A Structural Model of Government Formation*

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ABSTRACT

In this paper we estimate a bargaining model of government formation in parliamentary democracies. We use the estimated structural model to conduct policy experiments aimed at evaluating the impact of institutional features of the bargaining environment on the type of coalitions that form (e.g., minority, or majority) and on their relative stability.

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1 Introduction

The defining feature of parliamentary democracies is the fact that the executive derives its mandate from and is politically responsible to the legislature. This implies that who forms the government is not determined by an election alone, but is the outcome of a bargaining process among the parties represented in the parliament. Furthermore, it implies that the government may terminate at any time before the expiration of a parliamentary term if it loses the confidence of the parliament.

Parliamentary democracies, however, are quite diverse with respect to the specific rules in their constitutions that govern the formation and termination of their governments (Lijphart (1984), Inter-Parliamentary Union's archives at http://www.ipu.org).[1] They also differ systematically with respect to the observed duration of their government formation processes, the outcomes of these processes, and the relative durability of their governments. For example, in some countries like Denmark minority governments are virtually the norm, while in Germany they almost never occur. Similarly, governments in Italy are notoriously unstable, while Dutch governments frequently last the entire legislative period (Laver and Schofield (1990), Strom (1990)). These observations raise the following questions: Can constitutional features account for these observed differences? And if so, which institutions are quantitatively most important for the structure and the fate of governments?

Providing answers to these questions is rather important for the design (or redesign) of constitutions in modern parliamentary democracies.[2] An important line of research in politi-

[1] Parliamentary democracies also differ in their electoral laws. In this paper, we abstract from differences in electoral institutions and restrict attention to parliamentary systems with proportional representation. By holding the electoral system constant, we can then focus on the institutional rules that govern the formation and termination of governments.

[2] Several "young" democracies, like the countries that emerged from the collapse of the East European block, are currently facing these issues. Some of the "older" democracies, for example Belgium and Italy, are also experimenting with changes in their constitution. Moreover, the European unification process may

cal economy aims at assessing the political and economic consequences of political institutions (see, e.g., Besley and Coate (1997, 1998), Grossman and Helpman (1994), Myerson (1993), and Persson, Roland and Tabellini (1997, 1998)).[3] Empirical studies have demonstrated that political instability has a detrimental effect on economic performance and growth (see, e.g., Alesina et al. (1996) and Barro (1991)). The main goal of this paper is to investigate which features of a parliamentary democracy are most responsible for inducing government stability.

For the most part, the theoretical and the empirical literature on government formation and termination have been proceeding in parallel ways. Empirical studies are typically concerned with establishing stylized facts outside the context of any theoretical model.[4] Theoretical contributions typically aim at providing tractable models which may explain some of these facts, but are in general not suitable for empirical analysis.[5]

An exception is represented by the work of Merlo (1997) who estimates a structural model of government formation in postwar Italy and uses the estimated model to evaluate the effect of bargaining deadlines on negotiation delays and government stability. Merlo's analysis, however, is tailored to a specific institution (Italy's political system after World War II) and takes the set of parties who have agreed to try form a government together (what we refer to as the *proto-coalition*) as given.

In this paper, we use data from nine West European countries over the period 1947–

lead to the formation of a "european state" whose constitution presumably would draw from the existing constitutions of the member states.

[3]For an extensive survey of the literature see Persson and Tabellini (1999).

[4]For recent overviews of the large empirical literature on government formation and termination see Laver and Schofield (1990), Laver and Shepsle (1996), Strom (1990), and Warwick (1994).

[5]See, for example, Austen-Smith and Banks (1988, 1990), Baron (1989, 1991, 1993, 1998), Baron and Diermeier (1998), Baron and Ferejohn (1989), Diermeier and Feddersen (1998), Diermeier and Merlo (1998), Laver and Shepsle (1990, 1998), and Lupia and Strom (1995).

1997 to estimate a structural model of government formation in parliamentary democracies. The theoretical model we consider extends the bargaining model proposed by Merlo (1997) to endogenize the formation of the proto-coalition and the selection of the proto-coalition *formateur* (i.e., the party chosen by the head of state to try to form a government). Our analysis accounts for most of the empirical regularities identified by the existing literature and interprets them in the context of an equilibrium model. In addition, our approach allows us to conduct policy experiments to evaluate the effect of institutional features of the bargaining environment (such as whether an investiture vote is required to form a government, the rules for tabling a vote of no–confidence, and the procedure for the selection of the formateur) on the outcomes of the bargaining process: That is, which coalition forms the government, the number of attempts it takes to form the government, and the stability of the government.

Our main findings highlight the importance of constitutional rules for government formation and stability. For example, we find that political systems with a constructive vote of no-confidence and without an investiture vote dominate all other systems with respect to stability. Moreover, the analysis demonstrates that the effects of specific constitutional features may be quite subtle. For instance, a constitutional rule that requires the selection of the largest party to make the first government proposal has a large negative effect on government stability, except in political systems without an investiture vote and a constructive vote of no-confidence, where the same rule would promote stability. These subtleties emphasize the importance of quantifying the effects of constitutional rules on the making and breaking of governments. Our structural model allows us to perform such an assessment in the context of an equilibrium framework.

The remainder of the paper is organized as follows. In Section 2 we present the model. In Section 3 we describe the data and the econometric specification. Section 4 contains the results of the empirical analysis. Policy experiments are presented in Section 5. Concluding remarks are included in Section 6.

