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PERSISTENT IDEOLOGY AND THE DETERMINATION OF PUBLIC POLICY OVER TIME*

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This article investigates how public policy responds to persistent ideological shifts in dynamic politico-economic equilibria. To this end, I develop a tractable model to analyze the dynamic interactions among public policy, individuals' intertemporal choice, and the evolution of political constituency. My main finding is that a right-wing ideology may increase the size of government. Data from a panel of 18 OECD countries confirm that after controlling for the partisan effect, there is a positive relationship between the right-wing political constituency and government size. This is consistent with my theoretical prediction, but hard to explain by existing theories.

1. INTRODUCTION

Modern political economy is designed to reveal the underlying mechanism of policy decision making. A salient feature in real-world democracies is that policy attitudes are often driven by motives that seem hard to reconcile with mere economic factors. The empirical literature has long documented that ideology plays a key role in shaping policy preferences.[2] Many theoretical frameworks, such as the probabilistic voting model (e.g., Lindbeck and Weibull, 1987), also incorporate ideology as an important factor for political decisions. Existing theory, however, ignores the persistence of ideological shifts. For example, pro-redistribution "leftist" policies were highly popular in the 1950s and 1960s, whereas a "rightist" mood appeared to dominate in the late 1970s and 1980s.[3] The impacts of such persistent ideological waves are far from trivial. In particular, they lead to prospective changes in the type of government and associated policy outcomes, which may influence private intertemporal choices and even the distribution of future voters.[4] Such variations in response to ideological shifts naturally affect the incumbent government's choices, indicating a distinct role of ideology in the policy decision process.

This article, therefore, aims to show explicitly how persistent ideology influences the determination of public policies. To this end, I construct a politico-economic model that has the

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[2] For instance, Sears et al. (1980) show that symbolic attitude (mainly liberal–conservative ideology and party identification) far outstripped all self-interest variables in terms of predicting support for policies in the United States: The contribution of symbolic attitudes to R^2 ranged between 10% and 17%, whereas the contribution of self-interests never exceeded 4%. In addition, Levitin and Miller (1979), Knight (1985), and Alvarez and Nagler (1995, 1998), among many others, show that ideology turns out to be a significant predictor for individuals' voting choice in U.S. presidential elections.

[3] See Robinson (1984), Robinson and Fleishman (1984), and Durr (1993) for discussions of the U.S. survey data.

[4] Recent theoretical work has shown that the evolution of political constituency can be *endogenously* driven by private intertemporal choices in a full-fledged dynamic environment (e.g., Hassler et al. 2003).

ability to capture rich dynamic interactions among policies, private decisions, and the evolution of the distribution of voters. My main finding is that a right-wing ideology may increase the size of government. The underlying mechanism is twofold. First, a persistent ideological shift toward the right implies a higher probability that a right-wing government will be elected in the future. Since a right-wing government features lower taxes, on average, the ideological shock encourages investment by reducing expected future tax rates. This makes the investment less elastic and, hence, provides the incentive for the incumbent to increase taxes. Moreover, the shock generates a self-reinforcing process on the distribution of future voters. More investment results in more individuals in favor of the right wing, which further increases the right wing's future election probability. The impact of ideology can, thus, be amplified by this endogenous response of probabilities over future government types.

The model is based primarily on a tractable framework recently developed by Hassler et al. (2007). There are two types of individual economic status, the rich and the poor. Individuals make human-capital investments that increase their likelihood of being rich. Two political parties run electoral competition. The right-wing and left-wing parties, modeled as citizen-candidates (Osborne and Slivinski, 1996; Besley and Coate, 1997), represent the rich and poor, respectively. To incorporate ideology, I assume that a proportion of the poor (rich) vote for the right-wing (left-wing) party. The discrepancy between individuals' economic interests and their political preferences captures the impact of ideology on voting behavior. The election is, thus, codetermined by two fundamentals in the economy: the size of the rich (or the poor) and the ideological state.

A distinctive feature of my model is that public policies, private investment, and the distribution of future voters are mutually affected over time. To show how policies are determined in this environment, I focus on Markov perfect equilibria, where the dynamic interactions are characterized by two fixed points: the ideology-contingent distribution of future voters and the ideology-contingent policy rules. Under quasi-linear preferences and uniformly distributed ideological shocks, the equilibrium can be solved analytically.

The standard partisan model suggests that ideological shifts play no role in the policy decision process, as long as the current type of government remains unchanged. By contrast, my model implies a positive relationship between government size and the right-wing ideology within each political regime. It is then left for empirical study whether the positive relationship holds in real-world democracies or is just a counterfactual result. I provide evidence from an OECD panel that a more right-wing political constituency indeed leads to a larger government, which is consistent with my prediction but hard to explain by existing theories. Specifically, I find that one percentage point increase in the vote share of right-wingers is associated with an increase in the central government revenue GDP ratio of 0.17 percentage points. This result is statistically significant and quite stable to a number of control variables and estimation specifications.

There is a growing literature on the dynamics of government without commitment techniques (e.g., Besley and Coate, 1998; Hassler et al., 2003, 2007).[5] This strand of research, including the present article, emphasizes the fact that in representative democracies, the incumbent government has limited abilities to commit to policies after the next election. The effect of a change in the future government type on equilibrium outcomes has been studied in some recent work, such as Amador (2003) and Song et al. (2007).[6] However, much of the literature ignores a potentially important channel that runs from current policies back to future election probabilities. Azzimonti Renzo (2005) extends the analysis by endogenizing the distribution of voters in a dynamic setup. Like Azzimonti Renzo, I also allow current political and private decisions to affect the evolution of political constituency. The focus of my article, however, is fundamentally different. I am interested in how persistent ideological shifts change policies,

[5] See, also, Krusell et al. (1997) and Krusell and Rios-Rull (1999).

[6] Earlier research includes Persson and Svensson (1989) and Alesina and Tabellini (1990), among others, providing examples of strategic policy decision making under future electoral uncertainty.

whereas in Azzimonti Renzo (2005) ideological shocks are purely i.i.d., acting to endogenize election outcomes and, therefore, playing a role similar to that played in the partisan model.[7]

Although this article aims to understand the influence of persistent ideology on the determination of public policies, it is also relevant for a long-standing issue in political science and sociology concerning the cause of changes in political constituency. A sizable empirical literature shows that political identifications are related to lagged economic conditions.[8] However, few works have formalized the dynamic interaction between macroeconomy and political cycles. My model, based on rational choices of parties and individuals, contributes to the literature by building a theoretical framework of analyzing changes in political constituency in response to both exogenous ideological shocks and endogenous public policies.

The rest of the article is organized as follows: Section 2 describes the model and solves examples with exogenous political constituency. Section 3 characterizes Markov perfect equilibrium with endogenous political constituency. In Section 4, I provide a closed-form solution. Section 5 shows empirical evidence, and Section 6 concludes.

2. A MODEL WITH EXOGENOUS POLITICAL CONSTITUENCY

2.1. *The Model Economy*. The model economy is based primarily on a tractable framework recently developed by Hassler et al. (2003, 2007). The economy is inhabited by an infinite sequence of overlapping generations. Each generation has a unit mass and lives two periods. There are two types of old individuals endowed with different productivity, referred to as the old poor and the old rich, respectively. The wage of the old rich is normalized to unity, and the poor earn zero. The benefits from public good consumption g are identical across old individuals. The government imposes a proportional income tax rate τ^o on the old. Let u^{ou} and u^{os} be the utilities of the old poor and old rich, respectively. These are equal to

$$u_t^{ou} = a^o g_t, \tag{1}$$

$$u_t^{os} = 1 - \tau_t^o + a^o g_t, \tag{2}$$

where a^o is the constant marginal utility of a public good for the old.[9]

Young individuals are ex ante homogenous. They make a human-capital investment h at birth, which will increase the probability p of being rich over their lifetime.[10] Without loss of generality, let $p = h \in [0, 1]$. As with old individuals, the wage of the young rich equals unity, and the poor earn zero. Therefore, once being rich, an individual earns a high wage, normalized to unity, in both periods of her life. On the other hand, a poor individual receives zero earnings.[11] τ^y is the proportional income tax rate for young individuals. For analytical convenience, I assume a linear-quadratic preference over consumption and costs of human-capital investment. The expected utility of a young household is

$$u_t^y = h_t\left(1 - \tau_t^y\right) + a^y g_t - h_t^2 + \beta E[u_{t+1}^o], \tag{3}$$

[7] See Alesina et al. (2009) for an analysis on endogenous evolution of ideology.

[8] See, among many others, Mueller (1970), Hibbs (1982), Norporth and Yantek (1983), Mackuen et al. (1989), Weisberg and Smith (1991), and Haynes and Jacobs (1994).

[9] Assuming equal marginal utility of public spending across households is for notational convenience. It can be argued that the poor care about public spending more than the rich. The following results carry over to the case in which a^o is different between the poor and the rich.

[10] This implies that human-capital investment increases productivity contemporaneously. The assumption simplifies the analysis substantially. Otherwise I would have to work on a multiperiod model that captures conflicts of interests across generations.

[11] The assumption on the perfectly correlated earnings in both periods is not essential. My results will be qualitatively unchanged as long as earnings in the two periods are positively correlated.

where E is the expectation operator and $\beta \in [0, 1]$ denotes the discount factor. a^y is the marginal utility of a public good for the young. Since the probability of being rich when old is equal to h, we have

$$E\left[u_{t+1}^{o}\right] = h_t E\left[u_{t+1}^{os}\right] + (1 - h_t) E\left[u_{t+1}^{ou}\right]. \tag{4}$$

Age-dependent taxation has its counterparts in the real world. Many public programs and tax policies have important age-dependent elements. In addition, the young and old may evaluate public goods, such as public health care, in quite different ways. Allowing for age-dependent taxation also simplifies the analytical characterization, without fundamentally changing the results.[12]

Through the wage structure, the old and young produce h_{t-1} and h_t, respectively. Thus, the aggregate output y_t equals

$$y_t = h_{t-1} + h_t. \tag{5}$$

Total tax revenue and public spending amount to $\tau_t^o h_{t-1} + \tau_t^y h_t$ and $2g_t$, respectively. I assume that the government budget must be balanced in each period, which implies

$$g_t = \frac{\tau_t^o h_{t-1} + \tau_t^y h_t}{2}. \tag{6}$$

2.2. *Policy Choices in a Two-Party System.* The sequence of tax rates is set through a repeated political decision process. There are two parties, the left wing and right wing, representing the poor and rich, respectively. The party candidates cannot credibly commit to any policy other than that preferred by the group they represent. Specifically, the left wing (right wing) has an objective of maximizing an average utility of the poor (rich).

$$W_t^L = u_t^{ou} + \hat{\omega} u_t^{yu}, \tag{7}$$

$$W_t^R = u_t^{os} + \hat{\omega} u_t^{ys}, \tag{8}$$

where $\hat{\omega} > 0$ is a political weight assigned to the young and

$$u_t^{yu} = a^y g_t + \beta a^o E\left[g_{t+1}\right],$$
$$u_t^{ys} = 1 - \tau_t^y + a^y g_t + \beta E\left[1 - \tau_{t+1}^o + a^o g_{t+1}\right],$$

stand for ex post utilities of the young after their productivity is revealed.[13]

The electorate's ideological label plays a significant role in policy preference and voting choice. As a warm-up exercise to facilitate the intuition, I adopt (tentatively) an extreme assumption that election outcomes are purely determined by an exogenous ideological state, denoted by s_t. Define the left-wingers (right-wingers) as individuals voting for the left-wing

[12] See the technical appendix (available upon requests) for more details.

