$ (*common-pool effect: polarization*)		**0.573**	**0.486**	**1.179**	**0.239**
Constituent Terms from the Interactions	z_1 (*CoG*)	0.051	0.131	0.390	0.697
	z_2 (*ENoP*)	0.281	0.446	0.629	0.530
	z_3 (*SDwiG*)	0.542	0.437	1.242	0.215
	z_4 (*NoP*)	0.181	0.277	0.654	0.514
	z_5 (*ARwiG*)	-0.312	0.259	-1.205	0.228
Summary Statistics					
N (Deg. Free)		735 (691)		s_e^2	2.525
R^2 ($\bar{R}^2$)		0.991 (0.990)		**DW-Stat.**	2.101

Notes: Estimated using E-Views 5.1. Country fixed-effects suppressed to conserve space; available on request.

We find some evidence for the common-pool-moderated electoral-cycles argument, as seen in the γ_{en} estimate of how the effective number of governing parties moderates cycles, although the positive γ_{sd} estimate suggests governing-party polarization may work against this.[32] We find the expected sign for veto-actor policy-adjustment retardation as measured by raw numbers of parties (ρ_n), although the absolute range measure of polarization shows no such effect (ρ_{ar}). We also find the expected sign for β_{cg}, indicating partisan-differentiated degrees of Keynesianism, with the partisan measure employed suggesting a weighted-average (Nash-bargained) compromise among government-members' parties. Although these correctly-signed parameter estimates are only

presenting that model would have seemed at least somewhat *ex post*, and the simpler model serves us as well.

[32] More likely, this exemplifies Achen's (1985) effect of correlated imperfect measures of the same or closely related concepts in one regression model. He showed the indicator more accurately gauging the concept tends to get inflated coefficient estimate and significance while the lesser proxy gets reversed sign and muted significance. Here, both *ENoP* and their *SDwiG* may relate to voters' divvying of credit for electioneering, which creates the common pool, but the former measure also surely better measures and more accurately reflects the underlying concept than does the latter. A similar, though weaker, effect seems to be operating with *NoP* and *ADwiG*. However, we refrain from closer, substantive analysis of these and other parameter estimates until determining a preferred model-specification.

about equal to their standard errors, Wald joint-significance tests of the conditioning effects of multiple policymakers (γ_{en}, γ_{sd}, ρ_n, ρ_{ar}, and β_{cg}) overwhelmingly rejects excluding these from the model (p≈.001) whereas joint-significance tests of the set of constituent terms, **z**, clearly fails to reject (p≈.602) their exclusion. Since the inclusion of these constituent terms follows no important theoretical, substantive,[33] statistical, or mathematical reason—to the contrary, we generally expect these coefficients to be zero—but rather reflected prudent, practical application *Occam's razor*, and since the empirical evidence seems so comfortable with their omission as well, we can confidently respecify the model to omit these **z** terms. Furthermore, the best-fitting version of these saturated models, the one using natural log of the veto-actor but not the common-pool measures (see note 31 and Appendix 1) supports all of the conclusions that lead to omitting **z** even more strongly.

Table 2: *NLS Estimation of Equation (1) with Insignificant Constituent Terms Removed*

		Coeff.	Std. Err.	*t*-Stat.	Pr(*T*>|*t*|)
Lagged Dependent Variables	D_{t-1}	1.207	0.060	20.290	0.000
	D_{t-2}	-0.158	0.085	-1.851	0.065
	D_{t-3}	-0.117	0.045	-2.577	0.010
ρ_n (*veto-actor effect: fractionalization*)		**0.011**	**0.005**	**2.369**	**0.018**
ρ_{ar} (*veto-actor effect: polarization*)		**-0.002**	**0.004**	**-0.437**	**0.662**
Macroeconomic Conditions	ΔY	-0.375	0.087	-4.332	0.000
	ΔU	1.095	0.286	3.829	0.000
	ΔP	-0.207	0.053	-3.889	0.000
β_{cg} (*partisan-compromise bargaining*)		**-0.051**	**0.020**	**-2.484**	**0.013**
Controls	x_1 (*open*)	16.128	5.314	3.035	0.002
	x_2 (*ToT*)	0.414	1.728	0.239	0.811
	x_3 (*open·ToT*)	-10.780	5.194	-2.076	0.038
	x_4 (*dxrig*)	-0.038	0.066	-0.578	0.563
	x_5 (*oy*)	1.898	1.100	1.724	0.085
Pre- and Post-Electoral Indicators	E_t	0.475	0.420	1.133	0.258
	E_{t-1}	1.146	0.562	2.040	0.042
γ_{en} (*common-pool effect: fractionalization*)		**-0.570**	**0.209**	**-2.727**	**0.007**
γ_{sd} (*common-pool effect: polarization*)		**0.881**	**0.586**	**1.503**	**0.133**
		Summary Statistics			
N (Deg. Free)		735 (696)		s_e^2	2.522
R^2 ($\bar{R}^2$)		0.991 (0.990)		**DW-Stat.**	2.099

Notes: Estimated using E-Views 5.1. Country fixed-effects suppressed to conserve space; available on request.

As seen in **Table 2**, the results are much clearer and remarkably supportive of our theoretical arguments once we drop those constituent terms (although, of course, we can no longer take the *p*-

33 As noted, *ENoP* and *SDwiG*, whose coefficients may relate somewhat to the *intertemporal* common-pool problem in public-debt levels, are partial exceptions. Some weak evidence of such an effect does emerge. The estimated effect at the sample average of *ELE* (≈.3) of both *ENoP* and *SDwiG* increasing by one is +.83% of GDP, significant at p≈.105.

values reported here as face-value "significance levels" since the model has now been pre-tested on this data and some previously insignificant regressors removed). The effects expected from increasing polarization of policymakers, γ_{sd} and ρ_{ar}, remain absent and/or counter-intuitive—perhaps parties' fiscal preferences may be too crudely measured by the fixed, expert-judgment left-right indices used here—but, otherwise, these results are remarkably favorable to the three-way model of the effects of the dispersion of policymaking authority induced by increasing the number of actors. *Ceteris* paribus, adding a party to government retards debt-adjustment rates by about 1% ($\rho_n \approx .01$), but, at the same time, increasing the *effective* number of parties by one dampens electoral cycles in fiscal policy by almost 60% ($\gamma_{en} \approx .57$). Meanwhile, if adding this party to government shifts its partisan center of gravity one unit rightward (leftward), Keynesian activism diminishes (increases) by 5% ($\beta_{cg} \approx .05$), and all of these effects are satisfactorily precisely estimated. Again, we could refine these results further by adopting a log-veto-actor specification and/or dropping these weakly estimated counterintuitive results, and doing so yields estimates even more favorable to these arguments (such results available upon request), but these are anyway preliminary estimates en route to a better all-around model-specification and so will suffice at this degree of supportive precision for preliminary interpretation.