2 The Model

We consider a bargaining model of government formation in parliamentary democracies that builds on our previous work (Diermeier and Merlo (1998), Merlo (1997)). Let $N = \{1, ..., n\}$ denote the set of parties represented in the parliament and let $\pi \in \Pi = \{(\pi_1, ..., \pi_n) : \pi_i \in (0, 1), \sum_{i \in N} \pi_i = 1\}$ denote the vector of the parties' relative shares in the parliament.[6] Each party $i \in N$ has linear Von Neumann-Morgenstern preferences over the benefits from holding office $x_i \in \Re_+$ and the composition of the government coalition $G \subseteq N \cup \{\emptyset\}$,

$$U_i(x_i, G) = x_i + \lambda u_i^G, \tag{1}$$

where

$$u_i^G = \begin{cases} \varepsilon_i^G & \text{if } i \in G \\ \varepsilon_i^{N \setminus G} & \text{if } i \notin G, \end{cases} \tag{2}$$

and $\varepsilon_i^G > \varepsilon_i^{N \setminus G}$, $\varepsilon_i^G, \varepsilon_i^{N \setminus G} \in \Re$. This specification captures the intuition that parties care both about the benefits from being in the government coalition (and, for example, controlling government portfolios) and the identity of their coalition partners. In particular, ε_i^G can be thought of as the utility a party in the government coalition obtains from implementing government policies. Which policies a government implements depend on the coalition partners' relative preferences over policy outcomes and on the institutional mechanisms through which policies are determined. In this paper, we abstract from these aspects and summarize all policy related considerations in equation (2).[7]

Our analysis begins after an election or the resignation of an incumbent government (possibly because of a general election or because of a no-confidence vote in the parliament). We let H denote the *time horizon* to the next scheduled election (which represents the maximum amount of time a new government could remain in office) and $s \in S$ denote the

[6] The shares are determined by the outcome of a general election which is not modeled here.

[7] For a richer, spatial model of government formation where government policies are endogenously determined, see Diermeier and Merlo (1998).

current *state of the world* (which summarizes the current political and economic situation). While H is constant, we assume that the state of the world evolves over time according to an i.i.d. stochastic process σ with state space S and probability distribution function $F_\sigma(\cdot)$.

After the resignation of an incumbent government, the head of state chooses one of the parties represented in the parliament to try to form a new government. We refer to the selected party $\Bbbk \in N$ as the *formateur*. Following Laver and Shepsle (1996) and Baron (1991, 1993), we assume that the choice of a formateur is non-partisan and the head of state is non-strategic.[8] In particular, we assume that each party $i \in N$ is selected to be a formateur with probability

$$p_i = \frac{\exp(\alpha_1 \pi_i + \alpha_2 I_i)}{\sum_{j \in N} \exp(\alpha_1 \pi_j + \alpha_2 I_j)}, \tag{3}$$

where $I_i \in \{0, 1\}$ is an indicator variable denoting whether party i is the party of the former prime minister (in which case $I_i = 1$). We let $\Bbbk_{-1} \in N$ denote the party of the former prime minister. This specification captures the intuition that although relatively larger parties may be more likely to be selected as a formateur than relatively smaller parties, there may be an incumbency bias.[9]

The formateur then chooses a *proto-coalition* $D \in \Delta_\Bbbk$, where $\Delta_\Bbbk$ denotes the set of subsets of N which contain $\Bbbk$. Intuitively, a proto-coalition is a set of parties that agree to talk to each other about forming a government together. Let $\pi^D \equiv \sum_{i \in D} \pi_i$ denote the *size* of proto-coalition D. The proto-coalition bargains over the formation of a new government, which determines the allocation of government portfolios among the coalition members, $x^D = (x_i^D)_{i \in D} \in \Re_+^{|D|}$. Following Merlo (1997), we assume that cabinet portfolios

[8] Note that constitutions are typically silent with respect to the rules for selecting a formateur, which are generally reflected in unwritten conventions and norms. This is the case for all the countries we consider. An exception is represented by Greece (which is not in our data set), where the constitution prescribes that the party that controls the largest fraction of parliamentary seats must be chosen as the formateur.

[9] See, e.g., Diermeier and Merlo (1999).

generate a (perfectly divisible) unit level of surplus in every period a government is in power and we let $T \in [0, H]$ denote the duration of a government.

Government duration in parliamentary democracies is not fixed. Rather, it is a variable that depends on institutional factors (such as whether an investiture vote is required to form a government, and the rules for tabling a vote of no–confidence), the relative size of the government coalition, the time horizon to the next election, the state of the political and economic system at the time a government forms, and political and economic events occurring while a government is in power (see, e.g., King et al. (1989), Merlo (1998), and Warwick (1994)). Let Q denote the vector of institutional characteristics affecting government duration and let π^G denote the size of the government coalition. Hence, T can be represented as a random variable with density function $g(t|s, H, Q, \pi^G)$ over the support $[0, H]$.[10]

Given the current state s and given the vector of (time-invariant) characteristics (H, Q, π^D), let

$$y^D(s, H, Q, \pi^D) = E[T|s, H, Q, \pi^D] \tag{4}$$

denote the *cake* to be divided among the members of the proto-coalition D if they agree to form a government in that state. That is, $y^D(\cdot) \in (0, H)$ represents the total expected benefits from forming a government in state s. Given proto-coalition D, for any state s, let

$$X^D(s, H, Q, \pi^D) \equiv \left\{ x^D \in R_+^{|D|} : \sum_{i \in D} x_i^D \leq y^D(s; H, Q, \pi^D) \right\} \tag{5}$$

denote the set of feasible utility vectors to be allocated in that state, where x_i^D is the amount of cake awarded by coalition D to party $i \in D$.