[13] My two-period lived OLG is a simplification of reality. In a two-party model where agents lived longer, it would be reasonable to expect the left wing (right wing) to align with the poor (the rich), who are their natural constituency. In such an environment, the objective of each party would be given by expressions similar to (7) and (8). I thank a referee for pointing out the generality of this approach.

(right-wing) party. We have

$$e_t = \begin{cases} 1 & s_t \geq 1/2 \\ 1/2 + s_t & s_t \in (-1/2, 1/2) \\ 0 & s_t \leq -1/2 \end{cases}, \tag{9}$$

where e_t denotes the proportion of right-wingers. Equation (9) ensures that $e_t \in [0, 1]$ always holds. The ideological state, s_t, is a random variable and follows a stationary AR(1) process whose properties will be defined and discussed later. The AR(1) specification allows ideological movements to be persistent. A high (low) s_t refers to a more right-leaning (left-leaning) ideology.[14] The right-wing party will win the election if $s_t > 0$. Otherwise, the left-wing party is elected.[15] The next section will analyze a more general setup, in which e_t is codetermined by the distribution of individuals' economic situation and the ideological state.

The exogenous political constituency shuts down the effects of current policy decision on future election and, therefore, policy outcomes. This makes the following analysis straightforward. The right-wing party sets τ_t^o so as to maximize W_t^R in (8), subject to the balanced-budget constraint (6). To avoid trivial results, I assume that $a^o + \hat{\omega} a^y \leq 2$, which is sufficient for the right-wing to set $\tau_t^o = 0$. Similarly, the left wing sets τ_t^o by maximizing W_t^L in (7), which amounts to maximizing fiscal revenues $\tau_t^o h_{t-1} + \tau_t^y h_t$. Since h_{t-1} is predetermined and τ_t^o does not distort young individuals' human-capital investment, the left wing will set $\tau_t^o = 1$. In other words, the left-wing government entirely eliminates the income inequality of old individuals by imposing a 100% tax rate. To conclude, τ_t^o follows a binary rule

$$\tau_t^o = \begin{cases} 1 & \text{if } e_t \leq \dfrac{1}{2}, \\ 0 & \text{otherwise.} \end{cases} \tag{10}$$

I then turn to the decision on τ_t^y. According to the binary tax rule (10), $E[\tau_{t+1}^o]$ is equal to $1 - \pi_t$, where $\pi_t \equiv \Pr(e_{t+1} > 1/2)$ denotes the probability that the right wing will be elected in the next period. π_t can also be considered a variable characterizing the distribution of future voters. $\pi_t = \Pr(s_{t+1} > 0)$ under exogenous political constituency (9). Then, (7) and (8) imply that

$$\tau_t^y = \begin{cases} \arg\max T_t + \omega \underbrace{\left(\dfrac{a^o}{2} \beta (1 - \pi_t) h_t \right)}_{\text{welfare of the young poor}} & \text{if } e_t \leq \dfrac{1}{2} \\ \arg\max T_t + \omega \underbrace{\left(1 - \tau_t^y + \beta \pi_t + \dfrac{a^o}{2} \beta (1 - \pi_t) h_t \right)}_{\text{welfare of the young rich}} & \text{otherwise} \end{cases}, \tag{11}$$

where $T_t \equiv \tau_t^y h_t$ and $\omega \equiv 2\hat{\omega} / (a^o + \hat{\omega} a^y)$. Irrelevant constant terms are omitted.

Three remarks are in order. First, consider an extreme case in which $\omega = 0$. Despite the conflict of interest between left-wingers and right-wingers in terms of τ_t^o, their preferences on τ_t^y become perfectly aligned: attaining the top of the Laffer curve to maximize taxes from young individuals. Second, if $\omega > 0$, (11) illustrates an additional channel affecting the determination of τ_t^y through the presence of the young in the political decision process. A larger h_t increases the next-period

[14] s can also be considered the quality of the party leadership, or even the popularity of the leadership. More generally, "ideology" may capture any factor affecting vote shares unrelated to economic concerns. I thank a referee for this alternative interpretation.

[15] I assume that the left wing comes into power if the proportion of left-wingers and right-wingers is equal.

redistributive benefits for the current young, $a^o\beta(1-\pi_t)h_t/2$. Therefore, both the left- and right-wing parties face a trade-off between current and future tax revenue, resulting in lower τ_t^y. Finally, the difference of the objective functions across two political regimes, $1-\tau_t^y+\beta\pi_t$, implies a partisan effect on τ^y. The partisan effect leads to lower τ^y in the right-wing regime since the young rich are more averse to τ^y than the young poor.

The timing of events in each period is described as follows: Candidates announce their policy platforms at the beginning of each period. An ideological shock is realized afterward. The elected party then implements its preferred tax rates and public spending. Given public policies, young individuals invest in human capital. Their being rich or poor is revealed after they invest.

2.3. *Effects of Ideology*. I now distinguish three channels for ideology to affect policies in this simple model with exogenous political constituency. The effect of an ideological shock on policies via election (the first channel) is analogous to that in the standard partisan models. The second channel, a novel feature of my model, governs how policies respond to a change in the distribution of future voters driven by a persistent ideological shock. Finally, when $\omega > 0$, I have the third channel allowing the young to affect policy decision.

2.3.1. *The partisan effect of ideology*. Let us first study a static example with no private intertemporal trade-off. Here, the probability of being rich in old age, p, is assumed to be exogenous. Moreover, I let $\omega = 0$. These two assumptions shut down the second and third channels and, thus, help identify the partisan effect of ideology in the first channel. I will continue to drop the time subscript when it does not create any confusion. The corresponding politico-economic equilibrium is straightforward. The policy rule of τ^o follows (10). According to (3), young individuals' human-capital investment solves

$$h = \arg\max_{\hat{h}\in[0,1]} (1-\tau^y)\hat{h} - \hat{h}^2, \tag{12}$$

which yields

$$h = \frac{1-\tau^y}{2}. \tag{13}$$

Equation (13) shows that private choice is independent of ideology. Substituting (13) into (11), I obtain an equalized distorting tax rate across ideological states:

$$\tau^y = \frac{1}{2}. \tag{14}$$

Now, consider the policy rule (10) and (14). Assuming away intertemporal trade-offs and letting $\omega = 0$ shut down the link between ideology and the distortionary tax rate τ^y. Nevertheless, if the ideology shock $s \le 0$, the left-wing party, representing the interests of the poor, will win the election and spend more for redistribution by setting $\tau^o = 1$. Therefore, an ideological shift may affect the government size by changing the identity of the incumbent party. The implication from this partisan effect is thus in accordance with the standard prediction of partisan theory.

2.3.2. *The intertemporal effect of ideology.* To illustrate the second channel, I proceed by incorporating private intertemporal choices into the above static model. The assumption that $\omega = 0$ is maintained to shut down the third channel, which will be discussed later. Denote x' as the variable x in the next period. The expected utility u^y in (3) implies that h depends on $E[\tau^{o\prime}]$, which is equal to $1-\pi$ by the binary tax rule (10). Plugging (10) into (3), young individuals

solve

$$h = \arg\max_{\hat{h}\in[0,1]} (1 - \tau^y + \beta\pi)\,\hat{h} - \hat{h}^2. \tag{15}$$

The utility from a public good is irrelevant for the decision h, due to the atomistic unit assumption on individuals. Equation (15) yields

$$h = \frac{1 - \tau^y + \beta\pi}{2}. \tag{16}$$

Compared with (13), a new feature of (16) is that h increases in π, the probability that a right-wing government will be elected. The reason is simple: The right wing, if elected, would adopt a tax-free policy for the current young when they become old. Moreover, the elasticity of tax base h depends on the election probability

$$\epsilon = \frac{\tau^y}{1 - \tau^y + \beta\pi}, \tag{17}$$

where ϵ stands for the absolute value of the elasticity of h with respect to τ^y. Clearly, a higher π leads to a lower ϵ. That is to say, the current tax base tends to be less elastic when the future election is more favorable to the right wing.

Substituting (16) back into (11), together with the assumption that $\omega = 0$, I solve the following first-order condition for τ^y:

$$\tau^y = \frac{1 + \beta\pi}{2}. \tag{18}$$

Equation (18) shows that π can affect τ^y. Compared with the policy rule (14) in the static example, I find that the effect appears whenever the tax base h is subject to private intertemporal choices. The intuition is straightforward. Since the right-wing regime features a lower τ^o, a more rightist political constituency in the future will encourage private investment and, therefore, reduce the elasticity of the tax base. This provides the incentive for the incumbent to increase τ^y.

If ideological movements are persistent, i.e., $\mathrm{d}\pi/\mathrm{d}s > 0$, (18) implies that $\mathrm{d}\tau^y/\mathrm{d}s > 0$ within each political regime. This illustrates the second channel for ideology to affect political decisions via private intertemporal choices. By contrast, ideological shifts play no role in the standard partisan model, as long as the current type of government remains unchanged. Moreover, through the second channel, a right-leaning ideology may actually encourage the government to impose a higher tax rate, which is opposite to the partisan effect. Such an effect will be referred to as the intertemporal effect of ideology.

2.3.3. *The role of the young.* Finally, I move to the general case with $\omega > 0$, in which the political decision takes into account the welfare of the young. Substituting (16) back into (11) solves

$$\tau^y = \begin{cases} \dfrac{1 + \beta\pi}{2} - \omega\dfrac{a^o}{4}\beta\,(1 - \pi) & \text{if } e_t \le \dfrac{1}{2} \\ \dfrac{1 + \beta\pi}{2} - \omega\dfrac{a^o}{4}\beta\,(1 - \pi) - \omega & \text{otherwise} \end{cases}. \tag{19}$$

A comparison between (18) and (19) shows two additional effects of ideology on τ^y. First, the term $\omega a^o \beta\,(1 - \pi)\,/4$ reflects that both left- and right-wing parties have the incentive of lowering τ^y, in order to increase h and future redistributive benefits for the current young. This is an

analogue of "the strategic effect" in Persson and Svensson (1989). A high π, or a high s with persistent ideology, weakens the strategic effect since it reduces the left wing's election probability, making the incumbent government less concerned about future redistributive benefits. Therefore, this additional effect also implies an increasing τ^y in π, which further strengthens the impact of ideology on τ^y through the second channel. Second, the difference between τ^y in left- and right-wing regimes, ω, represents another partisan effect of ideology. The right-wingers would set a lower τ^y because they care about the welfare of the young rich who prefer zero tax. Recall that when $\omega = 0$, the only partisan effect of ideology is on the nondistortionary tax rate τ^o. $\omega > 0$ involves another partisan effect on the distortionary tax rate τ^y, as a reflection of the disagreement between the young rich and poor.

The main finding from the above simple model is that a right-leaning ideology may lead to a higher tax rate within each political regime, primarily due to the intertemporal effect of ideology. The model is, however, built upon an ad hoc assumption that the distribution of voters is driven entirely by ideology. Being rich or poor indeed shapes individual policy references, as can be seen from (1) and (2). Moreover, the exogenous political constituency has no interactions with policy decision and private choices. These interactions are not only theoretically appealing, but reflect the essence of democracy. In the rest of the article, I will remove this assumption and focus on a more general model, in which political constituency is codetermined by ideology and human-capital investment. Endogenizing political constituency results in a self-reinforcing process running from an ideological shock to the distribution of future voters. Nevertheless, my main finding on the intertemporal effect of ideology still holds true.