Table 3: *Estimated Veto-Actor Effects: Policy-Adjustment Retardation and Its Implications*

	***NoP*=1**	***NoP*=2**	***NoP*=3**	***NoP*=4**	***NoP*=5**	***NoP*=6**
a: **Net Coefficient on Lag**	0.943	0.952	0.960	0.969	0.978	0.986
b: **Policy-Adjustment/Year**	0.057	0.048	0.040	0.031	0.022	0.014
c: **Long-Run Multiplier**	17.498	20.639	25.154	32.200	44.727	73.208
d: **Half-Life of Effects**	11.778	13.956	17.087	21.971	30.654	50.397
e: **Years until 90% of Effects Felt**	39.127	46.362	56.761	72.985	101.832	167.415

Notes: *a*: Calculated as the sum of the coefficients on the lags of the dependent variable times $(1+\rho_n NoP+\rho_{ar} ARwiG)$, where $ARwiG$=0.97106NoP-0.67913; *b*: Calculated as 1-*a*; *c*: Calculated as 1/*b*; *d*: Calculated as *ln(.5)/ln(a)*; *e*: Calculated as *ln(.9)/ln(a)*.

We convey substantive magnitudes for the multifarious estimated effects of multiple policymakers in three tables. First, **Table 3** describes the estimated effect of numbers of veto actors on the policy-adjustment rate in five ways. Row *a* calculates the net coefficient on the lagged dependent-variable as a function of the (raw) number of parties in government.[34] Public

[34] These and subsequent estimates include the (small and insignificant) effect of polarization, i.e., the absolute range from farthest-left-to-right parties, *ARwiG*, insofar as this correlates with *NoP*, by assuming the empirical relationship

debt, unsurprisingly, adjusts very slowly under any conditions, but the extent to which last year's debt persists into this year varies over the sample range from .943 in single-party to .986 in six-party governments. This corresponds to policy-adjustment rates of a very slow 5.7% to a glacial 1.4% per year, as seen in row *b*. Even more dramatically, these estimates also imply an even more widely varying long-run multiplier, from 17.5 for unified governments to 44.7 for five-party and a whopping 73.2 for six-party governments. These multipliers mean that the long-run effects of permanent changes in regressors whose impact on debt occurs unless and until policies respond, such as economic or demographic shocks (see notes 24 and 28), are that many times greater under more fractionalized governments. For example, a permanent 0.5 increase in the ratio of over-65 to under-16 population would increase debt by about 16.6% of GDP in a polity continually governed by single-party governments whereas the same demographic shift would increase debt by about 42.4% of GDP under permanent five-party rule. Finally, as the number of veto actors increases from one to six, the half-lives of these long-run effects range from 11.8 to 50.4 years, and between 39 and 168 years must pass for 90% of these long-run effects to accumulate.

Table 4: *Estimated Bargaining & Compromise Effects on Partisan-Keynesian Fiscal-Cycles*

Bargaining Effects: Estimates of Keynesian Fiscal Responsiveness						
	Mean Econ. Performance -2 std. dev.	***Mean Econ. Performance -1 std. dev.***	***Mean Economic Performance***	***Mean Econ. Performance +1 std. dev.***	***Mean Econ. Performance +2 std. dev.***	
Growth	-2.354	0.454	3.261	6.069	8.877	
d(UE)	1.915	1.034	0.153	-0.728	-1.608	
Infl	-3.593	1.230	6.054	10.877	15.701	
CoG	***E(D|Econ)***[f]	***E(D|Econ)***	***E(D|Econ)***	***E(D|Econ)***	***E(D|Econ)***	***Fiscal-Cycle Magnitude***[g]
3.0	3.157	0.599	-1.959	-4.516	-7.074	10.231
4.2	2.930	0.556	-1.818	-4.192	-6.566	9.496
5.4	2.703	0.513	-1.677	-3.867	-6.058	8.761
6.6	2.476	0.470	-1.536	-3.543	-5.549	8.026
7.8	2.250	0.427	-1.396	-3.218	-5.041	7.291
9.0	2.023	0.384	-1.255	-2.894	-4.533	6.555

Notes: [f] Predicted deficits given the state of the macroeconomy of that column and the partisanship of government of that row.
[g] Calculated as the difference between predicted deficits in the worst macroeconomic scenario minus those in the best.

Table 4 illustrates the estimated bargaining effects multiple policymakers. More precisely, the empirical specification *assumes* that the partisanship reflected in fiscal policy is a weighted average of the preferences of government members, indicative of some bargained compromise. It does not

(bivariate-linear-regression) in this sample is determinate: *ARwiG*=-0.67913+0.97106(*NoP*).

test the empirical efficacy of that assumed bargaining structure against alternatives.[35] Right (left) partisanship, as gauged by this government *Center of Gravity*, is then expected to counter (enhance) Keynesian activism. The (significantly) estimated β_{cg} indicates about 5% such dampening *per* unit of *CoG*. (For references: U.S. Democrats and Republicans are about 3 *CoG* units apart and U.K. Labour and Conservatives about 5; typical U.S. governments, which blend partisan shares of the presidency and each legislative chamber equally, average about 1 *CoG*-unit apart, leaning right or left with the presidency.) The substantive magnitude of this bargained-*CoG* effect on fiscal activism (deficits) varies with economic performance. For instance, with macroeconomic conditions (inflation, real-GDP growth, unemployment change) two standard-deviations worse than their sample mean, the left-most sample-government (*CoG*≈3) would apply over 3% of GDP fiscal stimulus (deficits), whereas the right-most (*CoG*≈9) would apply just 2%, *ceteris paribus*. Conversely, these same left-most (right-most) governments would retire 7% (4.5%) of GDP in debt in a year with macroeconomic conditions two standard-deviations better than their means. In a sample-average year, governments would retire debt, *ceteris paribus*, at rates varying from almost 2% of GDP at far left to 1.25% at far right of the sample. Of course, these hypotheticals overstate the macroeconomic cycle, and so the fiscal cycle, because growth, unemployment, and inflation do not usually improve and worsen in lock-step; nonetheless, the relative magnitude of estimated left- and right-government fiscal cycles over these hypothetical, extreme macroeconomic cycles, which range from over 10% to about 6.5% of GDP left to right, are informative.[36]