The bargaining game proceeds as follows. Given state s, the formateur chooses either to pass or to propose an allocation $x^D \in X^D(s; H, Q, \pi^D)$. If $\Bbbk$ proposes an allocation, all the other parties in the proto-coalition sequentially respond by either accepting or rejecting the

[10] In this paper, we treat government dissolution as exogenous. Given our data, this assumption makes the estimation of the model feasible. For a theoretical model where the decision of dissolving a government is endogenous, see Diermeier and Merlo (1998).

proposal until either some party has rejected the offer or all parties in D have accepted it. If the proposal is unanimously accepted by the parties in the proto-coalition, a government is inaugurated and the game ends. If no proposal is offered and accepted by all parties in the proto-coalition, state s' is realized in the next period according to the stochastic process σ and party $i \in D$ is selected to make a government proposal with probability

$$\widetilde{p}_i(D) = \frac{\exp(\alpha_3 \pi_i + \alpha_4 K_i)}{\sum_{j \in D} \exp(\alpha_3 \pi_j + \alpha_4 K_j)}, \tag{6}$$

where $K_i \in \{0, 1\}$ is an indicator variable denoting whether party i is the formateur (in which case $K_i = 1$). Let $\ell \in D$ denote the identity of the proposer. This specification captures the intuition that although relatively larger parties in the proto-coalition may be more likely to be selected as proposers than relatively smaller parties, there may be a bias in favor of the formateur party. The bargaining process continues until some proposed allocation is unanimously accepted by the parties in the proto-coalition.

An outcome of this bargaining game (τ^D, χ^D) may be defined as a stopping time $\tau^D = 0, 1, ...$ and a $|D|$–dimensional random vector χ^D which satisfies $\chi^D \in X^D(\sigma_{\tau^D}, H, Q, \pi^D)$ if $\tau^D < +\infty$ and $\chi^D = 0$ otherwise. Given a realization of σ, τ^D denotes the period in which a proposal is accepted by proto-coalition D, and χ^D denotes the proposed allocation that is accepted in state σ_{τ^D}. Define $\beta^\infty = 0$. Then an outcome (τ^D, χ^D) implies a von Neumann-Morgenstern payoff to each party $i \in D$ equal to $E[\beta^{\tau^D} \chi_i^D] + \lambda \varepsilon_i^D$, where $\beta \in (0, 1)$ is the common discount factor reflecting the parties' degree of impatience, and a payoff to each party $j \in N \backslash D$ equal to $\varepsilon_{N \backslash D}$. Let

$$V_{\Bbbk}(D, H, Q, \pi^D) \equiv E[\beta^{\tau^D} \chi_i^D]. \tag{7}$$

For any formateur $\Bbbk \in N$, each potential proto-coalition $D \in \Delta_{\Bbbk}$ is associated with an expected payoff for party $\Bbbk$

$$W_{\Bbbk}(D, H, Q, \pi^D) = V_{\Bbbk}(D, H, Q, \pi^D) + \lambda \varepsilon_{\Bbbk}^D. \tag{8}$$

Hence, party $\Bbbk$ chooses the proto-coalition to solve

$$\max_{D \in \Delta_{\Bbbk}} W_{\Bbbk}(D, H, Q, \pi^D). \tag{9}$$

Let $D_{\Bbbk} \in \Delta_{\Bbbk}$ denote the solution to this maximization problem.

2.1 Equilibrium Characterization

The bargaining model described above is a special case in the class of stochastic bargaining games studied by Merlo and Wilson (1995, 1998). In particular, the unique stationary subgame perfect equilibrium to this game has the following features. First, the equilibrium agreement rule possesses a reservation property: In any state s, coalition D agrees in that state if and only if $y^D(s, H, Q, \pi^D) \geq y^*(D, H, Q, \pi^D)$, where $y^*(\cdot)$ solves

$$y^*(D, H, Q, \pi^D) = \beta \int \max\{y^D(s', H, Q, \pi^D),\, y^*(D, H, Q, \pi^D)\} dF(s'). \tag{10}$$

Second, for any formateur $\Bbbk \in N$ and for any potential proto-coalition $D \in \Delta_{\Bbbk}$, the ex-ante expected equilibrium payoff to party $\Bbbk$ is given by

$$W_{\Bbbk}(D, H, Q, \pi^D) = \left(\frac{1 - \beta(1 - \widetilde{p}_{\Bbbk})}{1 - \beta} \right) \int \max\{y^D(s, H, Q, \pi^D) - \, y^*(D, H, Q, \pi^D),\, 0\} dF(s) + \lambda \varepsilon^D_{\Bbbk}. \tag{11}$$

These results follow immediately from the general characterization contained in Merlo and Wilson (1998). Hence,

$$D_{\Bbbk} = \arg\max_{D \in \Delta_{\Bbbk}} \left(\frac{1 - \beta(1 - \widetilde{p}_{\Bbbk})}{1 - \beta} \right) \int \max\{y^D(s, H, Q, \pi^D) - \, y^*(D, H, Q, \pi^D),\, 0\} dF(s) + \lambda \varepsilon^D_{\Bbbk}. \tag{12}$$

3 Empirical Analysis

Our sample of observations consists of 236 governments in 9 countries over the period 1947–1997. The countries we consider are Belgium (32 governments), Denmark (23 governments), Finland (24 governments), Germany (21 governments), Iceland (19 governments), Italy (51

governments), Netherlands (19 governments), Norway (23 governments), and Sweden (24 governments). All these countries have been parliamentary democracies since World War II and elect their parliament according to proportional representation. They differ, however, with respect to specific institutional features which affect the way governments form and terminate. First, in some countries (Belgium and Italy), after a new government is inaugurated it has to be approved by a parliamentary majority (the so–called *investiture vote*). The other countries considered here do not have such a requirement. Second, in all parliamentary democracies each party represented in the parliament can at any time table a *vote of no–confidence*. In all countries except Germany (and, since 1993, Belgium), the vote establishes whether the current government has the support of a parliamentary majority. If it lacks a majority, the government has to resign which leads to a new government formation process. In Germany and, more recently, in Belgium, on the other hand the so–called *constructive vote of no–confidence* procedure establishes whether a proposed alternative government is preferred by a parliamentary majority to the current government coalition.

