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Time horizons matter: the hazard rate of coalition governments and the size of government

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Abstract This study examines how coalition governments affect the size of government, measured by total central government expenditure as a share of GDP. Existing studies suggest that the presence of multiple political parties within ruling coalitions generate common pool resource problems or bargaining inefficiencies which, in turn, leads to more government spending when coalition governments are in office. We demonstrate that coalition governments have shorter time horizons than single party governments and use that finding to motivate a simple formal model. The model shows that coalition governments have greater incentives to increase government spending because of a lower discount factor in office. Results from empirical models estimated on a global sample of 111 democracies between 1975 and 2007 provide strong statistical support for the aforementioned theoretical prediction. The empirical results remain robust when we control for alternative explanations, employ different estimation techniques, and use different measures of government spending.

Keywords Political Economy (P48) · Government Expenditure (H50) · Econometric and Statistical Methods (C1)

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1 Introduction

Research on the determinants of the size of government, measured by total central government expenditure as a share of GDP, has grown substantially in the last two decades. Numerous economists, for example, have focused on how the degree of trade openness affects government spending (Rodrik 1997; Shelton 2007). Some economists have also recognized that the political time horizons of incumbent governments may influence fiscal policy, but have not carefully tested this claim (Roubini and Sachs 1989; Velasco 1999). Early work by political scientists, in contrast, primarily focused on the impact of government partisanship on government expenditure (Garrett and Lange 1991; Hicks and Swank 1992). Building on this, some scholars not only suggest that government spending in countries with a proportional representation (PR) system is higher than those with a majoritarian system[1] but also claim that the size of government in parliamentary democracies is greater than presidential democracies.[2]

More recent studies, however, focus on the distinction between coalition and single party governments and argue that the former will spend more than the latter. Three claims have been advanced to explain why coalition governments have been less fiscally responsible. First Bawn and Rosenbluth (2006), suggest that the presence of multiple parties in coalition governments generate common pool resource problems that encourage parties in governing coalitions to increase government spending. Other scholars conjecture that multiple parties within ruling coalitions imply a greater number of veto players in coalition governments, which in turn leads to higher deficits, public debt or government spending (Hallerberg and von Hagen 1999; Franzese 2004; Tsebellis and Chang 2005). Finally, some argue that the partisan fractionalization produced by multiparty government fosters higher spending (Kontopolous and Perotti 1999; Franzese 2002).

We focus on the impact of coalition governments on government spending, but offer a rival argument compared to extant explanations. Specifically, we suggest that the short duration and short time horizon of coalition governments in office give incentives to leaders of governing coalitions to increase government expenditure. Data on central government expenditure as a percentage of GDP and the duration of governments in office from a full global sample of 111 democracies (1975–2007) listed in Table 1–which includes 24 OECD and 87 non-OECD (developing country) democracies—bear this out: coalition governments both have shorter durations in office *and* spend more than single party governments. In particular, Panel A in Table 2 indicates that the mean level of central government expenditure as a percent of GDP under coalition governments is substantially and significantly, in the statistical sense, higher than government expenditure under single party governments in the global, OECD and non-OECD sample. This is further confirmed by the left-hand side of the illustration in Fig. 1. Figure 1 and Table 2 also indicate that the average length of time that coalition governments survive in office is 23 months, which is substantially and statistically lower than single party governments which, on average, survive in office for 36 months.

[1] See, for e.g., Persson and Tabellini (2003), Milesi-Ferretti et al. (2002), Tavits (2004).

[2] Persson et al. (1997, 2005).

Table 1 List of democracies

Country	Years	Country	Years	Country	Years
Albania	1992–2004	Grenada	1975–2007	Pakistan	1976, 1988–98
Antigua	1981–2007	Guatemala	1975–2007	Panama	1989–2007
Argentina	1983–2007	Guinea Bissau	2000–02, 2005–07	Papua New Guinea	1975–2007
Australia	1975–2007	Haiti	1994–2002	Peru	1980–89, 2001–07
Austria	1975–2007	Honduras	1982–2007	Philippines	1986–2007
Armenia	1991–2007	Hungary	1990–2007	Poland	1989–2007
Bahamas	1975–2007	Iceland	1975–2007	Portugal	1976–2007
Barbados	1975–2007	India	1975–2007	Romania	1990–2007
Belgium	1975–2007	Indonesia	1999–2007	Russia	1992–2007
Benin	1991–2007	Ireland	1975–2007	Solomon Is.	1978–2007
Bolivia	1979, 1982–2007	Israel	1975–2007	Sri Lanka	1976, 1989–07
Brazil	1979–07	Italy	1975–2007	St. Kitts	1983–2007
Belize	1981–2007	Jamaica	1975–2007	St. Lucia	1980–2007
Bulgaria	1990–2007	Japan	1975–2007	St Vincent	1979–2007
Burundi	1993–95, 2005–07	Kenya	1998–2007	Sao Tome P.	1991–2007
Canada	1975–2007	Kiribati	1979–2007	Sierra Leone	1996–99, 2000–07
Cape Verde	1991–2007	S. Korea	1988–2007	Slovakia	1993–2007
Central Africa	1993–2002	Lesotho	1993–2007	Slovenia	1991–2007
Chile	1990–2007	Latvia	1991–2007	South Africa	1994–2007
Colombia	1975–2007	Lithuania	1991–2007	Spain	1977–2007
Comoros	1990–94, 2004–07	Luxembourg	1975–2007	Sudan	1986–1988
Congo	1992–1996	Macedonia	1991–2007	Suriname	1975–2007
Costa Rica	1975–2007	Madagascar	1993–2007	Sweden	1975–2007
Cote d'Ivoire	2000–2002	Malawi	1994–2007	Switzerland	1975–2007
Croatia	1991–2007	Mali	2002–2007	Thailand	1983–2007
Cyprus	1983–2007	Malta	1975–2007	Trinidad & T.	1975–2007
Czech Rep.	1990–2007	Mauritius	1975–2007	Turkey	1979, 1983–07
Denmark	1975–2007	Mexico	2000–2007	Uganda	1980–1984
Dominica	1978–2007	Mongolia	1992–2007	Ukraine	1991–2007
Dominican . Rep	1975–2007	Moldova	1996–2007	U. Kingdom	1975–2007
Ecuador	1979–2007	Namibia	1990–2007	United States	1975–2007
El Salvador	1984–2007	Nepal	1991–2001	Uruguay	1975–2007
Estonia	1991–2007	Netherlands	1975–2007	Vanuatu	1980–2007
Finland	1975–2007	New Zealand	1975–2007	Venezuela	1975–2007
France	1975–2007	Nicaragua	1984–2007	Zambia	1991–2007
Germany	1975–2007	Niger	1993–2007		
Ghana	1979–80, 1993–07	Nigeria	1979–82, 1999–07		
Greece	1975–2007	Norway	1975–2007		

The years listed for each country indicates the years in which country is observed as a democracy according to the Przeworski et al. (2000) criteria for democratic regimes

Table 2 Government spending and duration of governments in office

	Full global sample	OECD	Non-OECD
Panel A: Mean central government expenditure (percent GDP)			
Coalition government	29.41%	24.8%	33.78%
Single-party government	15.22%	12.56%	18.35%
Difference-of-means (p-value)	14.19% ($p=0.00$)	12.24% ($p=0.00$)	15.43% ($p=0.00$)
Panel B: Mean duration in office in months			
Coalition government	23	29	20
Single-party government	36	40	34
Difference-of-means (p-value)	13 ($p=0.00$)	11 ($p=0.00$)	14 ($p=0.00$)
Panel C: Mean hazard rate in office			
Coalition government	0.60	0.53	0.65
Single-party government	0.41	0.37	0.45
Difference-of-means (p-value)	0.19 ($p=0.00$)	0.16 ($p=0.00$)	0.20 ($p=0.00$)

The mean hazard rate in office for coalition (single party) governments in office is the mean of the predicted probability of failure across coalition (single party) governments in the respective sample. As described in the text, estimation of discrete time hazard models provides the predicted probability of failure (Eq. 5 in text) for each coalition and single-party government in the sample. This variable is bounded between 0 and 1. *Central government expenditure* is equal to total central government expenditure as a percent of GDP; this is drawn from the IMF (2008) GFS and World Bank (2008a,b) WDI CD-Roms

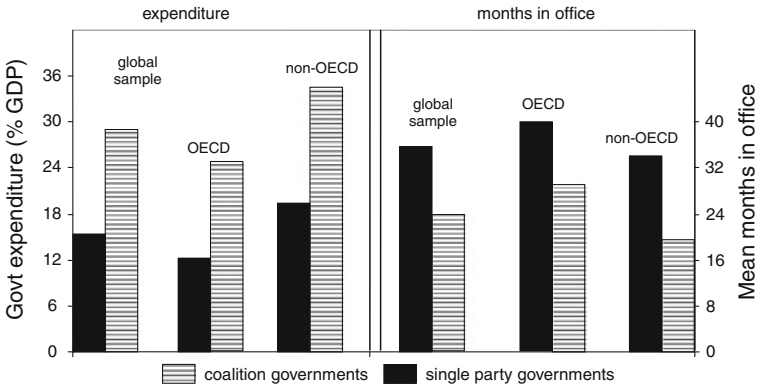

Fig. 1 Months in office and average total central government expenditure

Is it possible that the relatively shorter duration and thus short time horizons of coalition governments in office encourage policy-makers in ruling coalitions to increase government spending? Anecdotal evidence suggests that the short time horizons of coalition governments may indeed encourage them to increase government expenditure. For example, before the November 1986 election in Austria, the European edition of *The Guardian* (Frankfurt) reported that since ministers in the SPO (Socialist Party)-FPO (Freedom Party) coalition led by Sinowatz believed that their electoral prospects were poor and thus did not expect the coalition to retain office after the election, they dramatically increased government spending on welfare benefits in a last-minute bid

to appease voters and improve their electoral fortunes.[3] Similarly, the *Times Of India* reported in 1997 that ministers in the multiparty coalition headed by Prime Minister Gujral were taking bribes to "fill their pockets" and wastefully spending government revenue on populist policies targeted at the urban poor since the ministers expected that the "coalition would not survive in office for more than 8 months".[4]

The anecdotal evidence described above and the descriptive statistical results in Table 2 from our global sample motivate our exploration of the impact of coalition governments on government spending. Two additional reasons further motivate our research. First, our data reveals that the frequency of coalition governments has increased over space and time. For instance, coalition governments comprised 33% of all democratic governments between 1975 and 1990, but 59% of all governments between 1990 and 2007. Across space, we find that 45% of all coalition governments in our sample occurred in parliamentary democracies, 32% in presidential democracies and 23% in mixed democracies. Further, 44% of coalition governments occurred in PR democracies and 35% in majoritarian systems, thus suggesting that coalition governments are not unique to PR countries. Since the incidence of coalition governments has progressively become the norm rather than the exception across time, we believe that studying the impact of ruling coalitions on public spending will give us a better picture of the global trends and variation in the size of government across democracies.

Second, we wish to provide a more accurate and generalizable causal theory to explain why government spending is higher under coalition governments. In particular, unlike existing studies which suggest, for example, that common pool resource problems within coalition governments encourages leaders of such governments to spend more, we present a simple model that provides a different causal mechanism. Based on estimates from hazard models described below, which show that the hazard rate (the survival rate) of coalition governments in office is statistically higher (lower) than single party governments, we assume in our model that coalition governments have relatively short time horizons. Our model shows that short time horizons in office not only induces rent-seeking by parties in the coalition government but also encourages them to increase government expenditure and direct the benefits of higher spending to constituents in order to maximize their vote share as well as maintain their bargaining leverage in the legislature.

Moreover, because of short time horizons in office, coalition governments do not internalize the future costs of higher spending and believe that they can pass the burden of reducing high government expenditure to the future. In short, our model predicts that the short time horizons of coalition governments in office leads to higher government spending precisely because it induces parties in the coalition to (i) engage in rent seeking, (ii) appease constituents with more government money and (iii) shift the burden of higher expenditure to the future. We test the main prediction from our model—that coalition governments spend more because of short time horizons in office—on a pooled sample of 111 democracies observed between 1975 and 2007. The empirical

[3] Matt Engel, "More Public Spending: Cheap Populism?" *The Guardian* (Frankfurt), 5th October 1986, p. 3.

[4] Bharat Raman, "Ministers in Shaky Coalition Misuse Office," *The Times of India*, 14th June 1997, pp. 6.

results corroborate our prediction and remain robust when we control for alternative explanations (such as trade openness, majoritarian and PR systems, parliamentary democracies), employ different estimation techniques, and use different measures of government spending.

The paper proceeds as follows. In the next section, we first briefly show empirically that coalition governments have shorter time horizons in office than single party governments. Having established that fact we develop a model that assumes that coalition governments have short time horizons and produces the implication that short time horizons encourage leaders of coalition governments to increase government spending. In sections three and four we describe our data, variables and the results from the empirical models. We briefly discuss the main implications of this study in the conclusion.