3. THE POLITICO-ECONOMIC EQUILIBRIUM WITH ENDOGENOUS POLITICAL CONSTITUENCY

I now turn to a model with endogenous political constituency. To simplify analysis, I assume that only old individuals vote. This captures, in an extreme fashion, the phenomenon that the old are more influential in determining public policies.[16] In the technical appendix, which is available upon request, I show that a relaxation of this assumption leads to no major changes in my findings. Note that in the current setup, we may consider the left-wing and right-wing parties as citizen-candidates: The candidate representing the old rich and the one representing the old poor participate in the electoral competition.[17] A positive $\hat{\omega}$ in (7) and (8) can thus be interpreted as an ideology-dependent altruism on the young.

In the absence of ideology, election outcomes would be deterministic and depend solely on the distribution of old individuals' economic situation. It has been a long tradition in the literature of political economy that poor (rich) is synonymous with the left (right). This receives some empirical support from the finding that increased employment raises the popularity of the left government, whereas inflation reduces the popularity of the right via the wealth effect (e.g., Haynes and Jacobs, 1994). I introduce ideology to reflect the discrepancy between the electorate's economic interests and political preference.[18] Specifically, an ideological shock

[16] For instance, Mulligan and Sala-i-Martin (1999) argue that the old have more influence in the political decision process because they have a lower cost of time. Empirically, the voting turnout is, indeed, lower for younger households (e.g., Wolfinger and Rosenstone, 1980). This assumption would be observationally equivalent to assuming that voting occurs at the end of each period. Old individuals have no interests at stake and, thus, abstain from voting. For expositional ease, I keep the former interpretation throughout the article. See Hassler et al. (2003, 2007) for more detailed discussions.

[17] For simplicity, I assume zero-entry cost, which shuts down the entry game in the standard citizen-candidate model. However, I still regard the two-party system as a simplified citizen-candidate model, since the party candidates cannot credibly commit to any policy platform other than their preferred policies, as in Osborne and Slivinski (1996) and Besley and Coate (1997).

[18] Besides the extensive evidence provided by political scientists, worth mentioning is a recent empirical study from Di Tella and MacCulloch (2005) suggesting the importance of ideology. On the basis of survey data from 10 OECD countries for 1975–92, they find that "respondents declare themselves to be happier when the party in power has a similar ideological position to themselves, even after we control for key performance indicators such as unemployment, inflation and income" (Di Tella and MacCulloch, 2005, p. 378).

switches a proportion of the poor (rich) to the right-wing (left-wing) side in terms of voting choice. Equation (9) can be rewritten as

$$e = \begin{cases} 1 & s \geq 1 - h_{-1} \\ h_{-1} + s & s \in (-h_{-1}, 1 - h_{-1}), \\ 0 & s \leq -h_{-1} \end{cases} \tag{20}$$

where h_{-1} is the population of the old rich or, equivalently, the human-capital investment in the previous period. Compared with (9), associated with exogenous political constituency, (20) provides a more specific interpretation for s: A positive (negative) s switches some of the poor (rich) to vote for the right-wing (left-wing) party. When s takes an extreme value (either very high or very low), the economic determinant h_{-1} is wiped out. Outside these "ages of extremes" (Hobsbawm, 1996), economic motives may sway voters. In short, (20) can be thought of as a parsimonious way of capturing the influence of both economic and ideological factors on the formation of political constituency.

3.1. *The Endogenous Distribution of Future Voters.* The next-period election probability, π, is governed by the stochastic process of s under exogenous political constituency. However, when e follows (20), π becomes an equilibrium outcome involving private investment. To see this, I substitute (16) into (20). The definition of π establishes

$$\pi = \Pr\left(e' > \frac{1}{2}\right) = \Pr\left(\frac{1 - \tau^y + \beta\pi}{2} + s' > \frac{1}{2}\right). \tag{21}$$

The fixed point of Equation (21) solves the equilibrium probability π. In particular, the link between h and π establishes a channel for an ideological shock to affect the distribution of future voters. An increase of s (a right-wing ideology) leads to a high π and, therefore, a high h. More human-capital investment, in turn, increases π, as more individuals will be rich and in favor of the right wing in the next period. In other words, a right-wing ideological wave may move future political constituency further toward to the right through this self-reinforcing process. Equation (21) also shows that π depends on τ^y, since τ^y can affect h and, thus, e'. This establishes a channel for τ^y to influence h via π, resulting in a more distortive τ^y under the endogenous political constituency. We shall see explicitly in Section 4 how the endogeneity of political constituency affects political choices.

Before characterizing the fixed-point problem, I first specify the properties of the stochastic process of s as follows: The density function is defined by $f : R^2 \to [0, \infty)$ with $\int f(s'|s)\, ds' = 1$ for any given s. By (21), we know that π depends on τ^y and the probability of the future ideological state s', which is, in turn, contingent on the current ideological state s. Hence, π can be written as a function of τ^y and s, $\pi : [0, 1] \times R \to [0, 1]$, which solves the following functional equation implied by (21):

$$\pi(\tau^y, s) = \int_{s' > \frac{\tau^y - \beta\pi(\tau^y, s)}{2}} f(s'|s)\, ds'. \tag{22}$$

The existence of the ideology-contingent probability $\pi(\tau^y, s)$ can easily be obtained by assuming the following properties on $f(s'|s)$. Define $X \equiv [\underline{s}, \bar{s}]$, where $-\infty < \underline{s} < \bar{s} < \infty$. Assume

A1. s' and $s \in X$.

A2. $f(s'|s)$ is bounded and uniformly continuous.

LEMMA 1. *Assume A1 and A2. Then, there exists a uniformly continuous function* $\pi(\tau^y, s)$ *that solves (22).*

PROOF. See the Appendix.

A2 is a sufficient condition for the existence. $\pi(\tau^y, s)$ can exist under discontinuous distributions, as shall be seen in Section 4.

I can further establish the uniqueness of $\pi(\tau^y, s)$ by assuming

A3. $f(s'|s) < 2/\beta$ for all s' and $s \in X$.

LEMMA 2. *Assume A1 and A3. Then, there exists a unique* $\pi(\tau^y, s)$ *that solves (22).*

PROOF. See the Appendix.

Again, A3 is a sufficient condition for the uniqueness. Lemma 2 implies that sufficient ideological uncertainty can rule out the indeterminacy of beliefs, which features a number of recent studies on dynamic politico-economic equilibrium with endogenous identity of the policymaker (e.g., Hassler et al., 2003).[19] Plugging the probability $\pi(\tau^y, s)$ into (16) gives

$$h(\tau^y, s) = \frac{1 - \tau^y + \beta\pi(\tau^y, s)}{2}. \tag{23}$$

Then, (20) shows that the future political constituency e' evolves according to

$$e'(s', \tau^y, s) = \begin{cases} 1 & \text{if } s' \geq 1 - h(\tau^y, s) \\ h(\tau^y, s) + s' & \text{if } s' \in (-h(\tau^y, s), 1 - h(\tau^y, s)) \\ 0 & \text{if } s' \leq -h(\tau^y, s) \end{cases}. \tag{24}$$

3.2. *Markov Perfect Equilibrium.* Given the ideology-contingent probability $\pi(\tau^y, s)$ solved from (22) and the individual investment decision (23), an incumbent government will choose τ^y by maximizing (7) or (8). Define

$$V^L(\tau^y, s) \equiv T(\tau^y, s) + \omega \left(\underbrace{\frac{a^o}{2}\beta(1 - \pi(\tau^y, s))h(\tau^y, s)}_{\text{welfare of the young poor}} \right), \tag{25}$$

$$V^R(\tau^y, s) \equiv T(\tau^y, s) + \omega \left(\underbrace{1 - \tau^y + \beta\pi(\tau^y, s) + \frac{a^o}{2}\beta(1 - \pi(\tau^y, s))h(\tau^y, s)}_{\text{welfare of the young rich}} \right), \tag{26}$$

where $T(\tau^y, s) \equiv h(\tau^y, s)\tau^y$. The government decision solves

$$\tau^y(e, s) = \begin{cases} \arg\max_{\tau^y \in [0,1]} V^L(\tau^y, s) & \text{if } e \leq \frac{1}{2} \\ \arg\max_{\tau^y \in [0,1]} V^R(\tau^y, s) & \text{otherwise} \end{cases}. \tag{27}$$

[19] In an earlier version of this article (Song, 2005, Chapter 2), I relaxed Assumption A3 and investigated the multiplicity of equilibria.

Equation (27) is a generalized version of (11). First consider an extreme case of $\omega = 0$, which allows closed-form solution. As will be shown in Section 4 later, different from the economy with exogenous political constituency, the endogenous political constituency features a self-reinforcing process on the distribution of future voters, which tends to amplify the intertemporal effect of ideology on τ^y. When $\omega > 0$, the same strategic effect appears as that in the exogenous political constituency. Moreover, the endogenous political constituency provides an additional channel affecting the decision on τ^y. For the left wing, given h, V^L is decreasing in π. Since the next-period redistributive policy benefits the current young poor, the left-wing party has the incentive to increase their next-period election probability, $1 - \pi$. This is referred to as "the opportunistic effect," reflecting an incumbent's reelection concerns. Clearly, such an effect results in a higher τ^y and a lower h. In other words, the strategic and opportunistic effects work in opposite directions in the left-wing regime.[20] A symmetric opportunistic effect also applies for the right wing. Given h, V^R is increasing in π since the young rich would like to see the right wing in office. Nevertheless, the strategic and opportunistic effects work along the same direction in the right-wing regime.

This article focuses on Markov perfect equilibria, in which private and public choices are conditioned to payoff-relevant state variables.[21] There are two state variables in my model: the ideological state s and the proportion of right-wingers $e = s + h_{-1}$. These two state variables are payoff relevant since they determine the current election and, thus, policy outcomes. So, the Markovian political equilibrium can be defined as follows:

DEFINITION 1. A (Markov perfect) political equilibrium is a set of mappings $\tau^o(e)$, $\tau^y(e,s)$, $\pi(\tau^y(e,s),s)$, and $h(\tau^y(e,s),s)$ such that

(1) $\tau^o(e)$ follows (10);
(2) given $\tau^y(e,s)$, the next-period election probability $\pi(\tau^y(e,s),s)$ solves (22);
(3) given $\pi(\tau^y(e,s),s)$, the human-capital investment $h(\tau^y(e,s),s)$follows (23);
(4) given $h(\tau^y(e,s),s)$, the incumbent solves $\tau^y(e,s)$ by (27).

4. AN ANALYTICAL SOLUTION

In this section, I provide a closed-form solution of the Markov perfect equilibrium. To obtain tractability, I let $\omega = 0$; i.e., the young have zero weight in the political decision process. A complete characterization of the equilibrium reveals explicitly the rich dynamic interactions among political constituency, policy decision making, and private intertemporal choice. Subsection 4.4 below will illustrate the robustness of the results to positive values of ω. When $\omega = 0$, (27) reduces to

$$\tau^y(s) = \arg\max_{\tau^y \in [0,1]} T(\tau^y, s). \tag{28}$$

Here, τ^y depends only on the current ideological state s. e or the identity of an incumbent has no influence on τ^y since the objectives of the two parties over τ^y are perfectly aligned: maximizing tax revenue from the young. Although $\omega = 0$ shuts down the partisan effect of ideology on τ^y, the intertemporal effect of ideology, the main focus of this article, is actually independent of ω as shown in Subsection 2.3.[22]

[20] The opposite strategic and opportunistic effects can also be found in Jonsson (1997).