Table 5: *Estimated Collective-Action /Common-Pool Effects: Estimated Electoral Deficit-Cycle Magnitude*

	***ENoP*=1**	***ENoP*=2**	***ENoP*=3**	***ENoP*=4**	***ENoP*=5**
Electoral Deficit-Cycle Magnitude[h]	1.07410	0.86454	0.65497	0.44541	0.23585

Notes: [h] Calculated as the sum of the coefficients on E_t and E_{t-1} times $(1+\gamma_{en}ENoP+\gamma_{en}SDwiG)$, where $SDwiG=0.500551\cdot ENoP-0.23653$.

Table 5, lastly, describes the estimated substantive effects of the common-pool problem faced by multiple policymakers in fiscal electioneering. Credit from voters for economic boons delivered by deficit spending is a common pool for policymakers. Therefore, as the effective (i.e., size-

[35] Recall: Thomson *et al.* 2006, especially Achen 2006 therein, provide evidence that would support this assumption.

[36] The average debt-reduction stance of left parties is consistent with findings in Franzese (2000, 2002b), and the finding here of greater left-Keynesianism supports Cusack (1999, 2001) and is not inconsistent with Franzese's (2000, 2002b) finding regarding replacement-risk-conditional partisan debt-cycles.

weighted) number of policymakers increases, electioneering diminishes, seen here in the fading amplitude of estimated electoral deficit-cycles, from 1% of GDP under single-party government down to 0.25% of GDP as the effective number of governing parties rises to six.

III. Conclusion and Future Research

A. Conclusion: Multiple, but Distinguishable, Effects of Multiple Policymakers

The dispersion of policymaking authority across multiple actors affects policies in myriad ways. When empirical models are specified to reflect correctly the central implication of Tsebelis' veto-actor theory, most fully expounded in *Veto Players: How Political Institutions Work* (2002), that the number (and polarization) of veto actors enhances policy inertia, evidence strongly and consistently supports that core proposition. However, the number (and polarization) of policy-making actors does more than induce veto-actor effects. It also creates collective-action problems for these multiple policymakers, which induce over-fishing of their common-pool resources, and it ignites bargaining between them, which tends to engender partisan compromises in their enacted policies. This paper has argued theoretically that these veto-actor, common-pool, and bargaining-compromise effects manifest differently in outcomes—retarding policymakers' responses to their policymaking incentives, altering policymakers' policymaking incentives, and blending policymakers' differing incentives into one compromise, respectively—and that the aspects of the number and ideal points of policymakers that produce these different effects, i.e., of government fractionalization and polarization, likewise varies—respectively: raw numbers and preference ranges, size-weighted (i.e., effective) numbers and variances or standard-deviations of preferences, and weighted-averages of preferences. This paper has also illustrated how to model these effects empirically and shown that these aspects of fractionalization and polarization that induce the multifarious effects of the dispersion of policymaking authority and the form and manifestation of those effects on fiscal-policy outcomes vary sufficiently across democracies and over time to obtain noticeably distinct and appreciably precise estimates of their substantively interesting implications.

B. Future Research: Further Refinement of the Model

Much work remains in refining further this approach to modeling more fully the effects of the dispersion of policymaking authority in democracies. As already mentioned (see notes 24, 28, and the associated discussion in the corresponding text), one can incorporate Ghandi and Przeworski's (2004) insights on veto-actor effects. In their model, policymakers have a target, y^*, for outcome, y, with target a linear function of explanator(s), X, so $y^*=k+cX$, and with policy movements toward that target *per* period dampened at rate a by the veto-actor measure, V. The resulting following lagged-dependent-variable (*LDV*) model is estimable by ordinary (linear) least-squares (*OLS*):

$$\Delta y_t = \frac{(y_t^* - y_{t-1})}{aV_t} = \frac{k + cX_t - y_{t-1}}{aV_t} = \frac{k}{a}\times\frac{1}{V_t} + \frac{c}{a}\times\frac{X_t}{V_t} - \frac{1}{a}y_{t-1}$$

$$\Rightarrow y_t = \frac{k}{a}\times\frac{1}{V_t} + \frac{c}{a}\times\frac{X_t}{V_t} + \frac{a-1}{a}y_{t-1} \quad (2)$$

Replacing their single-factor measure of veto-actor effects, aV, with an expression reflecting both fragmentation and polarization, a_1NoP+a_2ARwiG, is straightforward, although nonlinear least-squares (*NLS*) estimation would be required. Next, notice that this model assumes (*i*) that veto-actor effects dampen both the *magnitude* of policy responses to X and the *rate* of policy-adjustment equally at rate a and (*ii*) that it does not distinguish outcome from policy because it assumes the entire gap from target, $Y^*= k+cX$, to outcome, Y, is equally narrowed at that single rate a in response to X. Veto-actor theory does not imply the former necessarily, and the latter is substantively unlikely if Y is an *outcome*, like debt or tax revenue, that policymakers only partially control rather than a *policy*, like tax rates, which they control (more) fully. Using the last line of (2), relaxing these assumptions produces:

$$E\left(y_t\right) = k^0 + \mathbf{x}_t^0\mathbf{b}^0 + \frac{k^1}{a_1NoP_t + a_2ARwiG_t} + \frac{\mathbf{x}_t^1\mathbf{b}^1}{a_1NoP_t + a_2ARwiG_t} + \left(\rho_0 + \rho_1 NoP_t + \rho_2 ARwiG_t\right)y_{t-1} \quad (3).$$