An observation in the sample is defined by the identity of the formateur party, $\mathbb{k}$, the composition of the proto-coalition, $D_{\mathbb{k}}$, the duration of the negotiation over the formation of a new government (i.e., the number of attempts), $\tau^{D_{\mathbb{k}}}$, the sequence of proposers (one for each attempt) if the formateur does not succeed to form the government at the first attempt, $\ell_2, ..., \ell_{\tau^{D_{\mathbb{k}}}}$, and the duration of the government following that negotiation (i.e., the number of days the government remains in power), $t^{D_{\mathbb{k}}}$. For each element in the sample we also observe the vector of institutional characteristics, Q, (i.e., whether an investiture vote is required to form a government and whether the rules for tabling a vote of no–confidence require an alternative to be pre–specified), the time horizon to the next scheduled election, H, the set of parties represented in the parliament, N, the vector of their relative seat shares, π, and the party of the former prime minister, $\mathbb{k}_{-1}$.

Keesings Record of World Events (1944–present) was used to collect information on the

number of attempts for each government formation, the identity of the proposer on each attempt, the time horizon to the next election, and the duration of the government following each negotiation.[11] The list of parties represented in the parliament for each country and their shares of parliamentary seats at the time of each negotiation over the formation of a new government was taken from Mackie and Rose (1990) and, for later years in the sample, from Keesings, the *European Journal of Political Research*, and the *Lijphart Elections Archives*.[12] Institutional characteristics of the countries included in our study were obtained from Lijphart (1984).

Data on the duration of negotiations are summarized in the histogram contained in Figure 1. As we can see from this figure, 67% of all government formations in our sample occur at the first attempt and 98% of all government formations require no more than four attempts.

Data on government durations expressed as percentages of the time horizon to the next scheduled election from the time a government formed are summarized in the histogram displayed in Figure 2. Since the time horizon to the next scheduled election represents the maximum potential duration of a government, this represents a useful normalization that allows us to compare the duration of governments formed under different circumstances. We refer to a government duration divided by its maximum potential duration, t/H, as a normalized government duration. As we can see from this figure, the empirical distribution of normalized government duration displays a noticeable "bathtub" shape. Most governments either fall early in their tenure or they tend to last until the next scheduled election. About 25% of all governments in the sample last less than 20% of their maximum potential duration, and about 28% of all governments last more than 80% of their maximum potential duration. Some of the short duration can be explained by governments failing their investiture vote. To illustrate this point we present Figures 3 and 4, which contain the empirical distributions of

[11]Several other country-specific sources (such as local newspapers and databases) were used to confirm dubious entries in Keesings.

[12]The archive is available on the World Wide Web at http://dodgson.ucsd.edu/lij.

normalized government duration when an investiture vote is required or no investiture vote is required, respectively. As we can see from these figures, in countries with an investiture vote about 20% of all governments fall within a few days of their inauguration, whereas in countries without an investiture vote this event occurs in less than 5% of the cases.

Data on the size of government coalitions are summarized in the histogram contained in Figure 5. About 35% of all governments in our sample are minority governments (i.e., the government coalition controls less than 50% of the seats in parliament). About 66% of all government coalitions control between 40% and 60% of the parliamentary seats.

Descriptive statistics of all the variables are reported in Table 1, where $INVEST$ is a dummy variable that takes the value one if a country requires an investiture vote and zero otherwise, $CCONF$ is a dummy variable that takes the value one if a country requires a vote of no–confidence to be constructive and zero otherwise, $MINORITY$ is a dummy variable that takes the value one if the government coalition is a minority coalition (i.e., it controls less than 50% of the parliamentary seats) and zero otherwise, and $MAJORITY = 1 - MINORITY$. Note that $Q = (INVEST, CCONF)$.

In addition to the information reported in Table 1, note that minority governments are on average less stable than majority governments (the mean normalized government duration is equal to 0.42 for minority governments and 0.56 for majority governments). Furthermore, there are relatively fewer minority governments in countries with an investiture vote (where minority governments account for 27% of all governments) or in countries with a constructive vote of no-confidence (where minority governments account for 10% of all governments), than in countries without an investiture vote (where minority governments account for 39% of all governments) or in countries without a constructive vote of no-confidence (where minority governments account for 37% of all governments). Finally, the average number of attempts is higher and the mean normalized government duration is lower when $INVEST = 1$ (in which case they are equal to 1.98 and 0.34, respectively) than when $INVEST = 0$ (in which

case they are equal to 1.35 and 0.60, respectively), and when $CCONF = 0$ (in which case they are equal to 1.62 and 0.50, respectively) than when $CCONF = 1$ (in which case they are equal to 1.10 and 0.61, respectively).

3.1 Econometric Specification

In the bargaining model described in Section 2, we specified the cake a proto-coalition bargains over in any given period, y^D, to be equal to the expected government duration conditional on the state of the world in that period, s, given the vector of (time-invariant) characteristics, (H, Q, π^D). Also, we characterized the conditions under which agreement occurs in terms of a reservation rule on the size of the current cake. Hence, from the perspective of the political parties that observe the cakes, the sequence of events in a negotiation is deterministic, since they agree to form a government as soon as the current cake is above a threshold that depends only on their expectation about future states of the world and hence future cakes. The only uncertainty concerns the actual duration of the government following the agreement, T^D, which also depends on events occurring while the government is in power.