[21] The dynamic game in my model also allows for equilibria with trigger strategies.

[22] The political parties would disagree on the tax rate imposed on the young if the government were not allowed to adopt age-dependent taxation. The technical appendix shows that my main findings do not hinge on this assumption.

I assume that s' follows an AR(1) process with a symmetric uniformly distributed innovation:[23]

$$s' = \rho s + \varepsilon'. \tag{29}$$

The ideological shock is stationary and persistent, i.e., $\rho \in (0, 1)$. The density of ε equals $1/(2z)$ if $\varepsilon \in (-z, z)$ and 0 otherwise. So, the conditional density function of s' is

$$f(s'|s) = \begin{cases} \dfrac{1}{2z} & \text{if } s' \in (\rho s - z, \rho s + z) \\ 0 & \text{otherwise} \end{cases}. \tag{30}$$

4.1. *Exogenous Political Constituency*. Before proceeding, it is instructive to solve π and τ^y when the distribution of voters is determined entirely by ideology, as in Subsection 2.2. There, $\pi = \Pr(s' > 0)$ is exogenous and only depends on s:

$$\pi(s) = \begin{cases} 1 & \text{if } s \geq \dfrac{z}{\rho} \\ \dfrac{\rho s + z}{2z} & \text{if } s \in \left(-\dfrac{z}{\rho}, \dfrac{z}{\rho}\right) \\ 0 & \text{if } s \leq -\dfrac{z}{\rho} \end{cases} \tag{31}$$

Clearly, π increases in s as long as $\rho > 0$. The marginal effect of ideology on π is equal to $\rho/(2z)$ for $s \in (-z/\rho, z/\rho)$. Substituting (31) back into (18), we obtain the distortionary tax rule associated with exogenous political constituency:

$$\tau^y(s) = \begin{cases} \dfrac{1}{2} & \text{if } s \leq -\dfrac{z}{\rho} \\ \dfrac{1 + \beta(\rho s + z)/(2z)}{2} & \text{if } s \in \left(-\dfrac{z}{\rho}, \dfrac{z}{\rho}\right) \\ \dfrac{1+\beta}{2} & \text{if } s \geq \dfrac{z}{\rho} \end{cases}. \tag{32}$$

We see explicitly from this example that a persistent right-wing ideological wave may increase the distortionary tax rate. The intertemporal effect of ideology on τ^y is equal to $\beta\rho/4z$ for $s \in (-z/\rho, z/\rho)$.

4.2. *The Endogenous Distribution of Future Voters*. Now I solve π when the distribution of future voters is endogenous and affected by private investment. Given (30), the functional equation (22) becomes

$$\pi(\tau^y, s) = \begin{cases} 1 & \text{if } \dfrac{\tau^y - \beta\pi(\tau^y, s)}{2} \leq \rho s - z \\ \dfrac{1}{2z}\left(\rho s + z - \dfrac{\tau^y - \beta\pi(\tau^y, s)}{2}\right) & \text{if } \dfrac{\tau^y - \beta\pi(\tau^y, s)}{2} \in (\rho s - z, \rho s + z) \\ 0 & \text{if } \dfrac{\tau^y - \beta\pi(\tau^y, s)}{2} \geq \rho s + z \end{cases}. \tag{33}$$

[23] An analytical solution is also available, though much more tedious, under more general setups. For example, s' follows an AR(n) process with the innovation that has a piecewise linear cumulative distribution function.

The linearity makes the analytical solution straightforward. Assumption A3 implies that $z > \beta/4$, which is sufficient for the uniqueness of $\pi(\tau^y, s)$ under the uniform distribution (30). In this subsection, I assume that $z > \beta/4$. It can be shown that $z > \beta/4$ is also necessary.[24] Solving (33) yields

$$\pi(\tau^y, s) = \begin{cases} 1 & \text{if } \tau^y \leq \lambda^-(s) \\ \dfrac{2(\rho s + z) - \tau^y}{4z - \beta} & \text{if } \tau^y \in (\lambda^-(s), \lambda^+(s)), \\ 0 & \text{if } \tau^y \geq \lambda^+(s) \end{cases} \tag{34}$$

where $\lambda^-(s) \equiv 2(\rho s - z) + \beta$ and $\lambda^+(s) \equiv 2(\rho s + z)$. Note that $\lambda^+(s) > \lambda^-(s)$ as long as $z > \beta/4$. For notational convenience, I refer to $\lambda^+(s) \leq 0$ or, equivalently, $s \leq -z/\rho$ as the left-dominating region, where the left wing will be elected with probability 1 in the next period, irrespective of τ^y. Symmetrically, $\lambda^-(s) \geq 1$ or, equivalently, $s \geq ((1-\beta)/2 + z)/\rho$ is referred to as the right-dominating region, where the right wing will be elected with probability 1 under any τ^y.

It immediately follows that $\partial\pi(\tau^y, s)/\partial s \geq 0$. Such an effect was illustrated by the model with exogenous political constituency in Subsection 2.3 (e.g., $d\pi/ds$ in (31)). A novel feature of the endogenous political constituency is that there is a self-reinforcing process running from s to π. A comparison between (34) and (31) shows that the marginal effect of ideology on π increases from $\rho/(2z)$ to $2\rho/(4z - \beta)$. The intuition is straightforward. A right-wing ideology increases π and h. The higher h, in turn, leads to more rich voters. The future political constituency moves further toward the right. Since the right wing features zero τ^o, such a self-reinforcing process encourages more private investment, giving an extra incentive for the incumbent to increase τ^y. This tends to amplify the intertemporal effect of ideology.

Equation (34) shows that the endogenous political constituency also allows τ^y to affect π. Differentiating (34) w.r.t. τ^y gives $\partial\pi(\tau^y, s)/\partial\tau^y < 0$ for $\tau^y \in (\lambda^-(s), \lambda^+(s))$. Intuitively, a higher τ^y discourages h. The smaller number of rich individuals in the next period yields a lower π, which further decreases h. Hence, the incumbent may have the incentive to cut τ^y due to the more distortive τ^y. Opposite to the self-reinforcing process, the link between τ^y and π tends to dampen the intertemporal effect of ideology.

In the left-dominating (right-dominating) region with $\lambda^+(s) \leq 0$ ($\lambda^-(s) \geq 1$), h and τ^y have no impact on the next-period government's identity. Therefore, π is independent of h and τ^y, as in the exogenous political constituency.

4.3. *The Equilibrium Tax Rule.* Now I am well equipped to solve for $\tau^y(s)$. By (23) and (34), tax revenues from young individuals are

$$T(\tau^y, s) = \begin{cases} T^R(\tau^y, s) \equiv \dfrac{1}{2}(1 - \tau^y + \beta)\tau^y & \text{if } \tau^y \in [0, \lambda^-(s)] \\ T^M(\tau^y, s) \equiv \dfrac{1}{2}\left(1 - \tau^y + \beta\dfrac{2(\rho s + z) - \tau^y}{4z - \beta}\right)\tau^y & \text{if } \tau^y \in (\lambda^-(s), \lambda^+(s)). \\ T^L(\tau^y, s) \equiv \dfrac{1}{2}(1 - \tau^y)\tau^y & \text{if } \tau^y \in [\lambda^+(s), 1] \end{cases} \tag{35}$$

Taking s as the state variable, τ^y can be pinned down by maximizing the piecewise quadratic function $T(\tau^y, s)$. A characterization of the policy rule $\tau^y(s)$ and the associated human-capital investment $h(s)$ is given by

[24] The opposite case, $z < \beta/4$, which produces multiple equilibria, was studied in Song (2005, Chapter 2). $\pi(\tau^y, s)$ does not exist if $z = \beta/4$. The nonexistence of $\pi(\tau^y, s)$ is due to the fact that the uniform distribution (30) is not continuous and, thus, does not satisfy Assumption A2.

PROPOSITION 1. *Assume that (30) and $z \geq \hat{z}$, where*

$$\hat{z} \equiv \frac{\beta}{8\left(-\left(\beta^2+2\beta\right)+(1+\beta)\sqrt{\beta^2+2\beta}\right)}.$$

Then, the Markov perfect equilibrium is such that τ^y is strictly increasing in s for $s \in [s^1, s^R]$

$$\tau^y(s) = \begin{cases} \frac{1}{2} & \text{if } s \leq s^1 \\ \phi(s) & \text{if } s \in \left[s^1, s_H^M\right] \\ \lambda^-(s) & \text{if } s \in \left(s_H^M, s^R\right] \\ \frac{1+\beta}{2} & \text{if } s > s^R \end{cases}, \tag{36}$$

and h is hump-shaped in s for $s \in [s^1, s^R]$

$$h(s) = \begin{cases} \frac{1}{4} & \text{if } s \leq s^1 \\ \frac{1}{4} + \frac{\beta(\rho s + z)}{2(4z-\beta)} & \text{if } s \in \left[s^1, s_H^M\right] \\ \frac{1}{2} - (\rho s - z) & \text{if } s \in \left(s_H^M, s^R\right] \\ \frac{1+\beta}{4} & \text{if } s > s^R \end{cases}, \tag{37}$$

where

$$\phi(s) \equiv (2\beta(\rho s + z) + 4z - \beta)/8z, \quad s^1 \equiv \frac{\sqrt{z(4z-\beta)} - (4z-\beta)/2 - \beta z}{\beta\rho},$$
$$s_H^M \equiv \frac{16z^2 - 6\beta z + 4z - \beta}{\rho(16z - 2\beta)}, \quad s^R \equiv \frac{(1-\beta)/4 + z}{\rho}.$$

PROOF. See the Appendix.