Here, veto-actors dampen the responses only to some variables, $\mathbf{x}^1$, namely those where policy change is required to produce their effect on the outcome, and not others, $\mathbf{x}^0$, whose effects incur directly on the outcome rather than by inducing policy change. Stated differently, factors $\mathbf{x}^0$ have effects $\mathbf{b}^0$ *unless* policymakers act to change current policy, whereas factors $\mathbf{x}^1$ act to induce policymakers to change policy by $\mathbf{b}^1$. Some factors may act both ways, of course, but the greater (the empirical bite of) the differences between $\mathbf{x}^0$ and $\mathbf{x}^1$, the greater leverage we will have to estimate $\mathbf{b}^0$ *versus* $\mathbf{b}^1$ distinctly. Likewise, the constant, or conditional mean of Y, the intercept, only partially reflects the constant in the target equation, the k^1 from Y^*; it would now have also a non-policy-induced component, k^0. Finally, outcomes, Y, will have dynamics of their own, distinct from these policy dynamics. Insofar as this stickiness of outcomes implicates policymaker inaction, veto actors retard those adjustment rates also, likely at different rate (for starters, because outcome stickiness has other sources as well). The last term reflects these considerations. Recognizing that *NLS* will have difficulty searching for optimal coefficients $\mathbf{a}$ in the denominators of the third and fourth term (in the neighborhood of values that produce division by zero), we reparameterize the same conceptual model-design using multiplicative terms to obtain the following:

$$E\left(y_t\right) = k^0 + \mathbf{x}_t^0\mathbf{b}^0 + \left(k^1 + \mathbf{x}_t^1\mathbf{b}^1\right)\left(a_1 NoP_t + a_2 ARwiG_t\right) + \left(\rho_0 + \rho_1 NoP_t + \rho_2 ARwiG_t\right) y_{t-1} \quad (4).$$

Next, we specify $\mathbf{x}^0$ and $\mathbf{x}^1$ using the explanators identified in the empirical application (1) estimated above. The purely political factors government partisanship and the electoral indicators are surely among the $\mathbf{x}^1$ factors whose effects occurs through policy. Also clearly in $\mathbf{x}^1$ is *dxrig*, the difference between expected real-interest and growth rates, which could only affect debt by inducing policy shifts.[37] The economic conditions, growth, unemployment, and inflation, likely have their effects almost exclusively[38] by pseudo-automatically increasing or decreasing debt given current (unchanged) policies, placing them among $\mathbf{x}^0$. How the remaining economic-structural factors enter the model is less certain. Terms-of-trade (*ToT*) and *ToT* times openness may have immediate, direct debt-impact by affecting expenditure- and revenue-relevant outcomes. The other macroeconomic factors largely control this channel but will miss trade-shock effects on deficits insofar as these effects differ from those of broad macroeconomic conditions. *ToT* and

[37] Policymakers expecting greater future real-growth relative to real-interest expect diminishing real debt-financing costs and so choose to borrow more: a policy move.

[38] Any effect current economic conditions may have on policy is likely to operate through expectations and/or (perceived) trends, both of which are largely controlled elsewhere: expected future economic conditions through *dxrig* (see note 27) and perceived trends there and through its model of dynamics.

ToT·open may also shape the degree to which policymakers expect macroeconomic shocks to be permanent, which would shift policies. Finally, open economies may have easier access to (esp. foreign) capital, which may induce a direct effect on debt.[39] Age demographics, *oy*, also have multiple causal pathways to debt. Even netting any effect they may have in shifting expected growth,[40] it would still affect debt through policy—in political responses to demographics—and directly—responses of existing programs' costs to demographics. A prudent strategy, then, might start by including *ToT*, *open*, *ToT·open*, and *oy* in both $\mathbf{x}^0$ and $\mathbf{x}^1$.[41]

The model-specification of collective-action/common-pool effects of multiple policymakers also needs refinement. As detailed in our theoretical discussion, common-pools for fiscal policymakers arise in two respects. First, future revenues, i.e., current borrowing (deficits), are a common pool to current and future policymakers, and so are overexploited. This effect did manifest in the current empirical model, but only weakly (see note 33). However, the appropriate conception of government fragmentation for this effect is intertemporal, so future research should devise measures of current policymakers' expectations of their share of all current and future policymaking authority. A feasible strategy for this is to use parties' actual share of all government seats across all sample years for each country, thereby assuming parties know or can forecast well, or at least without bias correlated with any regressors, their future share of governance. Second, policymakers' common pool of credit from voters for electioneering, for which the current model provided solid evidence, does not exhaust their common pools of credit/blame for policymaking.

The key features of deficit electioneering that create this common-pool effect of multiple policymakers are (*i*) that policymakers share interests in electioneering and (*ii*) that voters cannot allocate credit to specific policymakers in proportion to their efforts to foster it. This suggests that all explanators whose effects operate through policy and to which policy responses are not

[39] Openness may also shift expected growth, thereby altering policy, but these effects are controlled through *dxrig*.

[40] The age-demographic variable, *oy*, is also in the model generating *dxrig*.

[41] These factors should receive distinct coefficients in their two appearances. Given that the veto-actor effects dampen their $\mathbf{x}^1$ but not their $\mathbf{x}^0$ appearance, each coefficient in each pair would be separately identifiable. Thus, as a kind of side-benefit of this approach, one would also obtain distinct estimates of these factors' direct effects and their policy-induced indirect effects. However, making that distinction will be challenging empirically, requiring many observations and great variation with much explanatory leverage for precise estimation (small standard errors).

partisan-differentiated and not clearly attributable by voters to specific policymakers will have their effects dampened by the effective number of policymakers (and perhaps the standard-deviation of policymakers' ideologies/preferences).[42]

$$E\left(y_t\right)=k^0+\mathbf{x}_t^0\mathbf{b}^0+\left\{\left(k^1+\mathbf{x}_t^1\mathbf{b}^1\right)\left[1+\gamma_1 ENoP_t+\gamma_2 SDwiG_t\right]\right\}\left(a_1 NoP_t+a_2 ARwiG_t\right) \\ +\left(\rho_0+\rho_1 NoP_t+\rho_2 ARwiG_t\right)y_{t-1} \qquad (5).$$