We (the econometricians), however, do not observe the sequence of cakes in a negotiation over the formation of a new government. Also, we do not observe all the relevant elements in the parties' information set when they form their expectations about government durations. Hence, from the perspective of the econometrician,

$$\begin{aligned} y^D(s, H, Q, \pi^D) &\equiv E[T^D | s, H, Q, \pi^D] \\ &= E[y^D | H, Q, \pi^D] + \nu_y \\ &= E[T^D | H, Q, \pi^D] + \nu_y, \end{aligned} \tag{13}$$

where the first expectation is conditional on what the parties in the proto-coalition observe, the other expectations are conditional on the econometrician's data set, and ν_y is an unobservable random term (with zero mean) accounting for what the econometrician does not

observe. Furthermore, the duration of a government that forms in state s can be expressed as

$$\begin{aligned} T^D &= E[T^D|s,H,Q,\pi^D]+\nu_T \\ &= y^D(s,H,Q,\pi^D)+\nu_T \\ &= E[T^D|H,Q,\pi^D]+\nu_y+\nu_T, \end{aligned} \tag{14}$$

where ν_T is another unobservable random term (with zero mean and independent of ν_y) capturing the fact that the actual duration of a government also depends on events that occur while a government is in power.

Let $G_y(y^D|H,Q,\pi^D)$ denote the conditional distribution of cakes with conditional density $g_y(\cdot|\cdot)$, and let $G_T(t^D|y^D;H,Q,\pi^D)$ denote the conditional distribution of government durations with conditional density $g_T(\cdot|\cdot)$, where $G_y(\cdot|\cdot)$ and $G_T(\cdot|\cdot)$ are consistent with (13) and (14).[13] Thus, from the point of view of the econometrician $y^*(D,H,Q,\pi^D)$ solves

$$\begin{aligned} y^* &= \beta\int \max\{y^D,\, y^*\}dG_y(y^D|H,Q,\pi^D) \\ &= \beta\left(E[y^D|H,Q,\pi^D]+\int_0^{y^*}(\, y^*-y^D)dG_y(y^D|H,Q,\pi^D)\right), \end{aligned} \tag{15}$$

and

$$\begin{aligned} V_{\Bbbk}(D,H,Q,\pi^D) &= \left(\frac{1-\beta(1-\widetilde{p}_{\Bbbk})}{1-\beta}\right)\int \max\{y^D-\ y^*(D,H,Q,\pi^D),\,0\}dG_y(y^D|H,Q,\pi^D) \\ &= \left(\frac{1-\beta(1-\widetilde{p}_{\Bbbk})}{1-\beta}\right)\left(1-G_y(y^*(D,H,Q,\pi^D)|H,Q,\pi^D)\right)\times \\ &\quad \left(E[y^D|y^D\geq y^*(D,H,Q,\pi^D);H,Q,\pi^D]-y^*(D,H,Q,\pi^D)\right). \end{aligned} \tag{16}$$

Let us now consider the decision problem faced by the formateur party $\Bbbk$. For each possible coalition $D\in\Delta_{\Bbbk}$, party $\Bbbk$ can compute its expected equilibrium payoff if D is chosen as the proto-coalition and bargains over the formation of a new government. The

[13] Note that $G_y(y^D|H,Q,\pi^D)$ and $G_T(t^D|y^D;H,Q,\pi^D)$ imply a distribution of T^D conditional on (H,Q,π^D).

formateur's expected payoff is given in equation (11) and depends on the expected outcome of the bargaining process as well as the formateur's tastes for its coalition partners, $\varepsilon_{\mathbb{k}}^{D}$. Hence, from the perspective of the formateur party that knows its tastes, the optimal coalition choice described in equation (12) is deterministic. We (the econometricians), however, do not observe $\varepsilon_{\mathbb{k}}^{D}$. Hence, from the perspective of the econometrician $\varepsilon_{\mathbb{k}}^{D}$ is a random variable. This implies that $W_{\mathbb{k}}(\cdot)$ is a random variable, which in turn implies that the formateur's decision problem is probabilistic. We assume that $\varepsilon_{\mathbb{k}}^{D}$ is independently and identically distributed according to a standard (mean zero and constant variance) type I extreme value distribution (see, e.g., Johnson and Kotz (1970; ch. 21)).

We can now specify the likelihood function which represents the basis for the estimation of our structural model. The contribution to the likelihood function of each observation in the sample is equal to the probability of observing the vector of (endogenous) events $(\mathbb{k}, D_{\mathbb{k}}, \tau^{D_{\mathbb{k}}}, \ell_2, ..., \ell_{\tau^{D_{\mathbb{k}}}}, t^{D_{\mathbb{k}}})$ conditional on the vector of (exogenous) characteristics $(H, Q, N, \pi, \mathbb{k}_{-1})$, given the vector of the model's parameters $\theta = (\alpha_1, \alpha_2, \alpha_3, \alpha_4, \beta, G_y, G_T, \lambda)$. Given the specification of our model, this probability can be written as

$$\begin{aligned}
\Pr(\mathbb{k}, D_{\mathbb{k}}, \tau^{D_{\mathbb{k}}}, \ell_2, ..., \ell_{\tau^{D_{\mathbb{k}}}}, t^{D_{\mathbb{k}}} | H, Q, N, \pi, \mathbb{k}_{-1}; \theta) \;=\; & \Pr(\mathbb{k} | N, \pi, \mathbb{k}_{-1}; \theta) \times \\
& \Pr(D_{\mathbb{k}} | \mathbb{k}, H, Q, N, \pi; \theta) \times \\
& \Pr(\tau^{D_{\mathbb{k}}} | H, Q, \pi^{D_{\mathbb{k}}}; \theta) \times \\
& \Pr(\ell_2, ..., \ell_{\tau^{D_{\mathbb{k}}}} | \tau^{D_{\mathbb{k}}}, D_{\mathbb{k}}, \mathbb{k}, \pi; \theta) \times \\
& \Pr(t^{D_{\mathbb{k}}} | \tau^{D_{\mathbb{k}}}, H, Q, \pi^{D_{\mathbb{k}}}; \theta), \qquad (17)
\end{aligned}$$