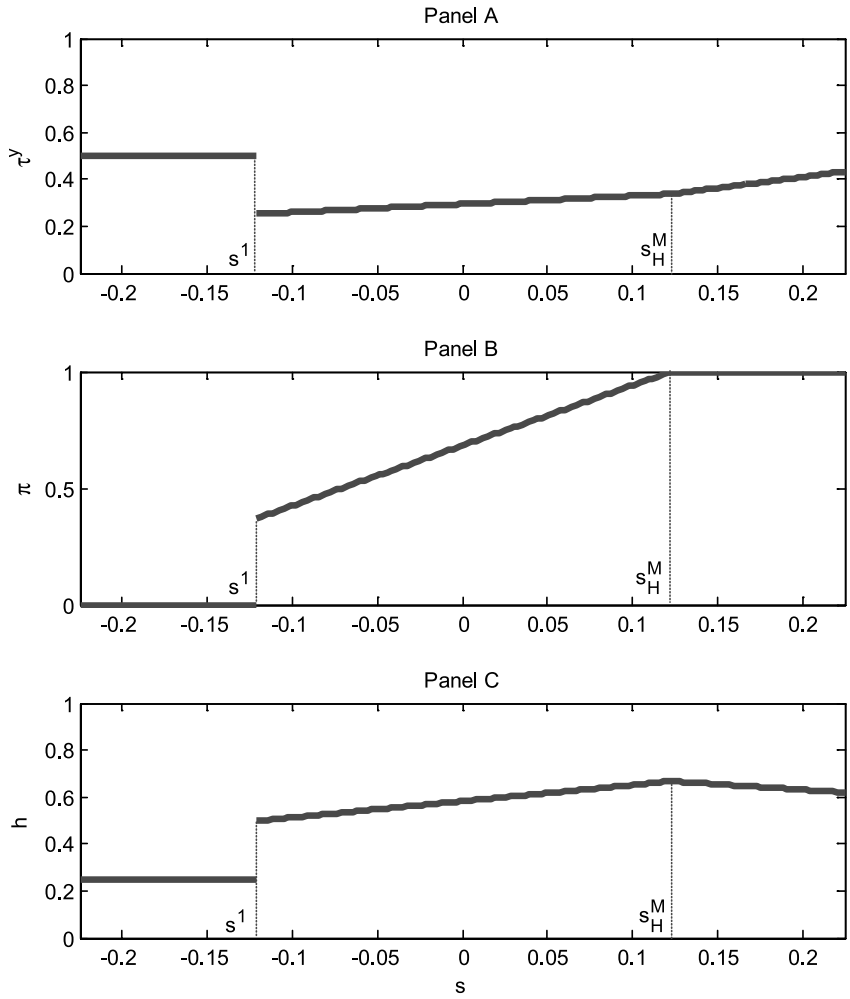
To simplify the statement in the article, I assume that $z \geq \hat{z}$.[25] Panels A and B in Figure 1 plot the policy rule $\tau^y(s)$ and the ideology-contingent probability $\pi(\tau^y(s), s)$ under the benchmark parameter values, which are set to $z = 0.22$, $\rho = 0.47$, and $\beta = 0.67$.[26]

In the left-dominating region, $\partial\pi(\tau^y, s)/\partial\tau^y = 0$, h and τ^y have no effect on future election outcomes. Equation (35) reduces to a quadratic function T^L, and the incumbent sets $\tau^y = 1/2$.

For $\lambda^+(s) > 0$ or, equivalently, $s > -z/\rho$, ideology becomes less hostile for the right wing. The corresponding objective function T is composed of two different quadratic functions, $T = T^M$ for low τ^y and $T = T^L$ for high τ^y (see Panel A of Figure 2). As s moves rightward, it is less costly to influence π by adjusting τ^y, as the top of T^M gets closer to the top of T^L. In particular,

[25] The other case, where $z \in (\beta/4, \hat{z})$, delivers qualitatively similar results and will be investigated in the technical appendix, which is available upon request. However, there will be no electoral uncertainty if $z < \hat{z}$.

[26] The parameter values are calibrated to match some long-run electoral patterns in OECD countries. See Appendix A.4 for details.



NOTES: Panel A represents the equilibrium policy rule $\tau^y(s)$. The probability for the right wing to be elected, $\pi(\tau^y(s), s)$, is plotted in Panel B. Panel C corresponds to the equilibrium investment rule $h(\tau^y(s), s)$. The parameter values are set equal to the benchmark case: $z = 0.22$, $\rho = 0.47$, $\beta = 0.67$.

FIGURE 1

EQUILIBRIUM RESULTS

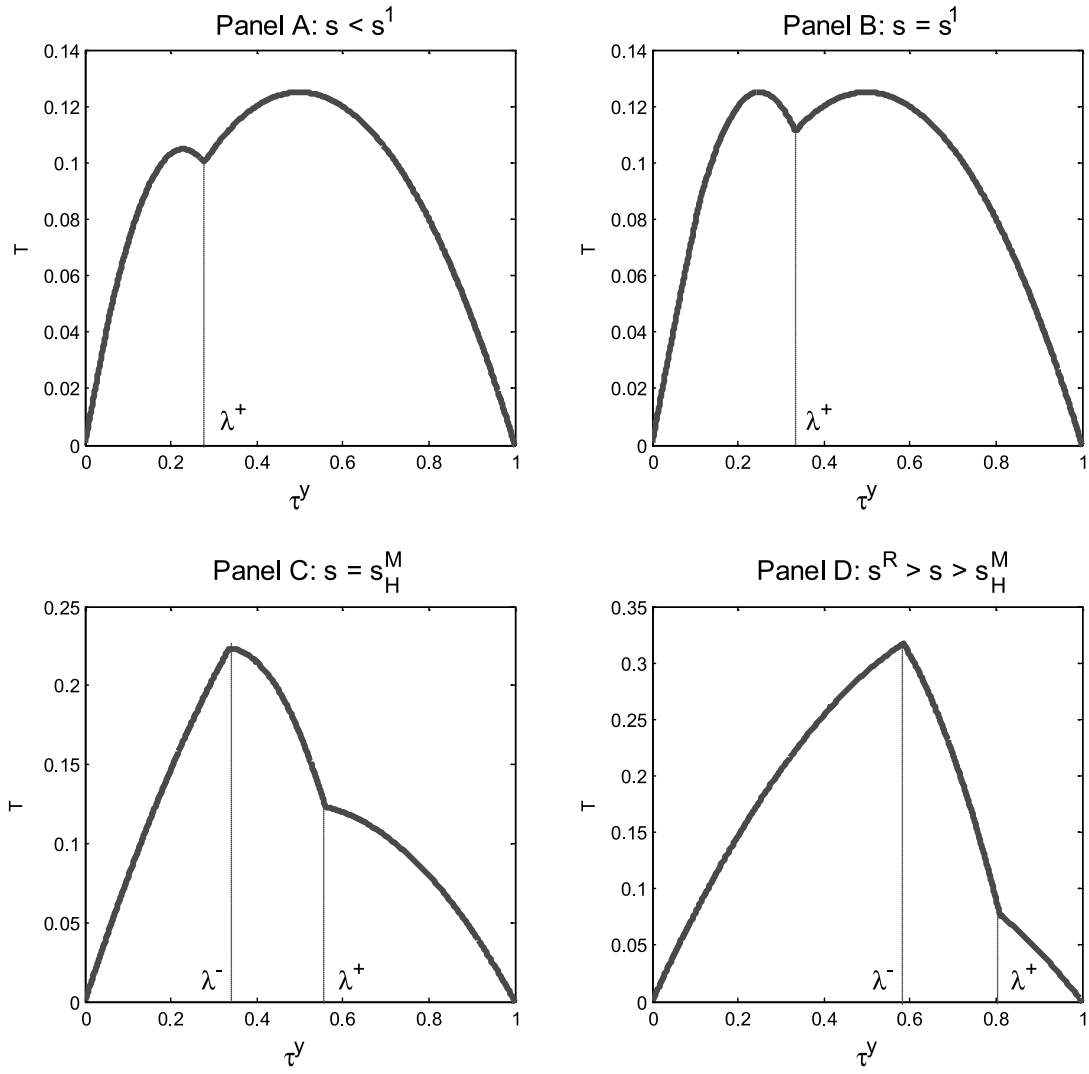
when s reaches the threshold point s^1, we find an equalized maximum of the two quadratic functions. In other words, the incumbent is indifferent between $\tau^y = 1/2$ and $\tau^y = \phi(s^1)$, where

$$\phi(s^1) = \frac{\sqrt{4 - \beta/z}}{4}. \tag{38}$$

This can be seen directly in Panel B of Figure 2. The indifference produces a discontinuity of τ^y at s^1.[27] For a small increment ξ in s, the incumbent will cut τ^y from $1/2$ to $\phi(s^1 + \xi)$, to attain the top of the Laffer curve. π turns positive accordingly.

Next, I investigate a more realistic region $[s^1, s_H^M]$, where both parties have positive probabilities to win the next election. This is referred to as "the competitive political region." The first observation is that now s plays a role in π (see Panel B of Figure 1), which gives rise to the

[27] More specifically, $\tau^y(s)$ is not lower hemicontinuous. The theorem of maximum (e.g., Stokey and Lucas, 1989, p. 62) ensures only that $\tau^y(s)$ is upper hemicontinuous.



NOTES: Panels A–D plot $T(\tau^y, s)$ with respect to τ^y under different ideological states. The parameter values are set equal to the benchmark case as in Figure 1.

FIGURE 2

LAFFER CURVES

intertemporal effect of ideology as illustrated in Subsection 2.3. Consequently, τ^y is increasing in s (see Panel A of Figure 1). Moreover, as discussed in Subsection 4.2, the link between h and π establishes a self-reinforcing process, which amplifies the intertemporal effect of ideology. Meanwhile, the link between τ^y and π makes τ^y more distortive and, thus, dampens the intertemporal effect of ideology. Interestingly, (36) shows that the marginal effect of ideology on τ^y, $\mathrm{d}\tau^y(s)/\mathrm{d}s$, equals $\beta\rho/4z$ and is identical to $\mathrm{d}\tau^y(s)/\mathrm{d}s$ in (32). Therefore, the two opposite effects cancel each other out.

When $s = s_H^M$, the optimal τ^y for maximizing T^M coincides with the boundary $\lambda^-(s)$ (see Panel C of Figure 2). Here, the right wing will win the next election with probability 1. When ideology moves further toward the right, the optimal τ^y will be equal to $\lambda^-(s)$; i.e., the incumbent will set τ^y such that $\pi = 1$ (see Panel D of Figure 2). Notably, this region features a stronger

intertemporal effect of ideology.[28] The reason is simple. The fact that $\pi = 1$ breaks down the link between τ^y and π. Since only the self-reinforcing process remains active, the incumbent would increase further τ^y. This illustrates how the intertemporal effect of ideology is amplified under the endogenous political constituency.

Finally, in the right-dominating region when $s > s^R$, young individuals rationally expect the right wing to win the next election under any τ^y. Consequently, (35) reduces to a quadratic function T^R, which solves $\tau^y = (1 + \beta)/2$.

Given the equilibrium tax rule $\tau^y(s)$ and the ideology-contingent probability $\pi(\tau^y(s), s)$, human-capital investment (37) is immediate from (23), (34), and (36). Panel C in Figure 1 plots the hump-shaped h. The nonmonotonicity of h is due to the fact that a right-wing ideology has two opposite effects on h. First, it helps the right wing win the next election and, thus, increases π. This has a positive effect on h. However, a high π also induces the incumbent to increase τ^y, which has a negative effect on h. For $s \in [s^1, s_H^M]$, the positive effect dominates the negative effect. For $s \in (s_H^M, s^R]$, the positive effect disappears since π has already reached its upper boundary, whereas the negative effect is still prevalent due to the increasing $\tau^y(s)$ in this region. This results in a decreasing h.

To conclude, the intertemporal effect of ideology on τ^y under the endogenous political constituency turns out to be similar to that under the exogenous political constituency. Particularly, if we focus on the competitive political region $[s^1, s_H^M]$, there is a positive relationship between the distortionary tax rate and the right-wing ideology.

4.4. *The Role of the Young.* Now I move to the general case with $\omega > 0$. The equilibrium policy rules of τ^y, π, and h are plotted in Figure 3 when $\omega = 0.1$ (solid lines).[29] The dotted lines are those from the benchmark model with $\omega = 0$.

We know from Subsection 3.2 that $\omega > 0$ gives rise to the strategic and opportunistic effects, which work in the opposite directions in the left-wing regime. Specifically, the left wing would like to cut τ^y in a cynical way that contradicts their political color according to the strategic effect, whereas the opportunistic effect tends to drive τ^y up for reelection concerns. It can be seen from Figure 3 that in the left-wing region, the results associated with positive ω are quantitatively close to those in the benchmark model, suggesting that the strategic and opportunistic effects largely cancel each other out.