2 The model: laying the groundwork

We present a simple model to study how the political discount factor of chief executives of coalition governments, which is determined by their hazard rate in office, affects government spending. We assume in our model that the discount factor of leaders of coalition governments in office, in other words their time-horizons in office, is lower compared to single party governments. This assumption rests on two uncontroversial empirical findings. First, the empirical literature on government termination shows that coalition governments have a higher hazard rate and survive in office for a shorter period of time relative to single party governments. This holds for coalition governments in OECD democracies (Woldendorp et al. 2000), and also as shown below in non-OECD democracies.

Second, we examined the duration of government, measured as the number of months that each government survived in office, for 111 democracies (24 OECD and 87 non-OECD democracies) in the 1975–2007 period. We find in the global sample that the mean duration of *coalition governments*—a dummy variable coded as 1 if the incumbent government consists of more than one party—in office is 13 months lower than the average length of time that *single party governments* survived in office (see panel B, Table 2). Table 2 also shows that the mean duration of coalition governments in office is (i) 11 months lower than the mean duration of single party governments in OECD democracies and (ii) 14 months lower than the mean survival time of single party governments in office across non-OECD democracies.

The difference in the means reported above for each sample is also statistically significant. Hence, coalition governments survive in office for a significantly shorter time than single party governments in our sample. Additionally, as reported in panel C of Table 2, results from discrete time hazard models show that the mean hazard rate of coalition governments is statistically higher than the mean hazard rate of single party governments in the global, OECD and non-OECD sample. Because a higher hazard rate implies shorter time horizons in office, the results in Table 2 empirically support our model's assumption that coalition governments have a relatively low time horizons in office.

The model is a dynamic incomplete information game with voters—who have a distribution of preferences over government spending—and the government. The government is either coalition or single party, and though we model both types of

governments, due to space constraints we focus our explication of the model in the text on the more substantively interesting case of coalition governments, while describing the single party government's maximization problem in a footnote. Since coalition governments are comprised of multiple parties, we include three parties—left, median, and right—in the model and assume that the ruling coalition consists of at least two of these three parties. Our objective is to model the impact of the discount factor of the coalition government in office on government spending, so it is natural to specify a game between a multiparty incumbent coalition and voters where the coalition government selects a level of expenditure, which is influenced by their expectations about the voters' decision at the polls and their desire to extract rent. We describe this game more formally below.

2.1 Voters and parties utility functions

The polity consists of an odd finite number of voters $j = 1, 2, 3 \ldots N$. Some voters prefer that the government implements high levels of spending while other voters prefer lower levels of government spending. Similar to the notation used by Tabellini and Alesina (1990, 39), we conceptualize this heterogeneity in each voter's preference over government spending as his or her "type" labeled as α (certain types of voters prefer higher spending while other types prefer lower spending).[5] Each voter prefers a unique ideal level of government spending, $g_t^{\alpha} \in [0, 1]$ where the subscript t denotes time. For analytic convenience, we label the highest spending level that voters prefer in the [0,1] interval as $\bar{g}$ and the lowest preferred spending level as $\underline{g}$. The objective function of type α voter is $\sum_{t=0}^{\infty} \delta(u_t^j, \alpha_t)$, where the per-period utility for voters is

$$(u_t^j, \alpha_t) = -\left(g_t - g_t^{\alpha}\right)^2 + \pi_t \tag{1}$$

In Eq. (1), which is quasi-linear, $g_t \in [0, 1]$ is the level of spending implemented by the government at t and π_t is each voter's individual non-policy characteristics (for e.g., class or partisan identification). Since spending preferences among voters vary according to their type, we define F_{α}^j as the distribution of spending preference types among j voters and assume that F_{α}^j is normally distributed, $F_{\alpha}^j \sim N(0, \sigma_{g_t}^2)$. We turn to describe the utility function of the political parties below.

With respect to the political parties in the model, first observe that our objective is to study how the discount factor of the incumbent coalition government *in office* affects spending. Hence we do not explicitly model the process of coalition government formation.[6] Rather, we assume without loss of generality that the coalition government

[5] In Tabellini and Alesina (1990) model, voters have heterogeneous preferences with respect to consumption of two public goods. They formalize this heterogeneity in their model by assuming that individual preferences (which vary) are indexed by the parameter α^i (Tabellini and Alesina 1990, 39).

[6] Modeling coalition government formation significantly increases the length and complexity of the model without providing additional insights. Further, our objective is not to study how uncertainty during government formation affects spending, but rather how the discount factor of a ruling coalition *in office* influences spending.

comprises of at least two of the three parties mentioned below.[7] More specifically, we assume that there are three political parties in the model, $i \in I = \{L, M, R\}$ where I is the set of parties. L stands for left-wing party, M denotes median party and R indicates the right-wing party. At each time period t, the three parties have a certain position on government spending, $g_t^i \in [0, 1]$. We assume that $g_t^L > g_t^M > g_t^R$. That is, following existing findings on government partisanship and public spending (for e.g., Garrett and Lange 1991), the left-wing party in our model prefers higher spending than the median party which, in turn, prefers higher spending than the right-wing party.

The objectives of the incumbent coalition government are to choose a certain level of government spending and appropriate rent. The degree of rent extracted by each party in the coalition may differ since some parties may be more corrupt and thus appropriate greater rent in office than other parties in the coalition. Because each party's preference for extracting rent is private information (known only to the party but not to voters), we define each party's type with respect to its preference for appropriating rent as λ^L, λ^M and λ^R, where $\lambda^i \sim U[0, 1]$. The profile of party types is $\boldsymbol{\lambda}^{\mathbf{i}} = (\lambda^L, \lambda^M, \lambda^R)$. In office, each party in the coalition government derives utility at each t from the spending policy and the rent it extracts. The *per-period* utility of type-λ party i in the coalition government, which is quasi-linear, is

$$v_t^i(g_t, r_t, \lambda) = -(g_t - g_t^i)^2 + br_{C,t}^{\lambda} \tag{2}$$

where g_t is the spending level implemented by the governing coalition at t, g_t^i is each party's preferred spending policy, b is the benefit derived from rent $r_{C,t}^{\lambda} \in [0, 1]$ extracted by each type-λ party in the government, and C in $r_{C,t}^{\lambda}$ denotes the number of parties in the ruling coalition.

In the model, the distribution of spending preferences among voters F_α^j and each party's position on government spending $\left(g_t^i\right)$ is common knowledge. But, as mentioned earlier, there is incomplete information since voters cannot observe each party's preference for appropriating rent in office. Voters thus have prior beliefs about each party's type defined as $\theta^i \in (0, 1)$. The profile of voters' prior belief about party types is $\Theta \equiv (\theta^L, \theta^M, \theta^R)$. Having defined the voters and parties' utility function, and the model's information structure, we describe below the sequence of moves in the game, the voters' voting rule, the government's optimization problem and the equilibrium concept used to solve the model.

2.2 Sequence of moves, optimization problem and equilibrium concept

The sequence of moves in the dynamic game is as follows: First, Nature independently draws each party's type that is uniformly distributed. Second, the incumbent coalition government chooses a level of government spending at t, g_t, and some amount of rent r_t. Third, voters observe g_t and elections occur where voters decide whether or not to

[7] The model's results presented below does not alter irrespective of the *composition* of the parties in the coalition; that is, irrespective of whether the coalition comprises of the left and median, right and median or left and right parties.

retain the incumbent government. We describe the election period and the voters' voting rule in more detail below. Fourth, after the election, a new government is formed which chooses g_{t+1} and some r_{t+1}. The sequence of moves described above is then repeated.

In the election held at the end of t, voters make their decision based on observing the spending policy outcome g_t at t, anticipation of spending policies g_{t+1} implemented by the government that assumes office after elections and updated beliefs about each party's type. Given their prior belief profile Θ, voters' update their beliefs about each party's type after observing g_t. Let $\mu^i(\Theta, g_t)$ denote voters' posterior beliefs about each party's type. The posterior beliefs for voters are derived from the prior and the incumbent coalition government's choice of g_t through Bayes' rule. Given voters beliefs about each party's type the voting strategy of a type α voter is the function ϕ^j_α, which is the probability $\phi^j_\alpha(i|\Theta, F, g_t, r^\lambda_{C,t})$ that he or she votes for the coalition government. Let ϕ be the profile of voting decisions and $EU^j_\alpha(\Theta, g_t, \phi, r^\lambda_{C,t})$ the expected utility that a type-α voter anticipates given the profile of voting decisions, the spending policy adopted by the government at t, his beliefs about (i) each party's type and (ii) the amount of rent extracted by the coalition government $r^\lambda_{C,t}$. The voters' voting rule in the model is,

Voting rule *Given voters' prior belief profile Θ, the distribution of voters spending preferences F^j_α and the spending level g_t, voters will vote for the coalition government if $EU^j_\alpha(\Theta, g_t, \phi, r^\lambda_{C,t}) > EU^j_\alpha(\Theta, g_t, \phi, r^\lambda_{-C,t})$, where $EU^j_\alpha(\Theta, g_t, \phi, r^\lambda_{-C,t})$ is each type-α voter's expected utility given Θ, g_t, ϕ and the amount of rent that he or she believes the opposition party may extract when it is in power.*[8]

In office, the coalition government chooses some level of spending g_t. While choosing g_t, parties in the coalition take into account four factors, which based on the preceding discussion, are as follows: (i) the inherited level of spending from the previous government labeled as g_0, (ii) the degree of rent extracted by the parties in the coalition given their type ($r^\lambda_{C,t}$), (iii) anticipation of the voters voting decisions, and (iv) spending level that may be implemented in the future g_{t+1}. Hence, the incumbent's choice of g_t is determined, in part, by the function $\gamma_t(\Theta, \lambda, F^j_\alpha, g_0)$. While choosing some level of spending the coalition government will not only take into account the four aforementioned factors but also its discount factor $\delta \in (0, 1)$. Note that the discount factor accounts for the ex ante uncertainty that the incumbent coalition government has with respect to how long it may survive in office and the electoral outcome.

Let $V^i_\lambda(g_{t+1})$ be the future $(t+1)$ expected utility for each type-λ party in the coalition government when the current period spending policy is g_t. Gathering the above information together, the coalition government's finite horizon[9] dynamic optimization problem is,

[8] Formally $EU^j_\alpha(\Theta, g_t, \phi, r^\lambda_{-C,t})$ is $EU^j_\alpha(\Theta, g_t, \phi, r^\lambda_{S,t})$ when a single party government is in office, but is defined as $EU^j_\alpha(\Theta, g_t, \phi, r^\lambda_{-C,t})$ when the coalition in office is different from the current incumbent coalition.

[9] It is a finite horizon problem because the coalition will not survive in office beyond some finite time T.

$$\begin{aligned} &\arg\max_{g_t}\{v^i\left(g_t(\gamma_t), r^{\lambda}_{C,t}\right) + \delta V^i_{\lambda}\left(g_{t+1}(\gamma_{t+1}), r^{\lambda}_{C,t+1}\right) \\ &\text{s.to.} g_t \in [0,1] \quad \text{and} \quad r^{\lambda}_t \in [0,1] \end{aligned} \tag{3}$$

We define the single party government's optimization problem in a footnote,[10] but to save space, we focus on solving the Perfect Bayesian equilibrium (PBE) of the game only when a coalition government is in office. We then conduct comparative static analyses to derive the hypothesis that we test on data. The PBE of our model should satisfy the following criteria: (i) the level of spending chosen by the coalition government must be optimal given voters voting strategies and beliefs, (ii) each voters strategy must be optimal given his or her beliefs and the level of spending that the government chooses and (iii) voters posterior beliefs are derived from the coalition government's spending level through Bayes' rule where possible.

2.3 Comparative statics and testable hypothesis

From the coalition government's optimization problem, we obtain

Lemma 1 *For the voters' distribution of spending preference F^j_{α} and the profile of party types $\boldsymbol{\lambda}^{\mathbf{i}}$, the optimal spending level implemented by the coalition government in a perfect Bayesian equilibrium is*

$$g^*_t = \frac{(1-\delta)(2br^{\lambda}_{C,t}) + \delta(1 + br^{\lambda}_{C,t+1})g_t(\gamma_t)}{\delta g_{t+1}(\gamma_{t+1})} \tag{4}$$

Proof See Appendix □

We briefly show formally in the appendix that the optimal level of government spending that the incumbent coalition government implements in office in (4) satisfies the conditions of a Perfect Bayesian equilibrium. However, while useful, the result in Lemma 1 does not provide substantive insights *per se*. Rather, comparative statics conducted on g^*_t with respect to the government's discount factor $\delta \in (0, 1)$ leads to the following result

Proposition 1 *For voters prior belief profile $\Theta \equiv (\theta^L, \theta^M, \theta^R)$ and F^j_{α}, the level of government spending under multiparty coalitions increases since coalition governments have a lower discount factor, or equivalently a shorter time horizon, in office. More formally, g^*_t strictly increases, ceteris paribus, when δ decreases* (*i.e. when* $\lim \delta \to 0$).