where

$$\Pr(\mathbb{k} | N, \pi, \mathbb{k}_{-1}; \theta) = p_{\mathbb{k}}, \qquad (18)$$

$$\begin{aligned}
\Pr(D_{\mathbb{k}} | \mathbb{k}, H, Q, N, \pi; \theta) \;&=\; \Pr\left(W_{\mathbb{k}}(D_{\mathbb{k}}, H, Q, \pi^{D_{\mathbb{k}}}; \theta) > W_{\mathbb{k}}(D, H, Q, \pi^{D}; \theta),\ \forall D \in \Delta_{\mathbb{k}}\right) \\
&=\; \frac{\exp(V_{\mathbb{k}}(D_{\mathbb{k}}, H, Q, \pi^{D_{\mathbb{k}}})/\lambda)}{\sum_{D \in \Delta_{\mathbb{k}}} \exp(V_{\mathbb{k}}(D, H, Q, \pi^{D})/\lambda)}, \qquad (19)
\end{aligned}$$

$$\begin{aligned}\Pr(\tau^{D_{\mathbb{k}}}|H,Q,\pi^{D_{\mathbb{k}}};\theta) &= \prod_{j=1}^{\tau^{D_{\mathbb{k}}}-1}\left[\Pr\left(y^{D_{\mathbb{k}}} < y^*(D_{\mathbb{k}},H,Q,\pi^{D_{\mathbb{k}}});\theta\right)\right]\times \\ &\quad \Pr\left(y^{D_{\mathbb{k}}} \geq y^*(D_{\mathbb{k}},H,Q,\pi^{D_{\mathbb{k}}});\theta\right) \\ &= \left[G_y(y^*(D_{\mathbb{k}},H,Q,\pi^{D_{\mathbb{k}}})|H,Q,\pi^{D_{\mathbb{k}}})\right]^{\tau^{D_{\mathbb{k}}}-1}\times \\ &\quad \left[1-G_y(y^*(D_{\mathbb{k}},H,Q,\pi^{D_{\mathbb{k}}})|H,Q,\pi^{D_{\mathbb{k}}})\right], \qquad (20)\end{aligned}$$

$$\Pr(\ell_2,...,\ell_{\tau^{D_{\mathbb{k}}}}|\tau^{D_{\mathbb{k}}},D_{\mathbb{k}},\mathbb{k},\pi;\theta) = \prod_{j=2}^{\tau^{D_{\mathbb{k}}}}\widetilde{p}_{\ell_j}(D_{\mathbb{k}}), \qquad (21)$$

and

$$\begin{aligned}\Pr(t^{D_{\mathbb{k}}}|\tau^{D_{\mathbb{k}}},H,Q,\pi^{D_{\mathbb{k}}};\theta) &= \Pr(t^{D_{\mathbb{k}}}|y^{D_{\mathbb{k}}} \geq y^*(D_{\mathbb{k}},H,Q,\pi^{D_{\mathbb{k}}});\theta) \\ &= \frac{\int_{y^*(\cdot)}^{H} g_T(t^{D_{\mathbb{k}}}|y^{D_{\mathbb{k}}};H,Q,\pi^{D_{\mathbb{k}}})dG_y(y^{D_{\mathbb{k}}}|H,Q,\pi^{D_{\mathbb{k}}})}{1-G_y(y^*(D_{\mathbb{k}},H,Q,\pi^{D_{\mathbb{k}}})|H,Q,\pi^{D_{\mathbb{k}}})}. \qquad (22)\end{aligned}$$

The log-likelihood function is obtained by summing the logs of (17) over all the elements in the sample.[14]

The next step consists of choosing parametric functional forms for $G_y(\cdot|\cdot)$ and $G_T(\cdot|\cdot)$. Following Merlo (1997), we assume that $g_y(\cdot|\cdot)$ and $g_T(\cdot|\cdot)$ are power function densities. In particular, we assume that

$$g_y(y^D|H,Q,\pi^D) \equiv \gamma(Q,\pi^D)\left[\frac{\left(y^D\right)^{\gamma(Q,\pi^D)-1}}{H^{\gamma(Q,\pi^D)}}\right],\ y^D \in (0,H),$$

where

$$\begin{aligned}\gamma(Q,\pi^D) &= MAJORITY \times \exp(\gamma_1+\gamma_2 INVEST+\gamma_3 CCONF+\gamma_4\pi^D+\gamma_5(\pi^D)^2)+ \\ &\quad MINORITY \times \exp(\gamma_6+\gamma_7 INVEST+\gamma_8 CCONF+\gamma_9\pi^D+\gamma_{10}(\pi^D)^2).\end{aligned}$$

Furthermore, we let

$$g_T(t^D|y^D;H,Q,\pi^D) \equiv \frac{y^D}{H-y^D}\left[\frac{\left(t^D\right)^{\frac{y^D}{H-y^D}-1}}{H^{\frac{y^D}{H-y^D}}}\right],\ t^D \in (0,H),$$

[14]Note that computing the likelihood function is a rather burdensome task since one has to enumerate all possible proto-coalitions and solve all possible bargaining games a proposer may choose to play. We thank Carl Coscia for developing the algorithm we use in our estimation.

which implies that $E[T^D|y^D; H, Q, \pi^D] = y^D$. We then use the likelihood function to estimate the parameters of the model, $(\alpha_1, \alpha_2, \alpha_3, \alpha_4, \beta, \gamma_1, \gamma_2, \gamma_3, \gamma_4, \gamma_5, \gamma_6, \gamma_7, \gamma_8, \lambda)$.