Recall from (19) that $\omega > 0$ also involves a partisan effect on τ^y, which leads to a fall of τ^y as the economy moves to the right-wing regime (see Figure 3). Moreover, the strategic and opportunistic effects work along the same direction in the right-wing regime, strengthening further the impact of ideology on τ^y through the intertemporal channel illustrated by the benchmark model. This can also be seen from Figure 3: The solid line in the right-wing regime is steeper than the dotted line.

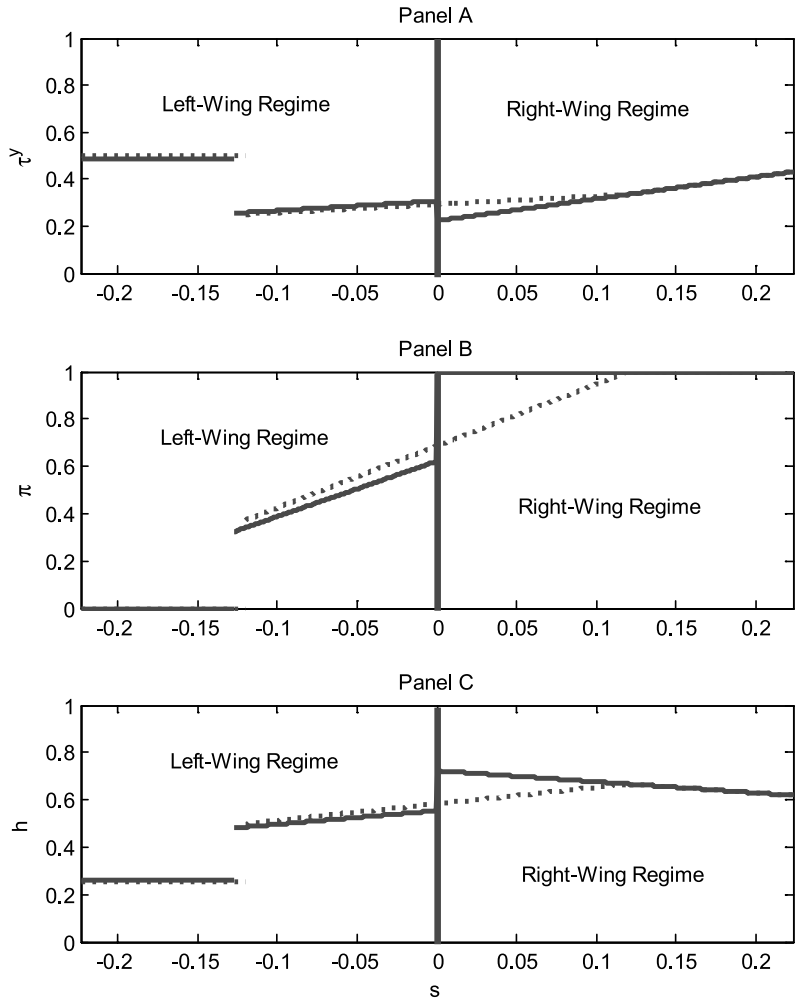
5. EMPIRICAL EVIDENCE

I have shown that the intertemporal effect of ideology leads to a positive correlation between ideology and τ^y within each political regime. It would be interesting to know whether the positive correlation holds in real-world democracies or is just a counterfactual result. However, there are two major difficulties in testing the prediction. The first one is how to measure ideology. A commonly used measure of ideology in political science literature is self-placement scores of the left right position from opinion polls or survey data (Inglehart, 1990). This approach obviously suffers from limited comparative observations across countries and time.[30] Second, it is equally hard to find an empirical counterpart of τ^y, though age-dependent taxation contains

[28] According to Proposition 1, $\mathrm{d}\tau^y(s)/\mathrm{d}s = \beta\rho/4z$ for $s \in [s^1, s_H^M]$ and $\mathrm{d}\tau^y(s)/\mathrm{d}s = 2\rho$ for $s \in (s_H^M, s^R]$. The latter is greater than the former since $z > \beta/4$.

[29] I set a low ω in order to facilitate the visual comparison with results from the benchmark model in Figure 1.

[30] Moreover, it has long been questioned whether all respondents have consistent views on the location of the "left" and "right" (e.g., Levitin and Miller, 1979).



NOTES: Solid and dotted lines stand for equilibrium results with ideology-dependent altruism and those in the benchmark case, respectively. The predetermined human capital $h_{-1} = 0.5$. Panel A represents the equilibrium policy rule. The probability for the right wing to be elected, $\pi(\tau^y(e, s), s)$, is plotted in Panel B. Panel C corresponds to the equilibrium investment rule $h(\tau^y(e, s), s)$. $\omega = 0.1$, and the other parameter values are held constant as in the benchmark case.

FIGURE 3

EQUILIBRIUM RESULTS WITH POSITIVE ω ($h_{-1} = 0.5$)

some realistic components. Given these concerns, I adopt an alternative approach: looking at vote shares and government size, for which data can easily be obtained. In the technical appendix, I show that the correlation between vote shares and government size is indeed close to that between s and τ^y.

5.1. *Data and Specification.* I use the Comparative Welfare States Data Set assembled by Huber et al. (1997) and updated by Brady et al. (2004). The sample consists of, at most, 41 years of observations (1960–2000) from 18 democracies, including Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Sweden, Switzerland, the United Kingdom, and the United States.[31]

[31] All the data used in this subsection are from the Comparative Welfare States Data Set, which is available at http://www.lisproject.org/publications/welfaredata/welfareaccess.htm.

Following Persson (2002) and Persson and Tabellini (2004), among many others, I use central government expenditure (or revenue) as a percentage of GDP, denoted by *CGEXP* (or *CGREV*), to measure the size of government. I use the percentage of vote for the right-wing parties (*RVOT*) as the empirical counterpart of the proportion of right-wingers in the model. A dummy variable, *R*, is created for controlling the partisan effect. I let $R = 1$ if both shares of seats of the right and center parties in parliament and government are larger than 66.6%. $R = 0$ otherwise. As will be seen later, such a supermajority of the right wing helps to empirically illustrate the partisan effect.[32] Of 738 observations, 201 are associated with $R = 1$. In words, about 27% governments in the sample are labeled as right wing.[33]

I estimate regressions in which policy outcomes Y_{it} are linear functions of *R* and *RVOT*:

$$Y_{it} = b_i^0 + b^1 R_{it} + b^2 RVOT_{it} + \phi X_t + \varepsilon_{it}, \tag{39}$$

where b_i^0 is a country-specific effect, and X_t is a set of year dummies to control for the unobserved common shocks. I also run this regression with some additional explanatory variables containing country-specific factors. Specifically, I use the log of real GDP per capita (*YPC*) to control the potential impact of Wagner's Law; i.e., the size of government will rise as income rises. Deviation of *YPC* from its trend (obtained by the HP filter), denoted by *YGAP*, is added, as government tends to implement countercyclical policies to smooth economic fluctuations. Other control variables include the unemployment rate (*UNEMPL*), export plus import share of GDP (*OPEN*), proportion of population over 65 (*POP*65*O*) and below 14 (*POP*14*U*), which are constantly adopted in recent empirical studies (e.g., Razin et al., 2002; Persson and Tabellini, 2005).[34] Finally, since the predetermined debt level may affect government revenues, I include the debt/GDP ratio as a control variable in the regression when using government revenues as the dependent variable.[35]

5.2. *Results*. Table 1 gives estimation results from fixed-effects regressions. I start with column 1, where the intertemporal effect of ideology is shut down by excluding *RVOT* in (39). This parallels the standard approach for testing the partisan effect. The baseline regression (column 1) shows that b^1 is negative, but statistically insignificant. When additional explanatory variables are included (column 2), $|b^1|$ increases from 0.82 to 1.05 and becomes significant at the 10% level. According to the point estimation, switching from a right-wing to a left-wing regime causes government expenditures to increase by about 1% of GDP. The magnitude of the partisan effect in OECD countries is roughly in line with previous findings.[36] Columns 3 and 4 display the same regressions on *CGREV*. There is a much stronger partisan effect for government revenue: The estimated $|b^0|$ amounts to 1.8 and is significant at the 1% level. This result is rather stable, irrespective of whether additional explanatory variables are included.

My main finding is in columns 5–8. The baseline regression (column 5) shows that b^2, the coefficient on *RVOT*, is positive and significant at the level of 1%. Including additional explanatory variables reduces the estimate of b^2 substantially (column 6). The statistical significance, however, is the same. The point estimation in column 6 implies that given the incumbent's political

[32] The partisan effect would be statistically insignificant if I use a simple majority as the criterion of setting the dummy variable *R*.

[33] A similar criterion is adopted by Woldendorp et al. (1993, 1998), where $R = 1$ is referred to as the "right-wing dominance" regime.

[34] The coefficient of the population share over 65 is positive and significant at 1% in all regressions reported below. This is consistent with the prediction of my model when interpreting political weights on the young as young population shares. See the technical appendix for details.

[35] There might be rich dynamic interactions between debt and public expenditure (see, e.g., Persson and Svensson, 1989). So I also use lagged debt/GDP ratios as instruments for the current debt/GDP ratio. The results are essentially the same. I thank a referee for raising these concerns.

[36] In Blais et al. (1993), such a shift from the right to the left will increase government spending by 0.7 percentage points. In Perotti and Kontopoulos (2002), the increase by a shift from a modest right government to a modest left government amounts to 1.6 percentage points in the steady state.

TABLE 1
OLS ESTIMATION OF THE DETERMINANTS OF GOVERNMENT SIZES

	CGEXP		CGREV		CGEXP		CGREV	
Dep. Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
R	−0.8150	−1.0462*	−1.8006***	−1.8270***	−1.4589	−1.2728**	−2.3819***	−2.2391***
	(−0.84)	(−1.65)	(−2.78)	(−3.10)	(−1.51)	(−1.96)	(−3.43)	(−3.50)
RVOT	–	–	–	–	0.1621***	0.0598***	0.2001***	0.1704***
					(6.69)	(2.62)	(8.72)	(7.03)
Control variables	No	Yes	No	Yes	No	Yes	No	Yes
Obs.	673	663	718	708	673	663	718	692
Adj. R^2	0.832	0.881	0.812	0.833	0.842	0.882	0.829	0.842

NOTES: Country dummies and year dummies are included to control for the fixed effects and time effects. Control variables are YPC (the log of real GDP per capita), YGAP (HP filtered YPC), openness, unemployment rate, and the sizes of population over 65 and below 14. I also include debt/GDP ratio as additional control variable when the dependent variable is CGREV (government revenue). Robust *t*-statistics are in parentheses. ***, **, and * are significant at 1%, 5%, and 10%, respectively.

identity, a one percentage point increase in the vote share for right parties will, on average, increase government expenditures by 0.06% of GDP. The intertemporal effect of ideology is more evident in columns 7 and 8, where I use central government revenue as an indicator of government size. A one percentage point increase in $RVOT$ will lead to a 0.17 percentage points increase in $CGREV$ when additional explanatory variables are added. These results provide statistical evidence in favor of the intertemporal effect of ideology.