Proof See Appendix □

[10] A single party government's spending decision g^S_t is influenced by its discount factor ($\delta_S \in (0, 1)$), the initial spending level, the rent it extracts ($r^{\lambda}_{S,t}$) and the voters' voting decision. The voters' belief *profile* Θ does not matter in this case since the government comprises of only one party. Hence, the single party's spending decision is determined by the function ($\beta_t(\lambda, F^j_{\alpha}, g_0)$) and its finite horizon dynamic optimization problem is $\arg\max_{g^S_t}\{v^i(g^S_t(\beta_t), r^{\lambda}_{S,t}) + \delta V^i_{\lambda}(g^S_{t+1}(\beta_{t+1}), r^{\lambda}_{S,t+1})$ s. to. $g^S_t \in [0,1]$, $r^{\lambda}_{S,t} \in [0,1]$.

Building on our finding in Table 2 that coalition governments survive for a relatively short time period in office, comparative statics from our model predict that government spending increases under coalition governments primarily because they have a low discount factor in office. The causal intuition that explains the result in Proposition 1 is as follows.

To begin with, note that a low discount factor ($\lim \delta \rightarrow 0$) implies a situation where policy makers and parties within the coalition government have short time horizons since they anticipate that their likelihood of surviving in office is low owing to expectations of government dissolution.[11] According to our model, a low discount factor induces the ruling coalition to deviate from the optimal level of spending[12] and has three effects that lead to higher government spending under coalition governments. These three effects and their impact on government spending (described in detail below) are: (i) incentives to increase government expenditure and direct the benefits of high spending to "favored" constituents, (ii) extraction of high levels of rent in office, and (iii) failure to fully internalize the future costs of high government spending.

First, a low discount factor increases the political insecurity of the coalition government and encourages parties in the incumbent coalition to hedge against the possibility of electoral defeat by appeasing constituents that may be favorably disposed toward the coalition parties. We suggest that one tactic that parties in the ruling coalition may employ to hedge against the possibility of electoral defeat is to increase public expenditure on subsidies or transfers as well as target the benefits of high spending to their constituents and other voters that may gain from such spending. Employing government expenditure as a tactic to win over voters is useful because unlike other instruments of fiscal policy (e.g. taxes),[13] it can be used to target voters in specific geographic areas—for instance, swing districts—that may be crucial to the electoral prospects of parties in the coalition. Bribing constituents with the benefits of high government expenditure provides two political advantages to the coalition government.

For one, constituents and voters that gain from higher spending targeted toward them are likely to support the coalition government in elections. This consequently

[11] Factors such as a political crisis or scandal could weaken the incumbent coalition government in office, increase its likelihood of dissolution and contribute to the low discount factor of parties in the coalition. Note that these factors are not relevant to the model's result in Proposition 1 or the analysis that follows.

[12] In his model of managerial incentives (Holmstrom (1999, 179)), finds that managers of firms will provide an efficient supply of labor only when their discount factor is high but not when their discount factor is low. The result from our model stated above partly reflects this insight from Holmstrom (1999) model. However our model examines the effect of the discount factor of coalition governments on public spending.

[13] It is harder for coalition governments at the center to use taxes, which are usually geographically broad-based, to target constituencies in specific geographic areas (Keefer 2004; Franzese and Nooruddin 2004). As a result, they are more likely to favor using spending to target voters particularly in geographic areas that help the ruling coalition to enhance their likelihood of winning the election. Moreover, note that large sections of the voting population in developing countries (i.e. non-OECD democracies) often do not pay taxes owing to the weak capacity of governments to collect taxes in these states (Tanzi and Zee 2001; Brautigam et al. 2008). We therefore claim that governments in especially developing democracies may recognize that offering "tax-cuts" to citizens may be less politically effective than offering subsidies or transfers to voters. Thus, we anticipate that the short time-horizon of coalition governments in office engenders a political bias toward higher government spending.

helps each coalition party to not only strengthen its electoral support among its constituents but also potentially increase its "vote-bank" among other sections of the voting population prior to and during elections. This allows the coalition parties to maximize their vote share that increases their prospects of winning the election *and* joining a new (or the same) coalition government that may form after the election. Second, increasing their vote share by targeting the benefits of higher level of spending to their supporters allows each party in the coalition to maximize their chances of obtaining sufficient legislative seats in an upcoming election, which acts as an insurance mechanism.

In particular, even if parties in the current coalition are unable to cobble together the same coalition or join a new government after elections, they anticipate that strengthening their electoral support among their constituents may give them enough representation in the legislature to minimize their electoral losses and maintain their bargaining leverage. Maintaining their bargaining leverage in the legislature is crucial since it ensures that policies implemented by the future government may not stray too far from the policy preferences of the parties in the current coalition if they are in the opposition in the future. Hence, put together, the preceding discussion suggests that the low discount factor of coalition governments gives it *political incentives* to increase government expenditure and direct the benefits of higher spending toward its constituents.

The second effect of short time horizons is that it encourages parties in the coalition government to maximize their personal consumption by extracting more rent in office, which also translates to a higher level of government spending.[14] The result stated above is not surprising because in the model rent extraction implies that parties in the coalition are spending government finances for their consumption. Hence, greater rent extraction means that government expenditure is *directly* being increased, in part, for consumption. The link between greater rent extraction and higher government spending is straightforward. But the key question that remains to be answered is: why does the low discount factor of coalition governments encourage parties in the coalition to appropriate more rent in office? We posit two reasons to answer this question.

First, when their discount factor is low, ruling parties in the coalition may anticipate that their opportunities for extracting rent in the future may end abruptly if they are unable to retain office. Anticipating that their rent-seeking opportunities may be drastically curtailed in the future gives them incentives to appropriate substantial amount of rent in office. We show formally in the appendix that the rent extracted by parties ($r^{\lambda}_{C,t}$) increases in equilibrium when their discount factor shrinks ($\lim \delta \rightarrow 0$).[15] Second, parties in the coalition government know that voters cannot observe their rent-seeking behavior and are incompletely informed about each party's type, namely its propensity for extracting rent.

This is a crucial point since parties in short-lived ruling coalitions have added incentives to exploit voters' incomplete information of their type by extracting more rent in office. To see why, first consider that rational parties in the multiparty coalition

[14] We provide a simple formal proof of this claim (claim 1) in the appendix.

[15] We briefly show this result in the proof of claim 2 in the appendix.

recognize that voters cannot observe their rent-seeking behavior and that voters do not know which particular coalition party to hold accountable for extracting rent especially when a multiparty coalition is in office. We suggest that the short time horizons of coalition governments makes it even more difficult for voters to identify the parties or actors in the ruling coalition that engage in rent extraction. This is because the low discount factor (i.e. time horizons) of coalition governments often, as suggested by some scholars,[16] induces parties in the coalition to resort to "blame-game" politics where each party accuses other coalition parties of engaging in rent-seeking or corruption.

Such blame-game politics exacerbates the voters' information problem described above and makes it almost impossible for voters to first identify and then punish during elections parties in the coalition that are responsible for extracting rent in office. Because coalition parties know that voters find it impossible to identify and then punish *ex post* those guilty of extracting rent, it will encourage these parties to extract more rent since they are more likely to believe in this case that they may not incur the political costs from doing so. Thus the voters' incomplete information of each party's type, which is exacerbated by the blame-game politics adopted by parties in short-lived coalitions, induces the coalition parties to actually extract more rent in office. And, as mentioned above, more rent seeking translates to higher government spending.

Apart from encouraging rent seeking behavior, the third effect of short time horizons is that it makes coalition governments less sensitive to the future costs that result from increasing government expenditure in the current period. Similar to the logic proposed for the median voter by Tabellini and Alesina (1990, 42),[17] we argue that a low discount factor leads to a situation where parties in the coalition fail to adequately internalize the future costs of implementing policies that increase the level of spending. This occurs because parties within short-lived coalition governments may believe that since their likelihood of retaining office after elections may be low, they can always buck pass the responsibility of reducing government spending to some future time. Indeed, the possibility that parties within short-lived coalition governments believe that they can potentially buck pass the burden of reducing government expenditure to the future gives them added incentives to increase current government spending to meet their short term political goals. Thus the short time horizon of the coalition government in office produces a "lame-duck term" effect where parties in the coalition are unable to fully internalize the potential costs of excessive public spending. This induces fiscal irresponsibility by the coalition government, which also engenders an increase in government spending.

As noted above, space constraints prohibit us from presenting the formal model with a single party government, but a similar analysis in which we replace the coalition government in the model with a single party government produces the proposition that the discount factor of a single party government in office will not influence its incentives to engage in greater levels of either rent seeking or target the benefits of higher government spending to voters. Thus:

[16] For the idea of blame-game politics see Groseclose and McCarty (2001) and Maravall (2010).

[17] Tabellini and Alesina (1990, 342) show in their model that "the median voter of period 1 does not fully internalize the cost of issuing debt: he finds it optimal to spend in excess of the current aggregate endowment."

Proposition 2 *For* λ, F_{α}^{j} *and the single party government's discount factor* $\delta_S \in (0, 1)$*, the level of government spending under single party governments does* <u>*not*</u> *increase.*

Though we lack space to present the formal analysis, we can sketch the causal intuition. First, as reported in Table 2, single party governments have substantially longer time-horizons in office compared to coalition governments. Hence, unlike multiparty coalitions, single party governments will internalize the future costs of high spending. This will give them incentives to avoid raising government expenditure to bribe voters and buck-pass the costs of higher spending. Indeed, when we replace the coalition government in our model with a single party government, we find that equilibrium spending (g_t^{S*}) does not increase under the single party government.[18]

Second, because single party governments contain only one party, voters find it easier to hold such governments accountable for rent-seeking behavior. As a result, during elections voters can more easily blame and punish the ruling party in a single party government if they believe that it has extracted excessive rent in office. Since single party governments will realize that voters find it easier to hold them accountable when they are in power and because they wish to avoid electoral punishment their incentives to extract rent in office will decrease dramatically, even when their discount factor is low. The rent extracted by a single party government ($r_{S,t}^{\lambda}$) in our model therefore does not increase in equilibrium for all $\delta_S \in (0, 1)$. This reduces the possibility of higher expenditure engendered by greater rent-seeking.[19]

The two propositions and the causal intuition that explains the results in these propositions imply the following hypothesis that we test below:

Hypothesis 1 *Under coalition governments government spending will be greater the lower the discount factor in office* (*i.e. higher hazard rate*)*, but the incumbent's discount factor in office* (*hazard rate*) *will not influence government spending under single party governments.*

3 Empirical analysis: sample, dependent variable and statistical methodology

We compile a time-series cross-sectional (TSCS) sample of 111 OECD and non-OECD democracies from 1975 to 2007 to test Hypothesis 1 since we examine how the time-horizons of coalition governments affect central government spending in *democracies*. The democracies in our sample satisfy (Przeworski et al. 2000) criteria for a democracy which are: (i) the chief executive and legislature must be directly elected; (ii) there must be more than one party in the legislature and (iii) incumbents must allow a lawful alternation of office if defeated in elections. The 111 democracies and the years in which they are observed as democracies are, as mentioned earlier, listed in Table 1.

[18] We briefly show in the proof of claim 3 in the appendix that the level of spending implemented by a single party government in equilibrium, g_t^{S*}, does not increase for all $\delta_S \in (0, 1)$.

[19] The proof that $r_{S,t}^{\lambda}$ does not increase when the discount factor of single party governments ($\delta_S \in (0, 1)$) decreases is available on request; note that if $r_{S,t}^{\lambda}$ does not increase, then equilibrium spending will not increase either because of a monotonic relationship between these two parameters.

Twenty four out of the 111 democracies are advanced OECD countries, while the remaining 87 are non-OECD (developing) countries. Our sample is comprehensive as it includes all democracies observed during the 1975 to 2007 period (based on the Przeworski et al. criteria) for which data to operationalize the dependent and independent variables are available.[20] This allows us to make more generalizable claims if we find empirical support for our hypothesis. Note that we include presidential and mixed democracies in our sample along with parliamentary democracies since our data and Cheibub et al. (2004, 575) study reveal, contrary to a widespread belief (e.g. Linz 1994), that the formation of coalition governments is common in Presidential and mixed democracies. For instance, in our data we find that out of a total of 973 instances of coalition governments, 438 coalitions occurred in Parliamentary democracies, 311 in Presidential and 224 in mixed democracies.

Following existing studies,[21] we operationalize the size of government—the main dependent variable for our tests—as total central government expenditure as a percent of GDP for each country-year. This variable is labeled as *expenditure*. Data for *expenditure* is taken from *Penn World Tables*, *Government Finance Statistics* [GFS] CD-Rom from the International Monetary Fund, and the *World Development Indicators* [WDI] CD-Rom from the World Bank. We also empirically assess some implications of our theoretical claims by employing the following measures for the dependent variable that are described later: government consumption as percent of GDP, government transfers as percent of GDP, and state and local government expenditure as percent of GDP.

We estimate TSCS regression models with panel-corrected standard errors (PCSE's) that are adjusted to correct for heteroskedasticity and contemporaneous correlation to test Hypothesis 1. Country fixed effects and year fixed effects are included in each empirical model. But we also check the robustness of our results in models estimated with random effects. To account for serial correlation, we include the lag of the dependent variable in the TSCS regressions (Beck and Katz 1995). Finally, we conduct a battery of specification and econometric robustness tests as well as diagnostic checks to evaluate the econometric validity of our results. These robustness and diagnostic tests are described later in this paper.