4 Results

Table 2 presents the maximum likelihood estimates of the parameters of the model. Note that a point estimate for β of 0.35 implies a fairly high degree of impatience on the part of the political parties or, alternatively, a fairly large distaste for bargaining. This is consistent with the findings reported by Merlo (1997) for Italy. While this number may appear small if we interpret it as an economic discount factor, political parties may have strong incentives to try to take office as rapidly as possible, especially in environments characterized by high government turnover.

Next, note that using our estimates of α_1 and α_2 we can answer two important questions regarding the selection of a formateur. First, if the size of one party increases by 1%, by what percentage does its probability of being selected as formateur increase? Providing an answer to this question is rather important. For example, a desirable property of a formateur selection rule requires that if the size of a party increases by 1% its recognition probability also increases by 1%. This implies that a party cannot increase its chances of forming a government by splitting, and two parties cannot get more joint chances by merging. To answer this question we obtain an estimate of the elasticity of the probability a party is selected as formateur with respect to its size,

$$\frac{\partial \ln p_i}{\partial \ln \pi_i} = \alpha_1 \pi_i (1 - p_i),$$

for each party in our sample, and we then compute the average across all observations. The estimate we obtain for this elasticity is equal to 0.98. The standard error associated with this estimate is equal to 0.09.[15] Hence, the null hypothesis that the elasticity is equal to 1

[15] The standard error was computed using the Delta Method (e.g. Greene (1997)), since the estimate of the elasticity of the recognition probability with respect to size is a function of the estimates of the model parameters.

cannot be rejected at standard significance levels

The second question concerning the formateur selection process can be stated as follows. For a given observation, consider the party that was successful in forming the previous government (i.e., the party of the former prime minister). Let that party be denoted by $\mathbb{k}_{-1} \in N$ and let $p_{\mathbb{k}_{-1}}$ be its probability of being selected as formateur. Holding everything else constant, let $\overline{p}_{\mathbb{k}_{-1}}$ be party $\mathbb{k}_{-1}$'s average recognition probability if we remove the incumbency advantage from party $\mathbb{k}_{-1}$ and we give it to one of the other parties $\ell \in N$ for all $\ell \neq \mathbb{k}_{-1}$. How large is the difference in the two probabilities–i.e., what is $p_{\mathbb{k}_{-1}} - \overline{p}_{\mathbb{k}_{-1}}$? Answering this question provides a measure of the incumbency premium. The average estimate of the incumbency premium we obtain is rather large and is equal to 0.23. This means that controlling for size, on average an incumbent party is 23% more likely to be selected as formateur. The standard error associated with this estimate (computed using the Delta Method) is equal to 0.03. Hence, the average incumbency premium is statistically greater than zero at conventional significance levels.[16]

To interpret the estimates we obtained for the other parameters of the model, note that they imply the following estimates for the mean of the distribution of (unobservable) cakes evaluated at the mean government size in the sample:[17]

$$\widehat{E}[y^D|H, INVEST = 0, CCONF, \pi^D = 0.54] = 0.444H, \tag{23}$$

$$\widehat{E}[y^D|H, INVEST = 1, CCONF, \pi^D = 0.54] = 0.312H, \tag{24}$$

$$\widehat{E}[y^D|H, INVEST, CCONF = 0, \pi^D = 0.54] = 0.376H, \tag{25}$$

[16]With respect to the selection of proposers within a proto-coalition, note that there is no evidence of a formateur premium, since the estimate of the parameter α_4 is not statistically different from zero.

[17]It follows from the assumption about the distribution of y that

$$E[y^D|H, Q, \pi^D] = \frac{\gamma(Q, \pi^D)}{1 + \gamma(Q, \pi^D)} H.$$

$$\widehat{E}[y^D|H, INVEST, CCONF = 1, \pi^D = 0.54] = 0.614H. \tag{26}$$

These estimates indicate that for any given H, the mean expected government duration for a majority coalition which controls 54% of the parliamentary seats in a political system without the investiture vote is 1.42 times larger than the mean expected government duration in a political system with an investiture vote. Furthermore, for any given H, the mean expected government duration for a majority coalition which controls 54% of the parliamentary seats in a political system with a constructive vote of no-confidence is 1.63 times larger than the mean expected government duration in a political system without the constructive vote of no-confidence.

The coalition partners, however, agree to form a government only if its expected duration exceeds a threshold and to delay agreement otherwise. This implies that not all potential governments form, and governments that are expected to have shorter duration are less likely to form. The threshold characterizing the agreement rule depend on H, Q, and π^D, and the estimates reported in Table 2 imply that

$$y^*(D, H, INVEST = 0, CCONF, \pi^D) > y^*(D, H, INVEST = 1, CCONF, \pi^D)$$

for any given D, H, $CCONF$, and π^D and

$$y^*(D, H, INVEST, CCONF = 1, \pi^D) > y^*(D, H, INVEST, CCONF = 0, \pi^D)$$

for any given D, H, $INVEST$, and π^D. These results indicate that, *ceteris paribus*, governments of shorter expected duration are less likely to form when there is no investiture vote than when there is an investiture vote and when there is no constructive vote of no-confidence than when there is a constructive vote of no-confidence. To evaluate the extent of the selection on expected government duration, we report the following estimates of the mean expected government duration if an agreement occurs (computed for a government

coalition whose size is equal to the sample mean):[18]

$$\widehat{E}[y^D|y^D \geq y^*(D, H, INVEST = 0, CCONF, \pi^D = 0.54)] = 0.560H, \tag{27}$$

$$\widehat{E}[y^D|y^D \geq y^*(D, H, INVEST = 1, CCONF, \pi^D = 0.54)] = 0.483H, \tag{28}$$

$$\widehat{E}[y^D|y^D \geq y^*(D, H, INVEST, CCONF = 0, \pi^D = 0.54)] = 0.520H, \tag{29}$$

$$\widehat{E}[y^D|y^D \geq y^*(D, H, INVEST, CCONF = 1, \pi^D = 0.54)] = 0.663H. \tag{30}$$

The comparison of the estimates reported in equations (27)-(30) with those in equations (23)-(26) (which are estimates of the mean expected government duration regardless of whether an agreement actually occurs), indicate that the selection effect as a consequence of delaying agreement may be substantial.