Finally, the current model unsatisfactorily *assumes, pre-estimation*, the bargaining/compromise effects of multiple policymakers. To review: a general feature of the equilibrium policies produced by multiple policymakers in most specific (i.e., extensive-form) non-cooperative bargaining games is that they will be some convex combination of the policymakers' ideal points, and the strongest empirical indications to date are that a simple form of this generalization, the bargaining-strength-weighted average of policymakers' ideals that emerges from the (cooperative game-theoretical) *Nash Bargaining* solution, performs best empirically, and, in fact, tends to outperform specific, extensive-form, non-cooperative bargaining models (Achen 2006). The current model uses cabinet-seat weighted-averages of governing parties' left-right ideological scores to measure government partisanship and interacts that with macroeconomic conditions to estimate the Keynesian counter-cyclicality of fiscal activism. Adding this to (5) requires separating and redefining $\mathbf{x}^1$, the factors whose debt-response depends on policy actions, into those whose policy affects are partisan differentiated, $\mathbf{x}^2$, i.e., those factors to which the policy-responses of different parties differ, and those whose effects are not partisan-differentiated, $\mathbf{x}^1$, i.e., those to which all parties respond the same. This yields the following penultimate combined model:

$$E\left(y_t\right)=k^0+\mathbf{x}_t^0\mathbf{b}^0+\left(\rho_0+\rho_1 NoP_t+\rho_2 ARwiG_t\right)y_{t-1} \\ +\left\{\left(k^1+\mathbf{x}_t^1\mathbf{b}^1\right)\left[1+\gamma_1 ENoP_t+\gamma_2 SDwiG_t\right]+\sum_{k=1}^{K}x_{kt}^2(\phi_0^k+\phi_1^k CoG_t)\right\}\left(a_1 NoP_t+a_2 ARwiG_t\right) \qquad (6).$$

However, rather than assume bargaining-power weighted-average compromises with weights equal to cabinet seat-shares, future research might more satisfactorily attempt to embed

[42] A third issue requiring fuller attention, as just seen again parenthetically, is that the role of polarization in collective-action/common-pool effects remains vague.

theoretical models of bargaining power into a (final) respecification of (6) for empirical estimation. That is, if we can describe the bargaining power of party i, p_i, as some function of characteristics, $\boldsymbol{c}$, of i and its bargaining environment, t, giving $p(\boldsymbol{c}_{it})$, and we can describe how fiscal policy would respond to political-economic conditions $\boldsymbol{x}_t$ if party i had exclusive policymaking authority in context operant at observational context t, $q_i(\boldsymbol{x}_t)$,[43] then we could embed the *Nash-Bargaining* solution, $\sum_i p(\boldsymbol{c}_{it}) q_i(\boldsymbol{x}_t)$, in the model for estimation rather than assuming its weighted-average compromise outcome *pre-estimation*. This brings us to the following (as-yet aspirational) combined veto-actor, common-pool, bargaining-compromise model of policy with multiple policymakers:

$$E(y_t) = \delta^0 + \mathbf{x}_t^0\mathbf{b}^0 + \left(\rho_0 + \rho_1 \ln(NoP_t) + \rho_2 \ln(1+ARwiG_t)\right) y_{t-1} + \left\{ \begin{array}{l} \left[\mathbf{x}_t^1\mathbf{b}^1 + \sum_{i=1}^{I} p(\mathbf{c}_{it}) \times q_i(\mathbf{x}_t^2) \right] \\ \times\left[1+\gamma_1 \ln(ENoP_t) + \gamma_2 \ln(1+SDwiG_t)\right] \end{array} \right\} \times \left[1+\alpha_1 \ln(NoP_t) + \alpha_2 \ln(1+ARwiG_t)\right] \quad (7),$$

where y is some fiscal-policy outcome of interest; $\mathbf{x}_t^0$ are factors affecting policy-outcomes *unless* policymakers act to change status quo; $\mathbf{x}_t^1$ = factors affecting policy-outcomes *if* policymakers act to change status quo, *without* partisan-differentiated response; $\mathbf{x}_t^2$ = factors affecting policy-outcomes *if* policymakers act to change status quo, *with* partisan-differentiated response; *NoP* and *ARwiG* are the sources of veto-actor effects: the raw number of parties in government and the absolute range from farthest left to right in government; *ENoP* and *SDwiG* are the sources of common-pool effects: the effective number of parties in government and the standard deviation of parties' in government partisan positions; $p(\mathbf{c}_{ij})$ is the model of the bargaining strength of party i in context t as a function of characteristics of that party and context; and $q_i(\mathbf{x}_t^2)$ is the model of party i's response in context t to factors $\mathbf{x}_t^2$. Combined these last two are the partisan bargaining and compromise effects.

Fuller consideration and actual implementation all these steps remain for future research, but

[43] For identification, $p(\cdot)$ and $q(\cdot)$ must be distinct from each other and across parties; the greater the difference in their empirical content and explanatory bite, the stronger the distinction. Franzese (1999, 2002, 2003) exemplify.

here is a anticipatory flavor…

$$D_{it} = c_i + \underbrace{(1+\rho_{n_1} NoP)}_{\substack{\text{Veto Actor Outcome}\\ \text{Adjust-Rate Effect}}}(\rho_1 D_{it-1} + \rho_2 D_{it-2} + \rho_3 D_{it-3})$$

$$+ \underbrace{\beta_{01} Open + \beta_{02} Open \times ToT}_{\text{Factors with Effects not Through Policy}}$$

$$+ \left[\begin{array}{l} \underbrace{(\beta_{11} Ele_t + \beta_{12} Ele_{t-1} + \beta_{13} oy + \beta_{14} dxrig) \times (1+\gamma_n ENoP)}_{\text{Factors with Effect through Policy, Not Partisan-Differentiated}} \\ + \underbrace{\left\{\beta_{21} d(Y) + \beta_{22} d(UE) + \beta_{23} d(P)\right\} \times \left\{1+\phi CoG\right\}}_{\text{Factors with Effect through Policy, Not Partisan-Differentiated}} \end{array} \right] \times \underbrace{\left(1+\rho_{n_2} NoP\right)}_{\substack{\text{Veto Actor Policy}\\ \text{Adjust-Rate Effect}}} + \varepsilon$$