3.1 Independent and control variables

Recall that the independent variable of interest in Hypothesis 1 is the discount factor (i.e. time-horizons) of coalition governments. Thus to test Hypothesis 1, we need a measure that captures the *ex ante* discount factor of *each* coalition government in our sample of 111 democracies during the 1975–2007 period. Developing this measure is not straightforward. Indeed, existing studies often use the mean turnover rate of leaders to proxy for the time horizons of incumbents (for e.g. Alesina et al. 1996), which does not capture the *ex ante* discount factor of governments and lacks temporal variation. Hence, unlike the aforementioned variable, we develop a measure that

[20] The empirical results that we report below do not change statistically and substantively when we use a sample of democratic country-years in which countries are defined as democracies if their Polity score (coded from a −10 to +10 scale) is greater than or equal to +6 in a given year.

[21] See, for e.g., Persson et al. (2005).

carefully operationalizes the ex ante discount factor of coalition governments in two main steps. For the first step, we employ numerous primary and secondary sources (listed in the appendix) to identify all the coalition governments—that is, governments that include more than one ruling party—in our sample of democracies. For the second step, we derive the predicted probability of government termination from office for each coalition government in our sample to operationalize the ex ante discount factor of these governments in office. We do so as follows.

First, we estimated some discrete time hazard models with a logit specification to derive the predicted probability of failure of *each coalition government* in our sample. We use the discrete-time hazard model to examine the duration (in months) of all coalition governments in our sample of democracies over the period January 1975 to December 2007. We only include governments that began on or after January 1975 because our TSCS sample of democracies begins in 1975, and governments that did not end before December 31 2007 are right censored. More formally, the discrete time hazard model with a logit specification (see Beck et al. 1998) is defined as,

$$P(y_{i,t} = 1) = h(t|\mathbf{x}_{i,t}) = \frac{1}{1 + \exp -(\mathbf{x}_{i,t}\beta' + k_{t-t0})} \tag{5}$$

where i denotes each coalition government in the sample, $\mathbf{x}_{i,t}$ denotes the vector of independent variables in the hazard model and the temporal dummies k_{t-t0} capture the length of the time that each ruling coalition has been in office from t_0 until the time period t at which the coalition collapses.[22] The hazard rate in this model, therefore, represents the probability that a coalition government will end at a particular time given that it has survived to that point. The dependent variable in the discrete time hazard model with a logit specification, *failed*, is a dummy variable coded one for each instance of government dissolution in democracies, which occur either due to elections or to a change in the composition of parties, no-confidence votes or voluntary resignations.

We include the following variables in the discrete time hazard model, which according to several studies, [23] directly influences the probability of government failure in democracies: government polarization, the effective number of legislative parties (ENLP), a measure of electoral volatility,[24] a count variable for the number of attempts to form the government, a continuous 0–1 measure of electoral risk,[25] a dummy for par-

[22] Beck et al. (1998) show that the hazard rate of a discrete hazard model with a logit specification and temporal dummies is similar to the hazard rate in the Cox duration model.

[23] The variables in our discrete time hazard model are drawn from the following studies that employ hazard models to estimate the likelihood of government failure in democracies: (Diermeier and Stevenson 1999 and Warwick 1994 (for OECD democracies); and Jackle 2009) for non-OECD democracies.

[24] The operationalization of government polarization (drawn from the World Bank (2008a,b)) DPI database) and ENLP is described later in the paper. Electoral volatility is operationalized by using the Pedersen electoral volatility index which is commonly used by scholars.

[25] The electoral risk variable captures the possibility that leaders may voluntarily dissolve their government and call for elections as the end of the constitutionally defined inter-election period approaches. We include this variable in the hazard model since scholars have shown that as the end of constitutionally defined inter-election period approaches particularly (but not only) in parliamentary democracies, the risk that leaders may voluntarily dissolve their government and call for elections increases significantly which increases the

liamentary democracies and a dummy for minority governments in the sample,[26] and time splines to control for duration dependence.[27] We do not report the estimates from the discrete time hazard model to conserve space, although the model does a good job in predicting when each coalition government is going to end in the sample (93% of the cases). More importantly, given that we have data on the month of entry (into office) and exit of coalition governments across the democracies in our sample during the 1975 to 2007 period, we use the estimates from the estimated discrete time hazard model to calculate the predicted probability of government failure, i.e. the hazard rate, of each coalition government. In more technical terms, the predicted probability of failure in office, i.e. the hazard rate for each coalition government, which is derived from the estimated discrete time hazard model described above is computed from the following formula,

$$\hat{P}(y_{i,t} = 1) = \frac{1}{1 + \exp -(\mathbf{x}_{i,t}\hat{\beta}' + \hat{k}_{t-t0})} \tag{6}$$

where $\hat{\beta}'$ is the estimated log hazard odds ratio for each coalition government given $\mathbf{x}_{i,t}$ and $\hat{k}_{t-t0}$ captures how long each ruling coalition has been at risk via the estimated baseline hazard probability $h_0(t)$. We denote this predicted probability of failure in office of each coalition government derived from formula in Eq. 6 as *hazard rate-coalition*.

The *hazard rate-coalition* variable is bounded between 0 and 1. This variable nicely captures the *ex ante* discount factor –and thus time horizons—of coalition governments in office since higher values of this variable indicate that the government's ex ante discount factor is low, while low values of this variable indicate the government's ex ante discount factor in office is high. The *hazard rate-coalition* variable is the independent variable that we employ to test Hypothesis 1. The data sources used to operationalize this independent variable include (Delury 1999; Woldendorp et al. 2000), *Keesings Record of World Events*(various years), the World Bank (2008a,b) *Database of Political Institutions* [DPI]; (Cheibub et al. 2004; Cheibub and Limongi 2002; Maeda and Nishikawa 2006; Strom et al. 2008, and Databanks International 2008) CNTS.

With respect to the control variables, first recall that we claimed earlier that incumbents of single party governments have relatively low incentives to increase government expenditure given that their time-horizons in office are higher than leaders of coalition governments. To assess this claim, we thus include the discount factor of single party governments which is denoted as *hazard rate-single party*. We operation-

Footnote 25 continued
hazard rate of these governments (Smith 2003; Cheibub et al. 2004). Since developing democracies have different constitutionally mandated election periods—i.e. 36, 48, 60 or 84 months—the electoral risk variable is operationalized as: $1 - \frac{\text{Number of Months Remaining in CIEP when leader dissolves government}}{\text{Constitutional Electoral Period}}$, where CIEP denotes "constitutionally defined inter-election period".

[26] We include a dummy for parliamentary democracies and minority government respectively as studies have examined whether the hazard rate of (i) governments in parliamentary democracies is higher than
Footnote 26 continued
those in presidential democracies (Maeda and Nishikawa 2006), and (ii) minority governments is high (Somer-Tocpu and Williams 2008).

[27] See Beck et al. (1998).

alize this measure by first identifying all the single party governments in our sample of 111 democracies from 1975 to 2007. We then calculate the predicted probability of government termination for each single party government in the sample. This is done by using the formula in Eq. 6 (developed for single party governments in this case) and the procedure that, as described above, is used to derive this particular formula.[28] Apart from *hazard rate-single party*, we control for several political and economic variables that capture alternative explanations for government spending. The political control variables are as follows.

To begin with, some scholars predict that left-wing governments spend more than right-wing governments (Garrett and Lange 1991). We thus include *partisanship*, which measures political parties on a 0–2 right to left scale and expect that it will have a positive effect on the dependent variable. Persson and Tabellini (2004) and Milesi-Ferretti et al. (2002) suggest that government spending is lower in countries with a majoritarian electoral system. We introduce *majoritarian* that is coded as 1 for countries with a majoritarian electoral system and treat countries with a PR or mixed electoral system as the reference category. We add the dummy *parliamentary* for parliamentary democracies and treat Presidential and mixed democracies as the reference categories since Persson et al. (1997) predict that parliamentary democracies are associated with higher spending.

Scholars suggest that greater legislative fragmentation-operationalized via the effective number of parties in the legislature—increases government spending (Scartascini and Crain 2002; Mukherjee 2003). We add Laakso and Taagepera's 1979 measure of effective number of legislative parties (ENLP) and expect that it will have a positive effect on the dependent variable. We incorporate the dummy *minority government* coded as 1 for minority governments since Roubini and Sachs (1989) claim that minority governments are associated with higher expenditure. We include the number of *veto players* in government since scholars predict that more veto players in government makes it difficult for policy-makers to reduce government spending (Hallerberg and von Hagen 1999; Tsebellis and Chang 2005).

We add *government polarization*, which is operationalized as the absolute maximum difference of partisan orientation among all parties in the government on a 0–2 scale. Since greater government polarization makes it difficult for policy-makers to adopt fiscal reforms to reduce spending (Franzese 2002), *government polarization* is likely to have a positive effect on the dependent variable. We also control for the dummy *coalition government* to capture the possibility that other features of coalition governments (i.e. features other than their hazard rate) may influence government spending as suggested by some scholars (e.g. Bawn and Rosenbluth 2006). Note that tests revealed that the correlation between *hazard rate-coalition* and *coalition government* is statistically insignificant, therein mitigating concerns of collinearity between these two variables. The data sources used to obtain the political control variables mentioned above are listed in the appendix.

With respect to the economic control variables, the first economic control that we include is *trade openness* that is measured as imports plus exports divided by a state's

[28] The data sources that we employed to operationalize *hazard rate-single party* are exactly the same as those used to develop the hazard-rate coalition measure.

GDP. We do so because Rodrik (1997) claims that greater trade openness induces governments to spend more. Since a higher proportion of dependent, non-working citizens in the population may influence government spending, we add *age dependency ratio* to the specification; this variable is operationalized as the ratio of the population that is below 14 and above 65 years to the population between 14 and 65 years of age. We control for *log population* and *log GDP per capita* in the model, which are standard controls in models of government spending (Rodrik 1997; Persson et al. 2005; Shelton 2007). Data for the economic controls are from the Penn World Tables, the IMF (2008) GFS CD-Rom and the World Bank (2008a,b) WDI CD-Rom. We control for *central bank independence* (labeled as CBI) since Franzese (1999, 11) suggests that an independent central bank may dissuade governments from excessive spending. The CBI mesaure is operationalized by using the 0–1 index of central bank independence created by Cukierman et al. (2002).

4 Findings and analyses

Models 1–3 in Table 3 report the results from the complete specification—where the independent variable is *hazard rate-coalition* and the dependent variable is *expenditure*—estimated for the full global sample (model 1), the OECD sample (model 2) and the non-OECD sample (model 3). The estimated coefficient of *hazard rate-coalition* is positive and statistically significant at the 1% level in all three models, which include country-specific and year fixed effects. Thus Hypothesis 1 finds strong statistical support in the global, OECD and non-OECD sample.

To gain a full appreciation of the impact of *hazard rate-coalition* on *expenditure*, we derive its substantive effect in two steps. First, from the estimates in model 1, we find that increasing *hazard rate-coalition* by one standard deviation above its mean, while holding other variables in the model at their respective mean in the sample, increases total central government *expenditure* by 8.7%, which is substantial. The illustration in Fig. 2, which is derived from model 1, confirms the aforementioned substantive impact and also shows that the marginal effect of *hazard rate-coalition* on *expenditure* posited above is statistically significant at the 95% confidence level. Similarly, the estimates from model 2 (OECD sample) and model 3 (non-OECD sample) reveal that increasing *hazard rate-coalition* by one standard deviation above its mean in each of these models (while holding other variables at their mean in these models), increases *expenditure* by 7.2% in OECD democracies and 10.4% in non-OECD democracies. Therefore we find strong statistical *and* substantive support for Hypothesis 1.

Second, in Fig. 3 we examine government spending under some coalition and single party governments in two countries in our data to provide a more intuitive interpretation of the substantive effects reported above. For example, panel A in Fig. 3 illustrates the change in central government spending as a percent of GDP that occurred under three different governments in India (a non-OECD democracy) during the last three decades. The first is the United Front (UF) coalition that survived for less than two years in office (from July 1996 to November 1998) and thus had a very high (short) hazard rate (time-horizon) throughout its tenure.[29] The second is the National Democratic

[29] The UF coalition was first led by Prime Minister HD Deve Gowda and then Prime Minister IK Gujral.