The positive b^2 does not suggest that right-wing governments will be larger. In fact, controlling for political constituency reveals a quantitatively larger partisan effect. The estimate of b^1 that is significant in columns 1–4 remains significant in columns 5–8. This suggests that left-wing governments are indeed more favorable toward public spending. The coexistence of the two effects is essential for my theory, since the intertemporal effect cannot exist without the partisan effect.

My reduced-form empirical analysis relies on an important hypothesis that the fraction of right-wing voters helps to predict the identity of the next government.[37] According to the dummy variable LR, my data set has only 24 political regime shifts in 18 countries over the sample period from 1960 to 2000. The limited variation does not allow us to run a panel regression to test the hypothesis. I then use the total shares of seats of the right and center parties in parliament and government, $\overline{LR}$, as a proxy of the identity of the government. Note that, by construction, $\overline{LR}$ and LR are highly correlated: The correlation coefficient is equal to 0.84. I run the following regression:

$$\overline{LR}_{it} = a_i^0 + a^1 RVOT_{it-1} + \phi X_t + \varepsilon_{it},$$

where a_i^0 is a country-specific effect, $RVOT_{it-1}$ is the lagged vote share for the right-wing parties, and X_t is a set of year dummies to control for the unobserved common shocks. The estimated key coefficient, a^1, is equal to 0.199 and statistically significant at the level of 1%. The result is very robust to adding additional explanatory variables containing country-specific factors.

5.3. *Robustness*. A key issue is whether $RVOT$ is an appropriate proxy of political constituency. Party ideology, on which $RVOT$ is completely silent, is clearly an important dimension of ideology. My model adopts a two-party system for simplicity. However, real democracies have much more complex political systems. One country may have several left (right) parties with differing ideological positions. Taking this issue into consideration, I use the index developed by Kim and Fording (1998, 2003) as an alternative proxy of political constituency. The advantage of the index is that it reflects not only changes in voting, but also changes in

[37] I thank a referee for pointing out this concern.

TABLE 2
2SLS ESTIMATION OF THE DETERMINANTS OF GOVERNMENT SIZES

	CGEXP		CGREV	
Dep. Variable	(1)	(2)	(3)	(4)
R	−2.4844*	−2.3420**	−3.8392***	−3.8592***
	(−1.95)	(−2.13)	(−3.36)	(−3.45)
RVOT	0.1632***	0.0380	0.2156***	0.1761***
	(5.55)	(1.34)	(7.64)	(5.86)
Control variables	No	Yes	No	Yes
Obs.	657	648	700	677

NOTES: Country dummies and year dummies are included to control for the fixed effects and time effects. R and RVOT are identified as endogenous. The corresponding instruments are the same variables, but one-year lagged. Control variables are YPC (the log of real GDP per capita), YGAP (HP filtered YPC), openness, unemployment rate, and the sizes of population over 65 and below 14. I also include debt/GDP ratio as additional control variable when the dependent variable is CGREV (government revenue). *t*-statistics are in parentheses. ***, **, and * are significant at 1%, 5%, and 10%, respectively.

party ideology.[38] Using the Kim–Fording index does not qualitatively change to the results. The coefficients that are significant remain significant.[39]

My panel regressions contain 18 countries. It is important to check the sensitivity of the results to individual countries. To this end, I run all the regressions in Table 1, excluding one country at a time. In every regression, the coefficients that are significant at the 5% level are still significant at the same level no matter which country is excluded.

Some evidence shows that fiscal policies legislated in the United States typically take one year to be effective (Poterba, 1994; Gilligan and Matsusaka, 1995). It is not clear whether the same mechanism carries over to the sample of OECD countries. Be it as it may, I replace R_{it} in the regressions with one-year lagged variable R_{it-1}. The results change only marginally, and the statistical significance for the coefficients of interest is never affected.

Finally, I have not yet addressed that there might be omitted variables affecting political variables and fiscal outcomes simultaneously. Concerning this, I choose one-year lagged political variables R_{it-1} and $RVOT_{it-1}$ to instrument the current political variables R_{it} and $RVOT_{it}$. These lagged variables are highly correlated with the respective current values and are expected to be independent of current policy outcomes. Table 2 reports the results of reestimating (39) using Two-State-Least Squares (2SLS). First, note that the 2SLS estimates of b^1 are significant in all cases. There is some evidence for the endogeneity of R since a Hausman test rejects the null hypothesis in columns 3 and 4 at the level of 10%. Second, though the endogeneity leads to a significant underestimation of the partisan effect, the endogeneity of $RVOT$ is much less severe. Application of the Hausman test cannot reject the null hypothesis. The 2SLS estimate of b^2 becomes statistically insignificant in column 2, but remains highly significant in all other cases.

To conclude, I find a significantly positive relationship between government revenue and the right-wing vote share, after controlling for the partisan effect. The point estimate is quite stable to a number of control variables and specifications. The empirical finding is in line with my theoretical prediction, but hard to explain by the existing literature. An interesting remaining question is why the positive relationship is less evident for government expenditure. The less significant partisan effect for government expenditure might be an important reason. Moreover, recall that in the model, the intertemporal effect of ideology is driven mainly by the government's target of tax-revenue maximization. Therefore, as an indicator of tax policy, $CGREV$ is perhaps a better measure of γ for identifying the intertemporal effect of ideology.[40]

[38] Kim and Fording first estimate party ideology, based on party manifesto statements, and then use the percentage of the vote received by each party to construct an adjusted index for the median ideological position.

[39] The results are available upon request.

[40] Although government expenditures and revenues usually move in tandem, imbalances between expenditures and revenues occur occasionally since governments may run deficits, which is totally assumed away in the theory.

6. CONCLUSION

In spite of the growing literature on public policy decision making in dynamic politico-economic equilibria, most works are silent on the role of ideological shifts, which tend to be persistent and have a nontrivial influence on political outcomes. To explore the underlying mechanism of policy decision making under stochastic ideological movements, I develop a tractable model to investigate the dynamic interactions among public policy, individuals' intertemporal choice, and the evolution of political constituency. My main finding is that the relationship between right-wing ideology and the size of government is positive within each political regime. This distinguishes the literature of partisan politics predicting that ideology has no effect on public policies if the political regime remains unchanged. I document empirical evidence from an OECD panel that supports my theory.

My analysis is subject to a number of caveats. For instance, my theory is completely silent on the determination of public policies under coalition government. Moreover, I abstract away public debt. When a government is allowed to borrow, however, public choices may appear to be strategic. In a related work, Song et al. (2007) analyze the determination of public debt in a stochastic ideological environment. In that model, however, private choices are irrelevant for the evolution of political constituency. It will be interesting in future research to incorporate public debt in the current setup, to see how public intertemporal trade-off interacts with private intertemporal choices.

APPENDIX

A.1. *Proof of Lemma 1.* Apply the Schauder fixed-point theorem. Let C be a set of bounded and uniformly continuous functions mapping from $[0,1]\times X$ to $[0,1]$. Define $F=\int_{s'\geq \frac{\tau^y-\beta\alpha(\tau^y,S)}{2}} f(s'|s)ds'$, where $\alpha(\tau^y,s)\in C$. I need to prove that the mapping F has a fixed point.

Let $\Omega=\{F(\alpha),\alpha\in C\}$. I first claim that Ω is equicontinuous; i.e., $F(\alpha)$ is bounded and uniformly continuous for any $\alpha\in C$. The boundedness is trivial since $F(\alpha)(\tau^y,s)\leq\int f(s'|s)ds'=1$. To prove that $F(\alpha)$ is uniformly continuous, I pick up any two vectors $x=(\tau_1^y,s_1)$ and $y=(\tau_2^y,s_2)$ from $[0,1]\times X$. It is straightforward to show that

$$
\begin{aligned}
&\left|F(\alpha)\left(\tau_1^y,s_1\right)-F(\alpha)\left(\tau_2^y,s_2\right)\right| \\
&=\left|\int_{s'\geq}\frac{\tau_1^y-\beta\alpha\left(\tau_1^y,s_1\right)}{2}f(s'\mid s)\,ds'-\int_{s'\geq}\frac{\tau_2^y-\beta\alpha\left(\tau_2^y,s_2\right)}{2}f(s'\mid s)\,ds'\right| \\
&\leq\left|\int_{s'\geq}\frac{\tau_1^y-\beta\alpha\left(\tau_1^y,s_1\right)}{2}f(s'\mid s)\,ds'-\int_{s'\geq}\frac{\tau_2^y-\beta\alpha\left(\tau_2^y,s_2\right)}{2}f(s'\mid s)\,ds'\right| \\
&\quad+\left|\int_{s'\geq}\frac{\tau_2^y-\beta\alpha\left(\tau_2^y,s_2\right)}{2}f(s'\mid s)\,ds'-\int_{s'\geq}\frac{\tau_2^y-\beta\alpha\left(\tau_2^y,S_2\right)}{2}f(s'\mid s)\,ds'\right| \\
&\leq\left|\frac{\tau_1^y-\tau_2^y-\beta\left(\alpha\left(\tau_1^y,s_1\right)-\alpha\left(\tau_2^y,s_2\right)\right)}{2}\right|\left\|f(s'\mid s)\right\|_{\sup} \\
&\quad+\left|\sup s'-\frac{\tau_2^y-\beta\alpha\left(\tau_2^y,s_2\right)}{2}\right|\left\|f(s'\mid s)-f(s'\mid s)\right\|_{\sup}.
\end{aligned}
$$

As $\|x-y\|\to 0$, we have $\left|\left(\tau_1^y-\tau_2^y-\beta\left(\alpha\left(\tau_1^y,s_1\right)-\alpha\left(\tau_2^y,s_2\right)\right)\right)/2\right|\left\|f(s'|s)\right\|_{\sup}\to 0$ by the uniform continuity of α and $\left\|f(s'|s)\right\|_{\sup}<\infty$ (A2). Moreover, from A1 and the boundedness of

α, it immediately follows that $\left|\sup s' - \frac{\tau_2^y - \beta\alpha\left(\tau_2^y, s_2\right)}{2}\right| < \infty$. By A2, $\left\|f\left(s'|s\right) - f\left(s'|s\right)\right\|_{\sup} \to 0$ as $\|x - y\| \to 0$. Therefore, we have $\left|F\left(\alpha\right)(x) - F\left(\alpha\right)(y)\right| \to 0$ as $\|x - y\| \to 0$.