Table 6: *Nonlinear-Least-Squares Estimation of a Model like Equation (7)*

		Coeff.	**Std. Err.**	***t*-Stat.**	**Pr(*T*>|*t*|)**
Temporal Dynamics	D(t-1)	1.197	0.059	20.144	0.000
	D(t-2)	-0.139	0.085	-1.629	0.104
	D(t-3)	-0.121	0.045	-2.698	0.007
Veto-Actor Effect On Outcome-Adjustment Rate	**NoP**	**0.008**	**0.004**	**1.883**	**0.060**
$\mathbf{x}_0$: Variables with "Direct" Effect on Outcome	Open	16.624	3.758	4.423	0.000
	Open*ToT	-11.190	3.135	-3.569	0.000
$\mathbf{x}_1$: Variables with Effects via Non-Partisan-Differentiated Policy Response	Ele(t)	0.315	0.363	0.867	0.386
	Ele(t-1)	0.873	0.399	2.186	0.029
	OY	2.833	1.295	2.187	0.029
	DXRIG3	-0.073	0.072	-1.009	0.314
Common-Pool Effect on Policy Response	**ln(ENoP)**	**-0.277**	**0.071**	**-3.903**	**0.000**
$\mathbf{x}_2$: Variables with Effects via Partisan-Differentiated Policy Response	Growth	-0.238	0.084	-2.815	0.005
	d(UE)	0.749	0.228	3.289	0.001
	Inflation	-0.137	0.047	-2.947	0.003
Bargaining-Compromise Effects on Partisan Policy-Responses	**CoG**	**-0.049**	**0.026**	**-1.893**	**0.059**
Veto-Actor Effect On Policy-Adjustment Rate	**NoP**	**0.215**	**0.121**	**1.773**	**0.077**
Common-Pool Effect on Debt Level	*ln(ENoP)*	*1.128*	*0.486*	*2.320*	*0.021*
		Summary Statistics			
N (Deg. Free)		735 (697)		s_e^2	2.510
R^2 ($\bar{R}^2$)		0.991 (0.990)		**DW-Stat.**	2.090

Notes: Estimated using E-Views 5.1. Country fixed-effects suppressed to conserve space; available on request.

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<u>Methodological Appendix</u>: Nonlinear Least-Squares (NLS) Estimation

Nonlinear regression is simple to describe, given an understanding of linear regression. The empirical implications of positive theory will usually amount to some statement that an outcome, y, depends on random chance, ε, and some explanatory factors, $\mathbf{x}$, perhaps including multiplicative interactions or other complex terms, according to some function, $y=f(\mathbf{x},\boldsymbol{\beta},\varepsilon)$, involving parameters $\boldsymbol{\beta}$ that relate $\mathbf{x}$ to y. In linear regression, the function is assumed linear-additive and separable, with $\boldsymbol{\beta}$ the simple coefficients on $\mathbf{x}$, giving $y=\mathbf{x}'\boldsymbol{\beta}+\varepsilon$. The ordinary linear-regression (OLS) problem and solution is thus:

$$\begin{aligned}
&Min_{\boldsymbol{\beta}} \sum_{i=1}^{n}\left(y_i-\mathbf{x}_i\boldsymbol{\beta}\right)^2 = Min_{\boldsymbol{\beta}}\left(\mathbf{y}-\mathbf{X}\boldsymbol{\beta}\right)'\left(\mathbf{y}-\mathbf{X}\boldsymbol{\beta}\right)\\
&= Min_{\boldsymbol{\beta}}\ \mathbf{y}'\mathbf{y}-\mathbf{y}'\mathbf{X}\boldsymbol{\beta}-\boldsymbol{\beta}'\mathbf{X}'\mathbf{y}+\boldsymbol{\beta}'\mathbf{X}'\mathbf{X}\boldsymbol{\beta} \equiv Min_{\boldsymbol{\beta}}\ S\\
&\frac{\partial S}{\partial \boldsymbol{\beta}} = \mathbf{0} \Rightarrow -2\mathbf{X}'\mathbf{y}+2\mathbf{X}'\mathbf{X}\boldsymbol{\beta}=0\\
&\Rightarrow \mathbf{X}'\mathbf{y}=\mathbf{X}'\mathbf{X}\boldsymbol{\beta}\\
&\Rightarrow \hat{\boldsymbol{\beta}}_{OLS}=\left(\mathbf{X}'\mathbf{X}\right)^{-1}\mathbf{X}'\mathbf{y}
\end{aligned} \tag{8}$$

If we instead continue to assume the random component is additively separable but allow explanatory factors, $\mathbf{x}$, and associated parameters, $\boldsymbol{\beta}$, to determine the systematic component of y according to some nonlinear function, $E(y)=f(\mathbf{x},\boldsymbol{\beta})$, specified by theory, with additively separable stochastic component, ε, so $y=f(\mathbf{x},\boldsymbol{\beta})+\varepsilon$, we have this nonlinear-regression problem and solution:

$$\begin{aligned}
&Min_{\boldsymbol{\beta}}\left(\mathbf{y}-f(\mathbf{X},\boldsymbol{\beta})\right)'\left(\mathbf{y}-f(\mathbf{X},\boldsymbol{\beta})\right)\\
&= Min_{\boldsymbol{\beta}}\ \mathrm{S}\equiv \mathbf{y}'\mathbf{y}-\mathbf{y}'f(\mathbf{X},\boldsymbol{\beta})-f(\mathbf{X},\boldsymbol{\beta})'\mathbf{y}+f(\mathbf{X},\boldsymbol{\beta})'f(\mathbf{X},\boldsymbol{\beta})\\
&\frac{\partial S}{\partial \boldsymbol{\beta}}=\mathbf{0}\Rightarrow -2\left(\frac{\partial f(\mathbf{X},\boldsymbol{\beta})}{\partial \boldsymbol{\beta}}\right)'\mathbf{y}+2\left(\frac{\partial f(\mathbf{X},\boldsymbol{\beta})}{\partial \boldsymbol{\beta}}\right)'f(\mathbf{X},\boldsymbol{\beta})=\mathbf{0}\\
&\Rightarrow \left(\frac{\partial f(\mathbf{X},\boldsymbol{\beta})}{\partial \boldsymbol{\beta}}\right)'\mathbf{y}=\left(\frac{\partial f(\mathbf{X},\boldsymbol{\beta})}{\partial \boldsymbol{\beta}}\right)'f(\mathbf{X},\boldsymbol{\beta})
\end{aligned} \tag{9}$$