Table 3 Main results

	Dependent variable: *expenditure*						
	Global sample	OECD	Non-OECD	Global sample			
	model 1	model 2	model 3	model 4	model 5	model 6	model 7
Lag dependent variable	0.272***	0.398***	0.181***	0.427***	0.224***	0.219***	0.271***
	(0.019)	(0.030)	(0.020)	(0.020)	(0.041)	(0.036)	(0.019)
Log GDP per capita	−0.016**	−0.005	−0.023***	−0.039**	−0.014**	−0.011**	−0.016**
	(0.007)	(0.003)	(0.005)	(0.017)	(0.006)	(0.003)	(0.008)
Age depend. ratio	0.045***	0.063***	0.024***	0.079***	0.038***	0.033***	0.046***
	(0.012)	(0.019)	(0.008)	(0.022)	(0.014)	(0.012)	(0.012)
Trade openness	0.031***	0.064***	0.016***	0.057***	0.023**	0.020**	0.031***
	(0.011)	(0.014)	(0.004)	(0.012)	(0.011)	(0.010)	(0.010)
Log population	0.047**	0.022**	0.079**	0.094***	0.042**	0.051**	0.047**
	(0.021)	(0.010)	(0.035)	(0.027)	(0.019)	(0.023)	(0.022)
Hazard rate-coalition	0.119***	0.102***	0.156***		0.114***	0.110***	0.119***
	(0.034)	(0.028)	(0.045)		(0.029)	(0.025)	(0.035)
ENLP	0.033	0.021	0.052		0.040	0.015	0.027
	(0.162)	(0.307)	(0.193)		(0.178)	(0.064)	(0.157)
Majoritarian	−0.025	−0.058	−0.014		−0.043	−0.022	
	(0.068)	(0.046)	(0.059)		(0.095)	(0.107)	
Govt polarization	0.037	0.028	0.049				0.039
	(0.034)	(0.033)	(0.055)				(0.037)
Veto players	0.021	0.034	0.018		0.030	0.023	0.021
	(0.015)	(0.042)	(0.019)		(0.027)	(0.039)	(0.015)
Parliamentary	0.025	0.036	0.014		0.032	0.024	0.025
	(0.038)	(0.054)	(0.018)		(0.037)	(0.043)	(0.027)
Coalition govt dummy	0.066	0.045	0.080	0.093			0.064
	(0.097)	(0.021)	(0.134)	(0.107)			(0.095)
Minority government	0.016	0.022	0.011		0.017	0.012	0.016
	(0.014)	(0.018)	(0.012)		(0.015)	(0.022)	(0.014)
Hazard rate-single party	−0.052	−0.047	−0.077		−0.043	−0.029	−0.051
	(0.041)	(0.038)	(0.060)		(0.060)	(0.068)	(0.041)
Partisanship	0.079	0.105	0.042		0.057	0.063	0.079
	(0.064)	(0.0119)	(0.083)		(0.090)	(0.103)	(0.065)
Coalition parties					0.061		
					(0.082)		
Coalition polarization						0.044	
						(0.095)	
PR							0.032
							(0.043)
Constant	0.430***	0.352***	0.472***	0.721***	0.404***	0.351***	0.431***
	(0.081)	(0.099)	(0.085)	(0.106)	(0.063)	(0.077)	(0.082)

Table 3 continued

	Dependent variable: *expenditure*						
	Global sample	OECD	Non-OECD	Global sample			
	model 1	model 2	model 3	model 4	model 5	model 6	model 7
N	2,767	703	2,064	2,921	2,688	2,688	2,767
Adjusted R^2	0.52	0.56	0.50	0.31	0.53	0.53	0.52
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes

***, ** and * denotes significance at the 1%, 5%, 10% level respectively. Panel corrected standard errors (PCSE's) in parentheses. To avoid collinearity, we exclude *government polarization* in model 6 since the correlation between this measure and *coalition polarization* is 0.64 and statistically significant. We also exclude the *coalition govt dummy* in models 5 and 6 as it is strongly and significantly (in the statistical sense) correlated with (i) *coalition parties* in model 5 (0.68) and (ii) *coalition polarization* in model 6 (0.61)

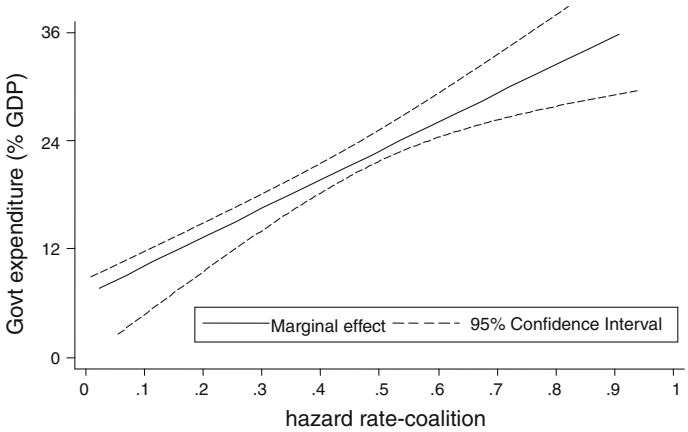

Fig. 2 Marginal effect (percentage terms) of *hazard rate-coalition* on *expenditure*

Alliance (NDA) coalition that had a lower hazard rate compared to the United Front coalition—but a higher hazard rate relative to the Congress-I single party government mentioned below—since it survived for slightly more than four years in office, i.e. from October 1999 to January 2004. The third is the Congress-I single party government which had a low hazard rate since it survived its full term of 5 years in office from 1984 to 1989. As suggested by our theory, we find in panel A of Fig. 3 that government spending increased sharply under the United Front (UF) coalition which, as mentioned above, had a very short time-horizon in office. Government expenditure also increased under the NDA coalition which was in office for a longer time period compared to the UF coalition. But it was not as dramatic as the growth in public spending under the UF coalition. Figure 3 (panel A) also shows that government spending by the Congress-I single party government, which had a longer time-horizon in office, was lower relative to the other two coalitions mentioned above and also *decreased*.

We observe a similar dynamic with respect to government spending in Austria (an OECD democracy) in Panel B of Fig. 3. Specifically, the first illustration in panel

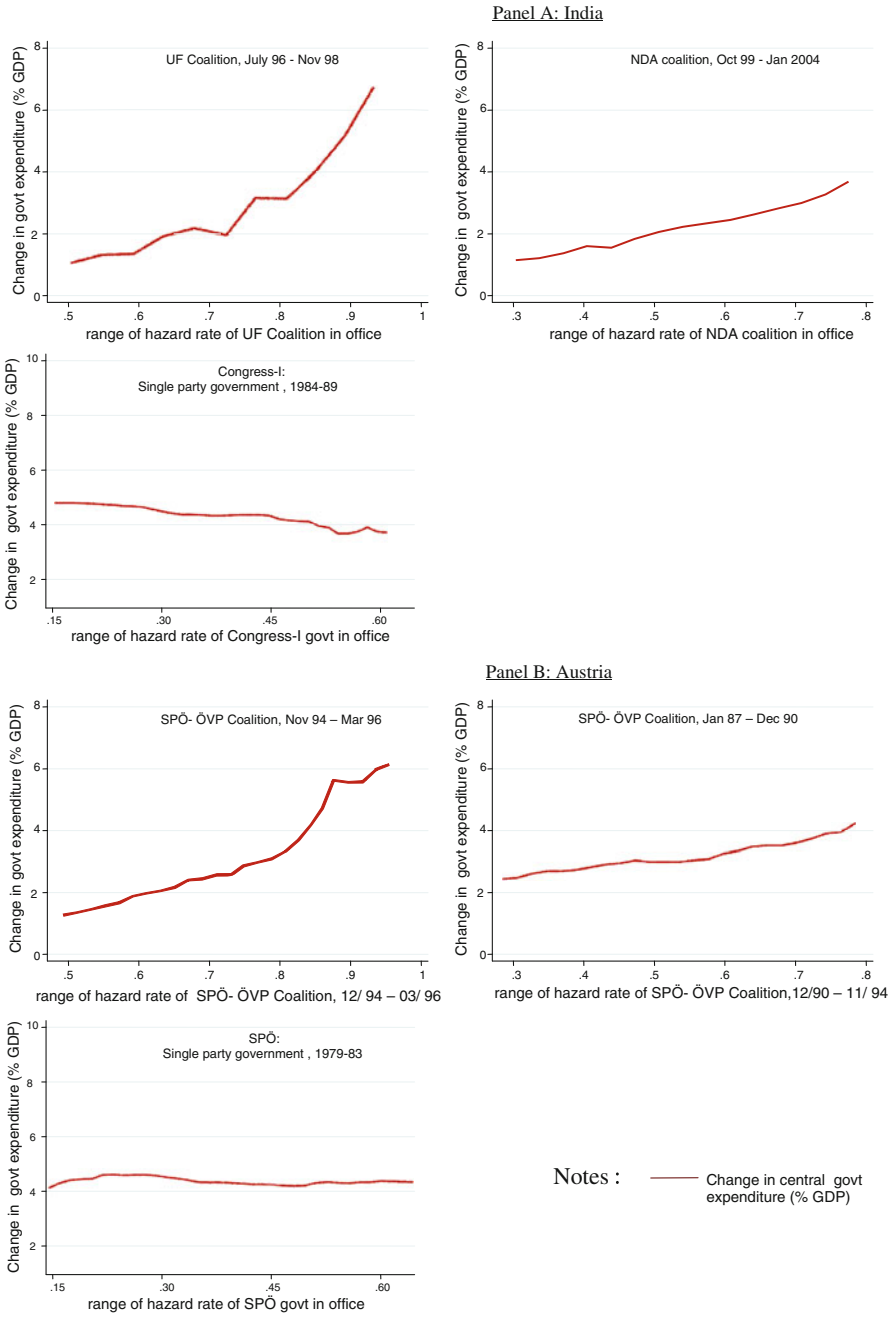

Fig. 3 Hazard rate of governments and government spending in two democracies

B indicates that government expenditure increased sharply under the second (post-1990) SPÖ-ÖVP coalition that was in office from November 1994 to March 1996.[30] This is not surprising from our perspective given that this second SPÖ-ÖVP coalition survived in office for less than two years and thus had a very high hazard rate during its incumbency. Government spending also increased, albeit less dramatically, under the first SPÖ-ÖVP coalition in the 1980s since it lasted in office in this decade for almost three years (January 1987 to December 1990) and thus had a relatively higher time-horizon in office compared to the second SPÖ-ÖVP coalition of the 1990s (see the second illustration in panel B). Finally, the third illustration in panel B indicates that government spending under the single-party SPÖ government led by Bruno Kreisky, which survived its full term in office from 1979 to 1983, was low. Thus, taken together, the examples discussed above are largely illustrative. But they do corroborate our main theoretical claims.

The results presented so far are encouraging. Yet we also assess whether it is possible that other factors inherent to ruling coalitions, that is features other than their hazard rate, may potentially engender higher levels of government spending. This allows us to check carefully whether or not the short time-horizons of coalition governments is indeed the most critical factor that leads to more government spending as suggested by our theory. Hence we conduct the exercise mentioned above via three main exercises. First, observe that the *coalition government* dummy is insignificant in models 1,2 and 3, while the estimate of *hazard rate-coalition* is in the predicted positive direction and is highly significant in all these three models.

Second, we estimate another model (see model 4) on the global sample in which we exclude the *hazard rate-coalition* variable but include the control variables in model 1 that are statistically significant as well as the *coalition government* dummy; this model is estimated with country and year fixed effects. Model 4 reveals that the *coalition government* dummy is statistically insignificant, and moreover this dummy also remains insignificant when the specification in model 4 is estimated with random effects (not reported to save space). The statistical insignificance of the *coalition government* dummy broadly suggests that it is the low discount factor of coalition governments rather than the mere presence of a governing coalition in office *per se* that has a significant positive effect on the size of government as predicted by our theory.

For the third exercise, we check the validity of two alternative explanations proposed by scholars to explain why coalition governments may engender higher levels of government expenditure. The first alternative explanation suggests that the presence of multiple political parties in ruling coalitions generate common pool resource problems, which consequently leads to higher government spending (Bawn and Rosenbluth 2006). We evaluate this claim by estimating an additional model (see model 5) in which we retain all the variables from the specification in model 1, including the *hazard rate-coalition* variable, but replace the coalition dummy variable with a variable called

[30] SPÖ denotes Sozialdemokratische Partei Österreichs (Social Democratic Party), while ÖVP stands for Österreichische Volkspartei (Christian Democratic Party). Franz Vranitzky headed the SPÖ from 1987 to 1990 and from 1994 to 1996 as well. The ÖVP was led by Josef Riegler and Alois Mock during the 1987–1990 period, and was later led by Erhard Busek and Wolfgang Schussell from 1994 to 1996.