Next, I check the conditions of the Schauder fixed-point theorem (Theorem 17.4, Stokey and Lucas, 1989). Ω has been to proved equicontinuous. And it is easily shown that C is nonempty, closed, and convex, and F is continuous. Thus, all conditions are satisfied. ■

A.2. *Proof of Lemma 2.* I only need to prove that, given any (τ^y, s), the following equation has a unique solution:

$$x = G(x) \equiv \int_{s' \geq \frac{\tau^y - \beta x}{2}} f\left(s'|s\right) ds'. \tag{A.1}$$

A3 implies that $\mathrm{d}G(x)/\mathrm{d}x = \beta f\left(s'|s\right)/2 < 1$. The proof is complete by applying the contraction mapping theorem. ■

A.3. *Proof of Proposition 1.* The proof is based on the following lemma:

LEMMA 3. *Assume that (30) and $z > \beta/4$.*

(i) *If $z \geq \hat{z}$,*

$$\tau^y(s) = \begin{cases} \dfrac{1}{2} & \text{if } s \leq s^1 \\ \phi(s) & \text{if } s \in \left[s^1, s_H^M\right] \\ \lambda^-(s) & \text{if } s \in \left(s_H^M, s^R\right] \\ \dfrac{1+\beta}{2} & \text{if } s > s^R \end{cases}. \tag{A.2}$$

(ii) *If $z < \hat{z}$,*

$$\tau^y(s) = \begin{cases} \dfrac{1}{2} & \text{if } s \leq s^2 \\ \lambda^-(s) & \text{if } s \in \left[s^2, s^R\right] \\ \dfrac{1+\beta}{2} & \text{if } s > s^R \end{cases}, \tag{A.3}$$

where

$$\hat{z} \equiv \frac{\beta}{8\left(-\left(\beta^2 + 2\beta\right) + (1+\beta)\sqrt{\beta^2 + 2\beta}\right)},$$

$$s^1 \equiv \frac{\sqrt{z(4z-\beta)} - (4z-\beta)/2 - \beta z}{\beta\rho},$$

$$s^2 \equiv \frac{1 - \beta - \sqrt{\beta^2 + 2\beta} + 4z}{4\rho},$$

$$s_H^M \equiv \frac{16z^2 - 6\beta z + 4z - \beta}{\rho(16z - 2\beta)},$$

$$s^R \equiv \frac{(1-\beta)/4 + z}{\rho}.$$

A.3.1. *Proof of Lemma 3.* The solution of maximizing (35) is straightforward under two polarized cases, i.e., $s \geq ((1-\beta)/2+z)/\rho$ and $s \leq -z/\rho$. Thus, I need only to focus on $s \in (-z/\rho, ((1-\beta)/2+z)/\rho)$.

For notational convenience, I define

$$L(s) = \max_{\tau^y \in (\lambda^+(s),1]} T^L(\tau^y, s) \qquad \tau^L(s) = \operatorname*{argmax}_{\tau^y \in (\lambda^+(s),1]} T^L(\tau^y, s)$$

$$M(s) = \max_{\tau^y \in (\lambda^-(s),\lambda^+(s))} T^M(\tau^y, s) \quad \tau^M(s) = \operatorname*{argmax}_{\tau^y \in (\lambda^-(s),\lambda^+(s))} T^M(\tau^y, s)$$

$$R(s) = \max_{\tau^y \in [0,\lambda^-(s)]} T^R(\tau^y, s) \qquad \tau^R(s) = \operatorname*{argmax}_{\tau^y \in [0,\lambda^-(s)]} T^R(\tau^y, s).$$

It is also convenient to classify the regions where interior solutions hold.

$$\tau^L(s) = \begin{cases} \frac{1}{2} & \text{if } s \leq s^L \\ \lambda^+(s) & \text{if } s > s^L \end{cases}, \tag{A.4}$$

$$\tau^M(s) = \begin{cases} \phi(s) & \text{if } s \in \left[s_L^M, s_H^M\right] \\ \lambda^-(s) & \text{if } s > s_H^M \\ \lambda^+(s) & \text{if } s < s_L^M \end{cases}, \tag{A.5}$$

$$\tau^R(s) = \begin{cases} \frac{1+\beta}{2} & \text{if } s \geq s^R \\ \lambda^-(s) & \text{if } s < s^R \end{cases}, \tag{A.6}$$

where

$$s^L \equiv \frac{1/4 - z}{\rho},$$

$$s_L^M \equiv \frac{-16z^2 + 2\beta z + 4z - \beta}{\rho(16z - 2\beta)},$$

and

$$s^R > s_H^M > s_L^M, \tag{A.7}$$

$$s^R > s^L > s_L^M. \tag{A.8}$$

I proceed by classifying the following six cases (see Table A.1), according to the conditions

TABLE A.1
SIX CASES

Case 1: if	Case 2: if	Case 3: if	Case 4: if	Case 5: if	Case 6: if
$s \leq s^L$ and $s \in \left[s_L^M, s_H^M\right]$	$s \leq s^L$ and $s > s_H^M$	$s \leq s^L$ and $s < s_L^M$	$s > s^L$ and $s \in \left[s_L^M, s_H^M\right]$	$s > s^L$ and $s > s_H^M$	$s > s^L$ and $s < s_L^M$

in (A.4) and (A.5). Some results are immediate. By (A.8), the sixth case is empty. In Cases 1–3, $s \leq s^L$. So, $\tau^L(s) = 1/2$. In Cases 4 and 5, $\tau^L(s) = \lambda^+(s)$. The continuity of $T(s)$ implies that $M(s) \geq L(s)$. So we are left to compare $M(s)$ and $R(s)$ in Cases 4 and 5.

Now let us consider the five cases in order. In the first case, $\tau^M(s) = \phi(s)$. Moreover, (A.7) and (A.6) give that $s < s^R$ and $\tau^R(s) = \lambda^-(s)$. The continuity of $T(s)$ implies that $M(s) > R(s)$. So, I only need to compare $L(s)$ and $M(s)$. It immediately follows that $\tau^y(s) = 1/2$ if $s \leq s^1$ and $\tau^y(s) = \phi(s)$ if $s \geq s^1$, where s^1 solves

$$T^M(\phi(s^1), s^1) = T^L(1/2, s^1).$$

This yields

$$s^1 = \frac{\sqrt{z(4z-\beta)} - (4z-\beta)/2 - \beta z}{\beta\rho}. \tag{A.9}$$

The other root is omitted since $s^1 > -z/\rho$. It is easy to see that

$$s^1 < s^L. \tag{A.10}$$

Moreover, by the assumption that $4z > \beta$, one can show that

$$s^1 > -\frac{z}{\rho} + \frac{\beta}{4\rho} > s_L^M. \tag{A.11}$$

(A.10) and (A.11) will be used in obtaining (A.14).

Turn to the second case, where $\tau^M(s) = \lambda^-(s)$. Since $s^L < s^R$, $\tau^R(s) = \lambda^-(s)$ and $M(s) = R(s)$. So, we have that $\tau^y(s) = 1/2$ if $s \leq s^2$ and $\tau^y(s) = \lambda^-(s)$ if $s \geq s^2$, where s^2 solves

$$T^R(\lambda^-(s^2), s^2) = T^L(1/2, s^2).$$

This yields

$$s^2 = \frac{1 - \beta - \sqrt{\beta^2 + 2\beta} + 4z}{4\rho}. \tag{A.12}$$

Since $L(s^1) > R(s^1)$, $L(s^1) = L(s^2)$ and $R(s)$ is increasing in s, $R(s^2) = L(s^2)$ implies that

$$s^2 \geq s^1. \tag{A.13}$$

Similarly, since $s_L^M < s^R$, $\tau^R(s) = \tau^M(s) = \lambda^-(s)$, and $M(s) = R(s)$ in the third case. So $\tau^y(s)$ follows the same rule as in the second case.

In the fourth case, $\tau^M(s) = \phi(s)$. Moreover, (A.7) and (A.6) establish that $s < s^R$ and $\tau^R(s) = \lambda^-(s)$. Hence, $M(s) > R(s)$ and $\tau^y(s) = \phi(s)$.

Finally, the fifth case gives that $\tau^M(s) = \lambda^-(s)$. If $s \leq s^R$, $\tau^R(s)$ is also equal to $\lambda^-(s)$ and $R(s) = M(s)$. On the other hand, if $s > s^R$, $\tau^R(s) = (1+\beta)/2$, $R(s) > M(s)$. So, $\tau^y(s) = \lambda^-(s)$ if $s \leq s^R$ and $\tau^y(s) = (1+\beta)/2$ otherwise.

To conclude, we have

$$\tau^y = \begin{cases} \frac{1}{2} & \text{if } s \in \left([\underline{s}, s^L] \cap [\underline{s}, s^1]\right) \cup \left([\underline{s}, \min\{s^L, s^2\}] \cap \left(s_H^M, \bar{s}\right]\right) \\ & \cup \left([\underline{s}, \min\{s^L, s^2\}] \cap \left[\underline{s}, s_L^M\right)\right) \\ \phi(s) & \text{if } s \in \left([\underline{s}, s^L] \cap [s^1, \bar{s}] \cap \left[s_L^M, s_H^M\right]\right) \cup \left((s^L, \bar{s}] \cap \left[s_L^M, s_H^M\right]\right) \\ \lambda^-(s) & \text{if } s \in \left(\left[s^2, \bar{s}\right] \cap \left[\underline{s}, s^L\right] \cap \left(s_H^M, \bar{s}\right]\right) \cup \left(\left[s^2, \bar{s}\right] \cap \left[\underline{s}, s^L\right] \cap \left[\underline{s}, s_L^M\right)\right) \\ & \cup \left([\underline{s}, s^R] \cap (s^L, \bar{s}] \cap \left(s_H^M, \bar{s}\right]\right) \\ \frac{1+\beta}{2} & \text{if } s \in (s^L, \bar{s}] \cap (s^R, \bar{s}] \cap \left(s_H^M, \bar{s}\right] \end{cases} \tag{A.14}$$

The first line on the RHS of (A.14) comes from the results in Cases 1, 2, and 3. The second line follows the results in Cases 1 and 4. Cases 2, 3, and 5 give the third line, and the last line collects the result from Case 5.

To simplify (A.14), now I need to further classify two cases: $s_H^M < s^1$ and $s_H^M \geq s^1$. $s_H^M < s^1$ is equivalent to

$$2 - \frac{1}{4}\beta/z > (1+\beta)\sqrt{(4 - \beta/z)}$$

after some algebra. It follows that $s_H^M < s^1$ if and only if

$$z < \hat{z}.$$

When $z < \hat{z}$, (A.13) establishes that $s_H^M < s^1 \leq s^2$. Moreover, when $z < \hat{z}$, one can show that $s^L > s^2$ must hold. Together with (A.7), (A.8), (A.10), (A.11), and (A.13), (A.14) can be reduced to (A.3). Finally, since $-\left(\beta^2 + 2\beta\right) + (1+\beta)\sqrt{\beta^2 + 2\beta} < 1/2$ always holds, $z \in (\beta/4, \hat{z})$ is not an empty set. Similarly, when $z \geq \hat{z}$, (A.13) establishes that $s_H^M \geq s^2 \geq s^1$. Then, (A.14) can be written as (A.2). ■

A.4. *Calibration.* I first use the panel for OECD countries in Subsection 5.1 and run the following regression to estimate the persistence of *RVOT* (the percentage of vote for the right-wing parties):

$$RVOT_{it} = \rho_i^0 + \rho^1 RVOT_{it-1} + \varepsilon_{it},$$

where ρ_i^0 is a country-specific effect. The estimated ρ^1 equals 0.927.[41] I then calibrate ρ to the estimated ρ^1. Assume that one period in my model contains 10 years. Hence, $\rho = 0.927^{10} = 0.469$. Moreover, the standard deviation of estimated ε_{it} from the above regression is 2.67%, implying a standard deviation of 6.14% over 10 years. Since I use ε as a proxy for ideological shocks, I target the "competitive political region" to the 95% confidence interval of ε, which is $[-0.1203, 0.1203]$. More precisely, I let $s^1 = -12.03\%$ and $s_H^M = 12.03\%$. This pins down two other parameters: $z = 0.2233$ and $\beta = 0.6689$. Note that the calibration implies a symmetric competitive political region around $s = 0$.

[41] I estimate the regression using a Least Square Dummy Variable (LSDV) estimator. For sample sizes of $T \geq 30$ and $N = 20$, the bias is small and the LSDV estimator generally performs better than the Arellano–Bond estimator or the Anderson–Hsiao estimator.

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