If $f(\mathbf{x},\boldsymbol{\beta})$ were the linear-additive $\mathbf{x}'\boldsymbol{\beta}$ as in the ordinary regression problem, then the last expression solves analytically to the familiar OLS formula in (8). However, with $f(\mathbf{x},\boldsymbol{\beta})$ nonlinear in parameters $\boldsymbol{\beta}$, the last expression in (9) cannot in general be simplified further. $\hat{\boldsymbol{\beta}}_{NLS}$ may be found numerically (i.e., computer search) though, either by finding the values for $\boldsymbol{\beta}$ that satisfy that last expression or by finding the values that minimize the sum of squared errors, *S*, given the data, $\mathbf{y}$ and $\mathbf{X}$. Effectively, the *derivatives*[44] of $f(\mathbf{x},\boldsymbol{\beta})$ with respect to $\boldsymbol{\beta}$, which would be simply $\mathbf{x}$ if $f(\mathbf{x},\boldsymbol{\beta}) = \mathbf{x}'\boldsymbol{\beta}$ as in the linear-additive case, serve as the regressors (and play like role in estimating the variance of the estimated parameters). In short, our basic understandings about ordinary least-squares regression, its necessary assumptions and its properties under those assumptions, applies to nonlinear regression with the *derivatives* of $f(\mathbf{x},\boldsymbol{\beta})$ replacing $\mathbf{x}$.[45]

The crucial change lies in interpretation and is the one that comes with any move beyond strictly linear-additive models—even just to simple linear-interaction models, dynamic models (i.e., models with time or spatial lags of the dependent variable in them), or the familiar logit or probit models of (probabilities of) binary outcomes—namely, that *coefficients* are not *effects*. The effect of *x* on *y* is, always and everywhere, the derivative or difference of (change in) *y* with respect to (over the change in) *x*, dy/dx, but only in purely linear-additive-separable models are these effects, these derivatives, equal to the coefficient on the variable in question. In other models, effects of one variable generally depend on other variables' values and usually more than one coefficient—that is, the effects of *x* are context-conditional. The important point here is that, if we can theorize how *y* depends on *x*, then we can write a function that describes that relationship, and then we can specify our empirical model by that function. Finally, provided the specified equation is identified and has positive degrees of freedom so that inference from data is logically possible, and if the comparative history that is our database has actually provided sufficient useful variation, we can estimate, evaluate, and interpret that model. Happily, the statistical software packages that political scientists commonly use now possess user-friendly NLS procedures.[46]

[44] Actually, the correct term is *gradient* because $\boldsymbol{\beta}$ is a vector, so the slope is multidimensional.

[45] All the usual additional complications of numerical optimization as opposed to analytical solution—such as possibility of local maxima, flat areas or ridges, or "nasty" surfaces to search and the concomitant need to explore multiple starting values and search sensitivities and procedures—apply also.

[46] See *nl.ado* in Stata™. The E-Views™ least-squares command, LS, accepts any $f(\mathbf{x},\boldsymbol{\beta})$, linear-additive or otherwise.

Appendix 1: Alternative Specifications of Preliminary Model

Table 1A: *Nonlinear-Least-Squares Estimation of Equation (1), with natural-log NoP, ENoP, 1+SDwiG and 1+SDwiG*

	Coefficient	Standard Error	t-Statistic	Prob(T>|t|)
D_{t-1}	1.220867	0.059036	20.68019	0.0000
D_{t-2}	-0.155355	0.085934	-1.807835	0.0711
D_{t-3}	-0.122776	0.045753	-2.683446	0.0075
ρ_n	**0.023948**	**0.018956**	**1.263347**	**0.2069**
ρ_{ar}	**-0.006779**	**0.018091**	**-0.374739**	**0.7080**
E_t	0.315557	0.315848	0.999079	0.3181
E_{t-1}	0.699603	0.401571	1.742162	0.0819
γ_{en}	**-2.459300**	**1.909641**	**-1.287834**	**0.1982**
γ_{sd}	**2.316325**	**2.653009**	**0.873094**	**0.3829**
ΔY	-0.340046	0.111700	-3.044265	0.0024
ΔU	1.004709	0.311371	3.226731	0.0013
ΔP	-0.190191	0.063748	-2.983468	0.0030
β_{cg}	**-0.038239**	**0.036971**	**-1.034302**	**0.3014**
X_1 (*oy*)	2.114670	1.082319	1.953831	0.0511
X_2 (*open*)	15.29885	5.278583	2.898288	0.0039
X_3 (*ToT*)	0.257541	1.750098	0.147158	0.8831
X_4 (*open·ToT*)	-10.31526	5.168630	-1.995744	0.0464
X_5 (*dxrig*)	-0.034977	0.065788	-0.531668	0.5951
Z_1 (*CoG*)	0.027402	0.134170	0.204235	0.8382
Z_2 ln(*ENoP*)	**0.971822**	**1.015119**	**0.957348**	**0.3387**
Z_3 ln(1+*SDwiG*)	0.598091	0.764959	0.781860	0.4346
Z_4 ln(*NoP*)	-0.013923	0.767314	-0.018146	0.9855
Z_5 ln(*ARwiG*)	-0.519619	0.662243	-0.784635	0.4329
		Summary Statistics		
N (Deg. Free)	735 (691)		**Std. Err. Regression**	2.527
R^2 ($\bar{R}^2$)	0.991 (0.990)		**Durbin-Watson**	2.101

Table 1B: *Nonlinear-Least-Squares Estimation of Equation (1), with natural-log NoP and 1+ADwiG*