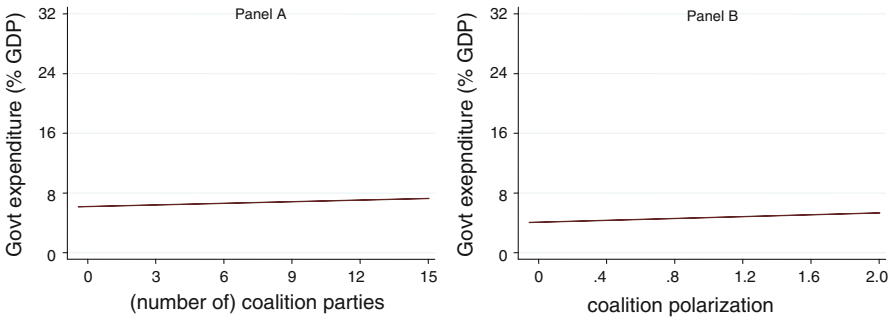

Fig. 4 Marginal effect (percentage terms) of *coalition parties* and *coalition polarization* on *expenditure*

coalition parties. The *coalition parties* variable operationalizes the number of parties in each coalition government in our sample.[31] The second alternative claim suggests that ideological polarization within coalition governments generates higher levels of public spending (Franzese 2002). We evaluate this latter claim as well by estimating one more model (see model 6) in which we also retain the variables from model 1 (including the *hazard rate-coalition* variable) but replace the coalition government dummy variable with a variable labeled as *coalition polarization*.[32] Specifically, following Budge et al. (2006), *coalition polarization* measures the degree of ideological dispersion within ruling coalitions since it is operationalized as the absolute value of the difference between the participating parties that had the lowest right–left position and the highest right–left position. It is worth noting here that the correlation between *coalition parties* and *hazard rate-coalition* as well as between *coalition polarization* and *hazard rate-coalition* is weak and statistically insignificant, therein mitigating concerns of collinearity between these variables.[33]

The estimate of *coalition parties* in model 5 and *coalition polarization* in model 6 is statistically insignificant. However, the estimated coefficient of *hazard rate-coalition* in both model 5 and 6 is positive and significant at the 1% level. Further, the illustration in panels A and B in Fig. 4, which is derived from model 5 (panel A) and 6 respectively (panel B), indicates that the marginal effect of *coalition parties* (panel A) and *coalition polarization* (model 6) on government *expenditure* is negligible and statistically insignificant. This suggests that empirical support for the two alternative explanations posited above is weak because neither the presence of multiple political parties within ruling coalitions nor the extent of ideological polarization within coalition governments generates higher levels of government spending. Rather, we find robust empirical support for our theoretical claim since the positive and significant estimate of *hazard rate-coalition* in model 5 and 6 indicates that it is the relatively low discount factor of ruling coalitions that engenders higher spending.

[31] The data sources used to operationalize this variable is listed in the appendix.

[32] We also exclude the coalition government dummy from models 5 and 6 respectively to avoid collineartiy problems since this dummy is strongly and significantly (in the statistical sense) correlated with (i) *coalition parties* in model 5 (0.68), and (ii) *coalition polarization* in model 6 (0.61).

[33] The correlation between (i) *coalition parties* and *hazard rate-coalition* is just 0.28 and (ii) *coalition polarization* and *hazard rate-coalition* is 0.34.

We estimate another model on the global sample where we retained the specification in model 1, but included the dummy *proportional representation* (hereafter PR) which is coded as 1 for countries with a PR electoral system. Countries with a majortiarian electoral system are treated as the reference category in this model estimated with the PR dummy. We replaced the majoritarian variable with the PR dummy since some scholars claim that the proportional representation electoral system engenders higher spending (see, for e.g., Persson and Tabellini 2003). The results from this specification is reported in model 7 (Table 3), which is estimated with country and year fixed effects. The PR dummy is positive but statistically insignificant in model 7. However, *hazard rate-coalition* remains positive and highly significant in the model, thus indicating robust support for Hypothesis 1. We also found, but do not report to save space, that the PR dummy is insignificant when model 7 is estimated with random effects and when the specification in the model is estimated with fixed and random effects for the OECD and non-OECD samples.

Unlike the strong statistical support for our theoretical prediction, we find mixed support for the remaining control variables. For instance, the *hazard rate-single party* is statistically insignificant in the empirical models, including the models estimated for the OECD and non-OECD sample. Hence the time-horizons of single-party governments does not statistically influence government expenditure as suggested by our theory. Other political control variables such as *veto players*, *parliamentary democracy, government polarization*, ENLP, *minority government* and *government partisanship* are also statistically insignificant in each model in Table 3. The estimate of the *majoritarian* dummy has the predicted negative sign but is statistically insignificant in the models. Hence, there is negligible statistical support for the claim that the majoritarian electoral system has a reductive effect on government spending (Persson and Tabellini 2004). With respect to the economic controls,*log GDP per capita, trade openness* and *age dependency ratio* have the predicted sign and are each significant. But the other economic control variables are insignificant.

Readers might suspect that the estimates of the political control variables reported above are consistently insignificant in the empirical models in Table 3 since these models are estimated with fixed effects. Hence, as a preliminary test of robustness, we re-estimate each model in Table 3 with random effects. We do not report the results from these models that are estimated with random effects owing to space constraints. But the estimated coefficient of the independent variable, *hazard rate-coalition*, remains positive and highly significant in these models. Furthermore, the sign and statistical significance (or lack thereof) of each control variable reported above does not alter statistically or substantively in the models estimated with random effects.

4.1 Additional tests, robustness and diagnostic checks

We conducted some additional empirical tests and a battery of robustness and diagnostic checks. First, recall that our theoretical arguments also broadly contain implications for various components of government spending such as government consumption and transfers. In particular, given that we claim and find that the hazard rate-coalition has a positive effect on total central government expenditure (as % of GDP), it is plausible that this independent variable may also have a positive impact on government

consumption and transfers.[34] To assess our claim, we therefore test the effect of *hazard rate-coalition* on two components of government expenditure, namely (i) government consumption expenditure as a percent of GDP (labeled as *consumption*)[35] and (ii) government transfers as a percent of GDP (labeled as *transfers*).[36] In models 8 and 9 in Table 4, which are estimated with country and year fixed effects, we find that *hazard rate-coalition* has a positive and statistically significant impact (at the 1% level) on *consumption* (model 8) and *transfers* (model 9). We also checked whether the results that support Hypothesis 1 (reported in the previous section) remain robust when we employ state and local government expenditure as a percent of GDP for each country-year (labeled as *subnational govt spending*)[37] as an alternative measure for the dependent variable, government spending. Model 10 in Table 4 (estimated with country and year fixed effects) shows that the impact of *hazard rate-coalition*) on *subnational govt spending* is positive and statistically significant effect at the 1% level. We also found that *hazard rate-coalition* has a positive and highly significant effect on each of the three different measures of government spending mentioned above in models that are estimated with random effects and in models that are estimated for the OECD and non-OECD samples respectively.[38] Thus statistical support for Hypothesis 1 remains robust when we focus on the composition of government spending and the degree of sub-national government expenditure.

Second, we add four more controls to the main specification in model 1 where *expenditure* is the dependent variable: *log inflation*, a dummy for *divided* government, a dummy for *federal* democracies and *ethno-linguistic fractionalization* (labeled as "elf") We do so because researchers suggest that the variables mentioned above may also influence government spending (Shelton 2007; Persson et al. 2005). The results from the specification estimated with the additional controls and with country and year fixed effects are presented in model 11. The effect of *hazard rate-coalition* on *expenditure* remains positive and highly significant effect in the global sample in model 11.[39]

Finally, we conducted two additional tests to assess the econometric validity of our results. For the first additional test, we follow Achen (2000) advice[40] and employ the global sample to estimate the impact of *hazard rate-coalition* on government *expen-*

[34] We thank an anonymous reviewer for suggesting this point.

[35] The data for *consumption* is from the IMF (2008) GFS CD-rom, the World Bank (2008a,b) WDI CD-Rom and the United Nation's System of National Accounts [SNA] (various years).

[36] The data for government transfers as a percent of GDP is drawn from the IMF (2008) GFS CD-rom, the World Bank (2008a,b) WDI CD-Rom, the OECD Economic Outlook database (various years) and UN's SNA (vaiours years). We define government transfers based on the definition provided by Milesi-Ferretti et al. (2002, 629) and then compute its share with respect to each country's GDP for each year.

[37] Data for *subnational govt spending* is from the IMF 2008 GFS CD-rom, the World Bank (2008a,b) WDI CD-Rom and Rodden (2004).

[38] Results available on request.

[39] The estimate of *hazard rate-coalition* is also positive and highly significant in the augmented models (with the additional controls) when these models are estimated with (i) random effects for the global, OECD and non-OECD samples, and (ii) country and year fixed effects for the OECD and non-OECD samples.

[40] Achen (2000) suggests that introducing the lag of the dependent variable may unnecessarily weaken the explanatory power of key substantive variables in the model, therein leading to spurious results.

Table 4 Additional tests and robustness checks

	Consumption Transfers		Subnational govt spend	Expenditure		
	PCSE-FE	PCSE-FE	PCSE-FE	PCSE-FE	Prais-winsten	System-GMM
	model 8	model 9	model 10	model 11	model 12	model 13
Lag dependent variable	0.670***	0.322***	0.414***	0.366***		0.439***
	(0.078)	(0.051)	(0.045)	(0.042)		(0.125)
Log GDP per capita	−0.040***	−0.008**	−0.023**	−0.012**	−0.037**	−0.004**
	(0.014)	(0.004)	(0.010)	(0.05)	(0.019)	(0.002)
Age depend. ratio	0.049	0.125***	0.108**	0.086***	0.102***	0.077***
	(0.036)	(0.054)	(0.047)	(0.023)	(0.035)	(0.023)
CBI	0.022	−0.047	0.014	0.007	0.053	0.018
	(0.085)	(0.099)	(0.072)	(0.054)	(0.090)	(0.078)
Trade openness	0.069***	0.114***	0.077***	0.022**	0.071**	0.053**
	(0.024)	(0.033)	(0.023)	(0.010)	(0.040)	(0.025)
Log inflation				0.077***		
				(0.023)		
Log population	0.056**	0.074**	0.029**	0.034**	0.022**	0.030
	(0.029)	(0.035)	(0.010)	(0.017)	(0.010)	(0.052)
Hazard rate-coalition	0.219***	0.145***	0.138***	0.104***	0.111***	0.095***
	(0.053)	(0.037)	(0.040)	(0.027)	(0.035)	(0.022)
ENLP	0.012	0.064	0.025	0.026	0.061	0.015
	(0.102)	(0.106)	(0.079)	(0.079)	(0.098)	(0.102)
Majoritarian	−0.028	−0.047	−0.031	−0.015	−0.035	−0.042
	(0.035)	(0.027)	(0.085)	(0.021)	(0.038)	(0.061)
Govt polarization	0.058	0.074	0.033	0.021	0.044	0.067
	(0.046)	(0.059)	(0.068)	(0.056)	(0.095)	(0.054)
Veto players	0.060	0.062	0.058	0.016	0.050	−0.089
	(0.073)	(0.198)	(0.045)	(0.012)	(0.097)	(1.14)
Parliamentary	0.021	0.043	0.037	0.018	0.034	0.087
	(0.051)	(0.065)	(0.070)	(0.040)	(0.028)	(0.126)
Coalition govt dummy	0.067	0.081	0.098	0.054	0.017	0.053
	(0.079)	(0.064)	(0.083)	(0.073)	(0.045)	(0.098)
Minority government	0.019	0.050	0.018	0.008	0.019	0.014
	(0.094)	(0.072)	(0.022)	(0.025)	(0.015)	(0.024)
Hazard rate-single party	−0.016	−0.018	−0.042	−0.009	−0.016	−0.091
	(0.068)	(0.040)	(0.089)	(0.056)	(0.058)	(0.079)
Partisanship	0.186	0.104	0.097	0.053	0.090	−0.163
	(0.164)	(0.233)	(0.105)	(0.082)	(0.103)	(0.285)
elf				0.043		
				(0.037)		

Table 4 continued

	Consumption	Transfers	Subnational govt spend	Expenditure		
	PCSE-FE	PCSE-FE	PCSE-FE	PCSE-FE	Prais-winsten	System-GMM
	model 8	model 9	model 10	model 11	model 12	model 13
Federal				0.011		
				(0.046)		
Divided				−0.038		
				(0.060)		
Constant	0.508***	0.430***	0.721***	0.372***	0.160***	0.224***
	(0.102)	(0.118)	(0.106)	(0.099)	(0.080)	(0.040)
N	2,694	1,979	2,235	2,387	2,754	2,766
Adjusted R^2	0.58	0.49	0.46	0.62	0.47	0.43
AR(1)						−3.37**
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

***, ** and * denotes significance at the 1, 5 and 10% level respectively. Models 8, 9, 10, 11 and 12 are estimated with PCSE's that are corrected for heteroscedasticity and contemporaneous correlation. To save space, we report the estimates from the levels equation in the system-GMM model in model 13. The numbers in the parentheses in model 13 are heteroskedastic and serial correlation robust standard errors. A negative and statistically significant AR1 term plus a statistically insignificant AR (2) (not reported to save space) term indicates that there is no serial correlation

diture in a Prais-Winsten model with country and year fixed effects, PCSEs and an AR(1) parameter. The estimated coefficient of *hazard rate-coalition* remains positive and highly significant in the Prais-Winsten specification which is reported in model 12.[41] For the second test, we assess whether potential endogeneity problems affect our findings even though we do not theoretically anticipate the possibility of reverse causality where government spending may affect the hazard rate (time-horizons) of coalition governments. We conduct two specific tests to address the concern that our measure of the hazard rate of coalition governments may be endogenous to the dependent variable, government spending.

We first conduct a variant of the Granger causality test designed for panel data (Hurlin and Venet 2003) to assess the potential endogeneity problem. F-statistics from these Granger causality tests reveal unambiguously that there is no endogeneity problem between *hazard rate-coalition* and *expenditure* (the main dependent variable) as well as between *hazard rate-coalition* and each of the three alternative measures of the dependent variable mentioned earlier. Yet, out of an abundance of caution, we further address the possibility of endogeneity by implementing the dynamic panel estimator—the Generalized Method of Moments (GMM)—suggested by Blundell and Bond (1998). The GMM estimator corrects for endogeneity by using moment conditions

[41] *Hazard rate-coalition* is positive and highly significant in the Prais-Winsten model with random effects and in Prais-Winsten models that are estimated for the OECD and non-OECD samples.

to derive a set of valid instruments for our endogenous explanatory variables. It also addresses the possibility of serial correlation and allows us to control for country fixed effects and heteroskedasticity via White's heteroskedasticity consistent standard errors.

We follow Blundell and Bond (1998) and estimate what they term a "system GMM" model that involves estimation of a single system that combines a regression in first-differences and a regression in levels. The instruments for the regression in first-differences are lagged levels (dated $t-2$) of the endogenous explanatory variables, while the instruments for the regression in levels are the lagged differences of the endogenous explanatory variables. Blundell and Bond (1998) show that estimating the two equations (levels and differences) in a single system reduces the potential bias and imprecision associated with just the first-difference GMM estimator.

We evaluate the impact of *hazard rate-coalition* on total central government *expenditure* in separate system GMM models for the global sample and then for the two sub-samples (OECD and non-OECD). Due to space constraints, we only report the results from the levels regression in the system GMM-model for the global sample in model 13; the results from the GMM models for the OECD and non-OECD countries are available on request. In the system-GMM specification in model 13, the effect of *hazard rate-coalition* on *expenditure* remains positive and highly significant. We thus find robust statistical support for Hypothesis 1 even after correcting for endogeneity. Furthermore, diagnostic tests reveal that none of the models suffer from severe multicollinearity, serial correlation, or omitted variable bias, and that the residuals are normally distributed.[42]

5 Conclusion

The theory presented in this paper provides a clear story: the low time-horizons of coalition governments engenders higher levels of government spending. Results from several empirical models provide strong statistical support for this prediction which remains robust when we control for alternative explanations and employ different estimation techniques. The findings presented in this study have two main implications. First, as mentioned earlier, our data reveals that the frequency of coalition governments has increased dramatically across time in democracies. This has important ramifications for government spending.

In particular, given that coalition governments survive in office for a shorter time period compared to single party governments (see Table 2) *and* because the low time-horizons of coalition governments leads to more spending, we believe that government expenditure across the globe may increase sharply in the future owing to the higher frequency of multiparty coalitions. Furthermore, given the main findings presented here about the link between the time horizons of ruling coalitions and public spend-

[42] The largest and mean VIF value in the models is less than 10 and greater than 1 respectively; thus multicollinearity is not a problem. The Breusch-Godfrey Lagrange-multiplier test score test failed to reject the null of no serial correlation each estimated empirical model. The RESET test shows that there is no omitted variable bias problem; the Jarque-Bera test shows that the residuals are distributed normally.

ing, it may be worth investigating whether the time horizons of coalition governments affect other economic policy outcomes.

Second, a cursory examination of our data reveals that the short time horizons of coalition governments may have adverse consequences on welfare. For instance, we find that when the hazard rate of coalition governments is increased by one standard deviation above its mean in the full global sample, the level of private investment (as a percent of GDP) decreases by approximately 3.4%. This perhaps indicates that the hazard rate of governing coalitions generates sufficient uncertainty in the economy which in turn deters investment by private investors. Additionally, when we increase the hazard rate of coalition governments by one standard deviation above its mean in the full global sample, we discover that the rate of economic growth declines by 1.5%. The substantive effect reported above for developing country democracies is even more dramatic because a one standard deviation increase in the hazard rate of coalition governments in the non-OECD sample decreases the rate of economic growth by almost 2.1% in these countries. Taken together, the preliminary analysis of the data presented above shows that the low discount factor of coalition governments has a detrimental impact on investment and growth which can especially hurt the prospects of development in developing country democracies.

This study can be extended in three main directions. First, extending the temporal domain of our sample to the years before 1975 may enhance the empirical generalizability of our findings. This may be a difficult task given the paucity of data on specific variables for many democracies in the developing world prior to 1975. Second, we have provided evidence to show that the hazard rate of coalition governments influences government spending. Researchers can potentially extend the findings presented here to study how the discount factor of ruling coalitions governments may also affect other fiscal policy instruments such as taxes. This is likely to be a daunting task given the lack of comprehensive and reliable data on taxes across several developing countries. But it may be worth exploring this issue-area in the future. Third, future research should also examine in-depth case analysis of some cases as it may allow us to tease out additional causal mechanisms to explore the relationship between the time horizons of coalition governments and spending policy. Whatever future direction this study might take, we hope that it provides a more plausible and accurate explanation for why government spending increases under coalition governments.

Appendix

Proof of Lemma 1 To save space, we only present below the main steps of this proof; the details of the proof are available on request. Suppose that parties M and R are in the ruling coalition. The Bellman equation of the coalition government's dynamic programming problem in Eq. (2),

$$\arg\max\{-(g_t - g_t^i)^2 + br_{C,t}^{\lambda} + \delta V(-(g_{t+1} - g_{t+1}^i)^2 + br_{C,t+1}^{\lambda})\} \qquad \text{(A.1)}$$

where $i \in (M, R)$, $g_t > 0$ and $g_t \in [0, 1]$ is bounded with $\bar{g}$ being its maximum value and $\underline{g}$ its minimum value. The instantaneous utility of the two parties in the

coalition government is, by construction, bounded and continuously differentiable. Thus, the value function $V(.)$ in (A.1) is continuously differentiable. The first order condition (FOC) of (A.1) with respect to (w.r.t) g_{t+1} yields $\delta V'[-2(g_{t+1} - g^i_{t+1})]$ and further, $V''(g_{t+1}) < 0$. The FOC of (A.1) w.r.t g_t is $-2(g_t - g^i_t)$ and the second order condition is $-2 < 0$. Using these FOC's, we obtain from (A.1) after some algebra and collecting terms $g^*_t = \frac{(1-\delta)(2br^{\lambda}_{C,t})+\delta(1+br^{\lambda}_{C,t+1})g_t(\gamma_t)}{\delta g_{t+1}(\gamma_{t+1})}$ where $g_{t+1}(\gamma_{t+1}) > 0$ and $g^*_t = (g^{M*}_t, g^{R*}_t)$ since parties M and R are in the coalition. Suppose that the distribution of spending preferences in the voting population is normally distributed with $F^j_\alpha \sim N(0, \sigma^2_{g_t})$. Further, voters' prior beliefs $\theta^i \in (\underline{\theta}, \bar{\theta})$ are uniformly distributed such that $\underline{\theta} \sim [\theta', \theta'']$ and $\bar{\theta} \sim [\theta', \theta'']$ where $0 \leq \underline{\theta} \leq \bar{\theta} \leq 1$. We now prove that for $F^j_\alpha \sim N(0, \sigma^2_{g_t})$ as well as $\underline{\theta}$ and $\bar{\theta}$ (where $0 \leq \underline{\theta} \leq \bar{\theta} \leq 1$), voters have no incentives to reject $g^*_t = (g^{M*}_t, g^{R*}_t)$ and will therefore reelect the ruling coalition that consists of parties M and R. We then prove that the incumbent parties M and R have no incentives to deviate from $g^*_t = (g^{M*}_t, g^{R*}_t)$. Without loss of generality, the remainder of this proof also holds if parties L and M or L and R the coalition; that is the proof holds as long as there are at least two parties in the coalition.

Suppose, as mentioned above, that parties M and R are in the coalition. Given (i) $g^L_t > g^M_t > g^R_t$, (ii) $F_\alpha \sim N(0, \sigma^2_{g_t})$ and prior beliefs of each parties type $0 \leq \underline{\theta} \leq \bar{\theta} \leq 1$ with belief profile Θ and (iii) the voters' utility function (Eq. 1), it follows that $EU^j_\alpha(\Theta, g^*_t, \phi, r^{\lambda}_{C,t}) > EU^j_\alpha(\Theta, g^i_t, \phi, r^{\lambda}_{C,t})$ (where $g^*_t = (g^{M*}_t, g^{R*}_t)$ and $g^i_t = g^L_t$ for $\underline{\theta} \sim [\theta', \theta''], \bar{\theta} \sim [\theta', \theta''], \forall 0 \leq \underline{\theta} \leq \bar{\theta} \leq 1$ and $\forall g^\alpha_t \in [0, 1]$. This $\Rightarrow \sum_i \phi^j_\alpha(i|\Theta, F, g^*_t, r^{\lambda}_{C,t}) \rightarrow 1$. Hence, for Θ and $F^j_\alpha \sim N(0, \sigma^2_{g^i_t})$, voters will rationally vote for the two incumbent parties M and R in the governing coalition when $g^*_t = (g^{M*}_t, g^{R*}_t)$. Likewise, for $\underline{\theta} \sim [\theta', \theta''], \bar{\theta} \sim [\theta', \theta''], \forall 0 \leq \underline{\theta} \leq \bar{\theta} \leq 1$ and $\forall g^\alpha_t \in [0, 1]$, it follows (using the logic posited above) that (i) $EU^j_\alpha(\Theta, g^*_t, \phi, r^{\lambda}_{C,t}) > EU^j_\alpha(\Theta, g^i_t, \phi, r^{\lambda}_{C,t})$ (where $g^*_t = (g^{L*}_t, g^{M*}_t)$ and $g^i_t = g^R_t$ and (ii) $EU^j_\alpha(\Theta, g^*_t, \phi, r^{\lambda}_{C,t}) > EU^j_\alpha(\Theta, g^i_t, \phi, r^{\lambda}_{C,t})$ (where $g^*_t = (g^{L*}_t, g^{R*}_t)$ and $g^i_t = g^R_t$.

Working backward, we can show that parties M and R in the coalition government have no incentives to deviate from $g^*_t = (g^{M*}_t, g^{R*}_t)$ when they know that voters will vote for $g^*_t = (g^{M*}_t, g^{R*}_t)$ given $F_\alpha \sim N(0, \sigma^2_{g_t})$ and Θ. To see why, suppose that $\exists \hat{g}^M_t$ and $\tilde{g}^M_t$ such that $\hat{g}^M_t > g^{M*}_t$ and $\tilde{g}^M_t < g^{M*}_t$ where g^{M*}_t is chosen by party M in $g^*_t = (g^{M*}_t, g^{R*}_t)$. Similarly, assume that $\exists \hat{g}^R_t$ and $\tilde{g}^R_t$ such that $\hat{g}^R_t > g^{R*}_t$ and $\tilde{g}^R_t < g^{R*}_t$ where g^{R*}_t is party $R's$ choice in $g^*_t = (g^{M*}_t, g^{R*}_t)$. For $\sum_i \phi^j_\alpha(i|\Theta, F, g^*_t, r^{\lambda}_{C,t}) arrow 1$, one can check that the maximum inter-temporal utility that party M can get is $-(g_t - g^{M*}_t)^2 + br^{\lambda}_{C,t} + \delta(-(g_{t+1} - g^{M*}_{t+1})^2 + br^{\lambda}_{C,t+1})$ is greater than $-(g_t - \hat{g}^M_t)^2 + br^{\lambda}_{C,t} + \delta(-(g_{t+1} - \hat{g}^M_{t+1})^2 + br^{\lambda}_{C,t+1})$ and $-(g_t - \tilde{g}^M_t)^2 + br^{\lambda}_{C,t} + \delta(-(g_{t+1} - \tilde{g}^M_{t+1})^2 + br^{\lambda}_{C,t+1}) \quad \forall \delta \in (0, 1)$ since the choice of $g^{M*}_t$by party M in $g^*_t = (g^{M*}_t, g^{R*}_t)$ is optimal. Similarly, it follows that $-(g_t - g^{R*}_t)^2 + br^{\lambda}_{C,t} + \delta(-(g_{t+1} - g^{R*}_{t+1})^2 + br^{\lambda}_{C,t+1})$ is greater than $-(g_t - \hat{g}^R_t)^2 + br^{\lambda}_{C,t} + \delta(-(g_{t+1} - \hat{g}^R_{t+1})^2 + br^{\lambda}_{C,t+1})$ and $-(g_t - \tilde{g}^R_t)^2 + br^{\lambda}_{C,t} + \delta(-(g_{t+1} - \tilde{g}^R_{t+1})^2 +$

$br^{\lambda}_{C,t+1})\forall\delta \in (0,1)$ which follows from the optimality of g_t^{R*}in$g_t^* = (g_t^{M*}, g_t^{R*})$. The aforementioned logic also holds if parties L and M or parties L and R belong to the coalition. Thus any two incumbent parties in the coalition government have no incentives to deviate from g_t^* as claimed. □