	Coefficient	**Standard Error**	**t-Statistic**	**Prob(T>|t|)**
D_{t-1}	1.221637	0.058723	20.80321	0.0000
D_{t-2}	-0.155867	0.085722	-1.818275	0.0695
D_{t-3}	-0.122238	0.045773	-2.670540	0.0078
$\boldsymbol{\rho_n}$	**0.024754**	**0.019174**	**1.291035**	**0.1971**
$\boldsymbol{\rho_{ar}}$	**-0.007687**	**0.018155**	**-0.423419**	**0.6721**
E_t	0.686821	0.569339	1.206349	0.2281
E_{t-1}	1.501111	0.646880	2.320540	0.0206
$\boldsymbol{\gamma_{en}}$	**-0.550939**	**0.180693**	**-3.049033**	**0.0024**
$\boldsymbol{\gamma_{sd}}$	**0.578632**	**0.481753**	**1.201098**	**0.2301**
ΔY	-0.338423	0.111145	-3.044881	0.0024
ΔU	1.002928	0.310631	3.228679	0.0013
ΔP	-0.189018	0.063175	-2.991973	0.0029
$\boldsymbol{\beta_{cg}}$	**-0.037679**	**0.037152**	**-1.014183**	**0.3109**
X_1 (*oy*)	2.020511	1.085490	1.861382	0.0631
X_2 (*open*)	15.32295	5.311670	2.884770	0.0040
X_3 (*ToT*)	0.229093	1.747867	0.131070	0.8958
X_4 (*open·ToT*)	-10.28496	5.196897	-1.979058	0.0482
X_5 (*dxrig*)	-0.034673	0.065722	-0.527576	0.5980
Z_1 (*CoG*)	0.047930	0.130939	0.366046	0.7144
Z_2 *ENoP*	**0.392913**	**0.461252**	**0.851840**	**0.3946**
Z_3 *SDwiG*	0.418555	0.421622	0.992727	0.3212
Z_4 ln(*NoP*)	0.089192	0.688340	0.129576	0.8969
Z_5 ln(*ARwiG*)	-0.498437	0.648434	-0.768679	0.4423
		Summary Statistics		
N (Deg. Free)	735 (691)		**Std. Err. Regression**	2.525
R^2 ($\bar{R}^2$)	0.991 (0.990)		**Durbin-Watson**	2.100

Table 1C: *Nonlinear-Least-Squares Estimation of Equation (1), with natural-log ENoP and 1+SDwiG*

	Coefficient	**Standard Error**	**t-Statistic**	**Prob(T>|t|)**
D_{t-1}	1.212029	0.060685	19.97258	0.0000
D_{t-2}	-0.152846	0.085828	-1.780831	0.0754
D_{t-3}	-0.122063	0.045293	-2.694997	0.0072
$\boldsymbol{\rho_n}$	**0.006525**	**0.006423**	**1.015862**	**0.3101**
$\boldsymbol{\rho_{ar}}$	**0.000319**	**0.006338**	**0.050334**	**0.9599**
E_t	0.317081	0.316998	1.000261	0.3175
E_{t-1}	0.700974	0.400736	1.749217	0.0807
$\boldsymbol{\gamma_{en}}$	**-2.428455**	**1.902951**	**-1.276152**	**0.2023**
$\boldsymbol{\gamma_{sd}}$	**2.278191**	**2.643128**	**0.861930**	**0.3890**
ΔY	-0.339172	0.111762	-3.034773	0.0025
ΔU	0.997332	0.310019	3.217006	0.0014
ΔP	-0.189363	0.063885	-2.964106	0.0031
$\boldsymbol{\beta_{cg}}$	**-0.037996**	**0.037011**	**-1.026621**	**0.3050**
X_1 (*oy*)	2.149243	1.093717	1.965082	0.0498
X_2 (*open*)	15.98344	5.232873	3.054430	0.0023
X_3 (*ToT*)	0.466845	1.739812	0.268331	0.7885
X_4 (*open·ToT*)	-10.83366	5.116392	-2.117441	0.0346
X_5 (*dxrig*)	-0.035988	0.066128	-0.544222	0.5865
Z_1 (*CoG*)	0.027145	0.136887	0.198301	0.8429
Z_2 *ENoP*	**0.777408**	**0.945677**	**0.822065**	**0.4113**
Z_3 *SDwiG*	0.608767	0.840116	0.724622	0.4689
Z_4 ln(*NoP*)	0.127844	0.305987	0.417811	0.6762
Z_5 ln(*ARwiG*)	-0.265145	0.259148	-1.023139	0.3066
		Summary Statistics		
N (Deg. Free)	735 (691)		**Std. Err. Regression**	2.527
R^2 ($\bar{R}^2$)	0.991 (0.990)		**Durbin-Watson**	2.101

<u>Appendix II</u>: Preliminary Attempts to Estimate Equation (7)

E-Views estimation equations in line with **(7)** explored to date are perturbations of the following:

```
dccggx=c(101)*c1+c(102)*c2+c(103)*c3+c(104)*c4+c(105)*c5+c(106)*c6+c(107)*c7+c(108)*c8+c(109)*c9+c
    (110)*c10+c(111)*c11+c(112)*c12+c(113)*c13+c(114)*c14+c(115)*c15+c(116)*c16+c(117)*c17+c(118)*
    c18+c(119)*c19+c(120)*c20+c(121)*c21+(c(1)*dccggx(-1)+c(2)*dccggx(-2)+c(3)*dccggx(-
    3))*(1+c(10)*@log(nop)+c(11)*@log(1+adwig))+c(21)*openx+c(22)*totx+c(23)*openx*totx+((c(31)*el
    e+c(32)*ele(-
    1)+c(33)*oy+c(34)*dxrig3)*(1+c(40)*@log(enop)+c(41)*@log(1+sdwig))+(c(51)*growth+c(52)*d(ue)+c
    (53)*gdpinflx)*(1+c(60)*cog))*(1+c(70)*@log(nop)+c(71)*@log(1+adwig))+c(81)*cog+c(82)*@log(eno
    p)+c(83)*@log(1+sdwig)+c(84)*@log(nop)+c(85)*@log(1+adwig)
```