Proof of Proposition 1 Recall that $g_t^* = \frac{(1-\delta)(2br^{\lambda}_{C,t})+\delta(1+br^{\lambda}_{C,t+1})g_t(\gamma_t)}{\delta g_{t+1}(\gamma_{t+1})}$ where g_t^{i*} is continuous in $\delta \in (0,1)$. One can check from this expression that if the discount factor of parties in the coalition government decreases (i.e.lim $\delta \to 0$), then $g_t^{i*} > 0$. Suppose $\delta'' < \delta'$ where $\delta' \in (0,1)$ and $\delta'' \in (0,1)$. Then $\frac{(1-\delta'')(2br^{\lambda}_{C,t})+\delta''(1+br^{\lambda}_{C,t+1})g_t(\gamma_t)}{\delta'' g_{t+1}(\gamma_{t+1})} > \frac{(1-\delta')(2br^{\lambda}_{C,t})+\delta'(1+br^{\lambda}_{C,t+1})g_t(\gamma_t)}{\delta' g_{t+1}(\gamma_{t+1})}$. Hence g_t^* strictly increases for lower values of (i.e. decreasing) δ. □

Proof of Claim 1 We need to demonstrate that $\partial g_t^*/\partial r^{\lambda}_{C,t} > 0$: Observe that $b'r^{\lambda}_{C,t} > 0$ and $b''r^{\lambda}_{C,t} < 0$, as assumed in the text. We thus obtain the following expression after some algebra and collecting terms,

$$\frac{\partial g_t^*}{\partial r^{\lambda}_{C,t}} = \frac{\overbrace{\delta g(\gamma^i_{t+1})}^{+}\left(\overbrace{2(1-\delta)b'r^{\lambda}_{C,t}}^{+}]+\overbrace{\delta[g'(\gamma^i_{t+1})(1+br^{\lambda}_{C.t+1})}^{+}\overbrace{(b'r^{\lambda}_{C,t+1})}^{+}\right)}{\underbrace{(\delta g(\gamma^i_{t+1}))}_{+}}.$$

Since the numerator and denominator of this expression is positive, we obtain $\partial g_t^*/\partial r^{\lambda}_{C,t} > 0$. □

Proof of Claim 2 We show that $r^{\lambda}_{C,t}$ increases when lim $\delta \to 0$. First, let lim $\delta \to 0$ in (A.1). If lim $\delta \to 0$ then (A.1) is equal to $-\left(g_t - g_t^i\right)^2 + br^{\lambda}_{C,t}$. Substituting g_t^*in $-\left(g_t - g_t^i\right)^2 + br^{\lambda}_{C,t}$ leads to $-\left(g_t^* - g_t^i\right)^2 + br^{\lambda}_{C,t}$ which implies that $r^{\lambda}_{C,t} = \frac{\left(g_t^* - g_t^i\right)^2}{b}$. Note that in $r^{\lambda}_{C,t} = \frac{\left(g_t^* - g_t^i\right)^2}{b}$, $b > 0$ and $(g_t^* - g_t^i)^2 > 0$ when lim $\delta \to 0$ in g_t^*. This $\Rightarrow r^{\lambda}_{C,t} > 0$ for lim $\delta \to 0$ □

Proof of Claim 3 From the Bellman equation of the single party's dynamic programming problem, we obtain $g_t^{S*} = \frac{\delta_S(1-\delta_S)(br^{\lambda}_{S,t+1})}{\delta_S(g_{t+1}(\beta_{t+1}))+(1-\delta_S)(br^{\lambda}_{S,t+1}+g_t(\beta_t))}$. Observe that $g_t^{S*} \to 0$ for lim $\delta_S \to 0$ *and* lim $\delta_S \to 1$. Since $g_t^{S*} \to 0$ at the upper *and* lower bound of δ_S, $g_t^{S*} \to 0$ in the interior of $\delta_S \in (0,1)$. □

Data sources for control variables

trade openness, age dependency ratio, log inflation, log GDP per capita, log population: World Bank (2008a,b) WDI CD-rom, IMF (2008) GFS CD-rom, PWT (2007).

parliamentary, majoritarian, federal, divided, PR, veto players, government polarization: Golder (2005), World Bank (2008a,b) DPI; Databanks International (2008) CNTS.

coalition dummy, coalition parties, coalition polarization: Budge et al. (2006), World Bank (2008a,b) DPI, Databanks International (2008) CNTS, Woldendorp et al. (2000), *Keesings Record of World Events* (various years), Cheibub et al. (2004), Strom et al. (2008) and Saiegh (2009).

elf: Fearon and Laitin (2003), *cbi*: Cukierman et al. (2002); *elf* & *cbi* extended to all countries in sample till 2007.

References

Alesina A, Özler S, Roubini N, Swagel P (1996) Political instability and economic growth. J Econ Growth l.1:189–211

Alvarez R, Garret G, Lange P (1991) Government partisanship, labor organization and macroeconomic performance. Am Polit Sci Rev 85(2):539–556

Banks A (2008) Databanks international. Available at: http://www.databanks.sitehosting.net

Bawn K, Rosenbluth F (2006) Short versus long coalitions: electoral accountability and the size of the public sector. Am J Polit Sci 50(2):251–265

Beck N, Katz J (1995) What to do (and not to do) with time series-cross sectional data. Am Polit Sci Rev 89(3):634–647

Beck N, Katz J, Tucker R (1998) Taking time seriously: time-series-cross-section analysis with a binary dependent variable. Am J Polit Sci 42(4):1260–1288

Beck T, Clarke G, Groff A, Keefer P, Walsh P (2002) New tools in comparative political economy: the database of political institutions. World Bank Econ Rev 15(1):165–176

Blundell R, Bond S (1998) Initial conditions and moment restrictions in dynamic panel data models. J Econ 87:115–144

Brautigam D, Fjelstad O-H, Moore M (2008) Taxation and state-building in developing countries: capacity and consent. Cambridge University Press, Cambridge

Budge I, Klingemann H-D, Volkens A, Bara J (2006) Mapping policy preferences II: estimates for parties, electors, and governments in central and Eastern Europe, European Union, and OECD, 1990–2003. Oxford University Press, New York

Cheibub JA, Limongi F (2002) Democratic institutions and regime survival: parliamentary and presidential democracies reconsidered. Annu Rev Polit Sci 5:151–179

Cheibub JA, Przeworski A, Saiegh S (2004) Government coalitions and legislative success under presidentialism and parliamentarism. Br J Polit Sci 34(3):565–587

Christopher A (2000) Why lagged dependent variables can suppress the power of other independent variables. Unpublished Manuscript

Cukierman A, Miller G, Neyapti B (2002) Central bank reform, liberalization and inflation in transition economies—an international perspective. J Monet Econ 49(2):237–264

Delury G (1999) World encyclopedia of political systems and parties, 3 edn

Diermeier D, Stevenson W (1999) Cabinet survival and competing risks. Am J Polit Sci 43(5):1051–1098

Fearon JD, Laitin D (2003) Ethnicity, insurgency, and civil war. Am Polit Sci Rev 97(1):75–90

Franzese R (1999) Partially independent central banks, politically responsive governments, and inflation. Am J Polit Sci 43(3):681–706

Franzese RJ (2002) Macroeconomic policies of developed democracies. Cambridge University Press, Cambridge

Franzese RJ (2004) Fiscal policy with multiple policymakers: veto actors and deadlock; collective action and common pools; delegation, bargaining, and compromise. Veto actor analysis H. Magara (ed.)

Franzese R, Nooruddin I (2004) The effective constituency in (Re)distributive politics: alternative bases of democratic representation. Unpublished Manuscript

Garrett G, Lange P (1991) Political responses to interdependence: what's 'Left' for the Left? Int Organization 45:538–564

Golder M (2005) Democratic electoral systems around the world, 1946–2000. Elect Stud 24(1):103–121

Groseclose T, McCarty N (2001) The politics of blame: bargaining before an audience. Am J Polit Sci 45:100–120

Hallerberg M, von Hagen J (1999) Electoral institutions, cabinet negotiations, and budget deficits in the European union. In: Poterba J, von Hagen J (eds) Fiscal institutions and Fiscal performance. University of Chicago Press, London
Hicks A, Swank D (1992) Politics, institutions, and welfare spending in industrialized democracies, 1960–82. Am Polit Sci Rev 86(3):658–674
Holmstrom BR (1999) Managerial incentive problems: a dynamic perspective. Rev Econ Stud 66(1): 169–182
Hurlin C, Venet C (2003) Granger causality tests in panel data models with fixed coefficients. mimeo
International Monetary Fund (2008) Government finance statistics (CD-ROM)
Jackle S (2009) Government termination in parliamentary democracies—an event history approach with special attention to party ideology. Paper presented at the ECPR Joint Session, Lisbon
Keefer P (2004) What does political economy tell us about economic development—and vice versa? Policy research working paper series 3250. The World Bank, Washington
Keesing's Record of World Events (2005) Keesing's Worldwide Online. http://www.keesings.com/
King G, Alt J, Burns N, Laver M (1990) A unified model of cabinet dissolution in parliamentary democracies. Am J Polit Sci 3(3):846–871
Kontopolous Y, Perotti R (1999) Government fragmentation and Fiscal policy outcomes: evidence from the OECD countries. In: Poterba J, von Hagen J (eds) Fiscal institutions and Fiscal performance. University of Chicago Press, Chicago, pp 81–102
Laakso M, Taagepera R (1979) Effective number of parties: a measure with application to west Europe. Comp Polit Stud 12(1):3–27
Linz J (1994) Presidential or parliamentary democracy: does it make a difference? In: Linz JJ, Valenzuela A (eds) The failure of presidential democracy. Johns Hopkins Press, Baltimore, pp 3–87
Maeda K, Nishikawa M (2006) Duration of party control in parliamentary and presidential governments: a study of 65 democracies, 1950–1998. Comp Polit Stud 39(3):352–374
Maravall JM (2010) Accountability in coalition governments. Annu Rev Polit Sci 13:81–100
Milesi-Ferretti G, Perotti R, Rostagno M (2002) Electoral systems and the composition of government spending. Q J Econ 117(2):609–657
Mukherjee B (2003) Political parties and the size of government in mulitparty legislatures. Comp Polit Stud 36(3):699–728
OECD OECD Economic Outlook (various years) Available at. http://www.oecd.org/statisticsdata/0,3381,en_2649_33733_1_119656_1_1_1,00.html
Penn World Tables (2007) Version 6.1. http://pwt.econ.upenn.edu/php_site/pwt_index.php
Persson T, Tabellini G (2003) Economic effects of constitutions. MIT Press, Cambridge
Persson T, Tabellini G (2004) Constitutional rules and economic performance outcomes. Am Econ Rev 94(1):25–46
Persson T, Roland G, Tabellini G (1997) Separation of powers and political accountability. Q J Econ 112(4):1163–1202
Persson T, Roland G, Tabellini G (2005) Electoral rules and government spending in parliamentary democracies. Working paper, Department of Economics, UCLA
Przeworski A, Cheibub A, Limongi F, Alvarez M (2000) Democracy and development. Cambridge University Press, New York
Rodden J (2004) Comparative federalism and decentralization: on meaning and measurement. Comp Polit 36(4):481–500
Rodrik D (1997) Has globalization gone too far? Institute for International Economics, Washington
Roubini N, Sachs J (1989) Political and economic determinants of budget deficits in the industrial democracies. Eur Econom Rev 33(5):903–938
Saiegh S (2009) Coalition governments and sovereign debt crises. Econ Polit 21(2):232–254
Scartascini C, Crain M (2002) The size and composition of government spending in multi party systems. mimeo, George Mason University, Department of Economics
Shelton C (2007) The size and composition of government spending. J Public Econ 91:2230–2260
Smith A (2003) Election timing in majoritarian parliamentary systems. Br J Polit Sci 33:379–418
Somer-Tocpu Z, Williams LK (2008) Survival of the fittest? cabinet duration in post-communist Europe. Comp Polit 40(3):313–329
Strom K, Muller WC, Bergman T (2008) Cabinets and coalition bargaining: the democratic life cycle in western Europe. Oxford University Press, Oxford
Tabellini G, Alesina A (1990) Voting on the budget deficit. Am Econ Rev 80(1):37–49

Tanzi V, Zee H (2001) Tax policy for developing countries. IMF Publication Series, Washington
Tavits M (2004) The size of government in majoritarian and consensus democracies. Comp Polit Stud 37(3):340–359
Tsebellis G, Chang ECC (2005) Veto players and the structure of budgets in advanced industrialized countries. Eur J Polit Res 44(2):295–326
United Nations, System of National Accounts (various years) U.N. Statistical Division. UN, New York
Velasco A (1999) A model of endogenous Fiscal deficits and delayed Fiscal reforms. In: Poterba J, von Hagen J (eds) Fiscal institutions and Fiscal performance. University of Chicago Press, Chicago, pp 37–57
Warwick P (1992) Economic-trends and government survival in west European parliamentary democracies. Am Polit Sci Rev 86:875–887
Warwick P (1994) Government survival in parliamentary regimes. Cambridge University Press, Cambridge
Woldendorp J, Keman H, Budge I (2000) Party government in 48 democracies, 1945–1998. Kluwer Academic Publishers, Boston
World Bank (2008a) Database of political institutions. Washington
World Bank (2008b) World development indicators. (CD-Rom)