To assess the fit of the model we present Tables 3, 4, and 5. In Table 3 we compare the density of negotiation duration predicted by the model to the empirical density. One of the criteria we use to assess how well the model fits the data is Pearson's χ^2 test

$$n \sum_{\tau=1}^{\overline{T}} \frac{[f(\tau) - \widehat{f}(\tau)]^2}{\widehat{f}(\tau)} \sim \chi^2_{\overline{T}-1},$$

where $f(\cdot)$ denotes the empirical density function of the number of attempts, $\widehat{f}(\cdot)$ denotes the maximum likelihood estimate of the density function of the number of attempts, $n = 236$ is the number of observations, and $\overline{T} = 7$.[19] The χ^2 goodness-of-fit test reported in Table 3 does not reject the model at conventional significance levels, and the predicted mean number of attempts is almost identical to the one observed in the data. Table 4 reports evidence on the fit of the model to the government duration data by comparing the density of normalized

[18] It follows from the assumption about the distribution of y that

$$E[y^D|y^D \geq y^*(D, H, Q, \pi^D)] = \frac{\gamma(Q, \pi^D)}{1 + \gamma(Q, \pi^D)} \left[\frac{H^{1+\gamma(Q,\pi^D)} - y^*(D, H, Q, \pi^D)^{1+\gamma(Q,\pi^D)}}{H^{\gamma(Q,\pi^D)} - y^*(D, H, Q, \pi^D)^{\gamma(Q,\pi^D)}} \right]$$

[19] Note that the number of degrees of freedom is an upper bound because we do not take into account that the parameters in the model are estimated.

government duration predicted by the model to the empirical density. The model is capable of reproducing the "bathtub" shape of the empirical distribution and correctly predicts its mean. However, the χ^2 goodness-of-fit test rejects the model at conventional significance levels. In Table 5 we compare the density of government size predicted by the model to the empirical density. As we can see from this table, the model is capable of reproducing the shape of the distribution and correctly predicts the fraction of minority governments. Furthermore, the average government size predicted by the model is remarkably close to the observed average. However, the χ^2 goodness-of-fit test rejects the model at conventional significance levels.

While these results clearly reveal some of the limitations of our structural model, they should not be interpreted as grounds for dismissing the model altogether. Not only does the model perform remarkably well along certain dimensions, but it is easy to understand why the model is failing along some other dimensions and to identify what additions to the data would be likely to improve the model's overall performance. First, the model assumes that all possible coalitions can form. In reality this is not the case as several parties in a political system would typically never enter the same government coalition (see, e.g., Budge, Strom and Laver (1994)). Such constraints are, however, extremely difficult to identify and hence incorporate in the analysis. Second, the model assumes that all parties could be chosen to form a government. In reality this is not the case as, for example, members of extremist parties are typically never chosen as formateurs regardless of their party's size.[20] Incorporating this aspect of reality into the model would require obtaining a consistent set of measures of the relative positions of each party in some policy space. While some measures of the policy position of parties in some West European countries exist in the literature (see, e.g., Laver and Budge (1992) and Laver and Hunt (1992)), these measures are hardly comparable across countries and widely regarded as questionable. Coscia (1999) uses the

[20] This was the case for the Comunist Party in Italy before the 1994 constitutional reform.

framework we develop in this paper to estimate a model that incorporates policy positions of political parties in a subset of the countries we consider. His analysis shows that while still not fully satisfactory, the model's performance improves.

5 Policy Experiments

Empirical studies have shown that political instability has a detrimental effect on economic performance and growth (see, e.g., Alesina et al. (1996) and Barro (1991)). For a democracy, political instability means short-lived governments and long-lasting negotiations. It is therefore important to try to evaluate the effect of specific institutional features of a democracy on its political stability. Our approach offers a systematic way of addressing these quantitative issues in the context of an equilibrium framework. We focus here on two aspects of parliamentary democracies (the investiture vote and the constructive vote of no-confidence) and we use our structural model to assess the impact of changes in the bargaining procedure on the outcomes of the bargaining process.

To conduct our policy experiments we consider an artificial political system with three parties and we simulate the outcomes of 5,000 elections by randomly drawing vectors of the parties' seat shares in parliament from a uniform distribution on $\Pi = \{(\pi_1, \pi_2, \pi_3) : \pi_i \in (0, .5), \sum_{i \in N} \pi_i = 1\}$.[21] For each draw we use the estimated model to compute the predicted distributions of negotiation duration, normalized government duration, and government size, and we then average across draws.[22]

Tables 6 presents the results of our experiments.[23] The first column in Table 6 (which we denote as "baseline") reports the mean number of attempts, the mean normalized government

[21]Note that the features we consider here may affect the electoral outcomes. Since in our model elections are exogenous, our analysis abstracts from such general equilibrium effects and in our simulations we assume that all outcomes are equally likely.

[22]We let party one be the incumbent and we set H equal to 1170–i.e., the mean value of H in our sample.

[23]Recall form the results reported in Section 4 that the model performs very well in predicting averages. Thus, in our experiments we focus on averages only.

duration, and the average fraction of minority governments implied by the model for four political systems that differ with respect to whether or not they have an investiture vote (i.e., $INVEST = 1$ or $INVEST = 0$) and whether or not they have a constructive vote of no-confidence (i.e., $CCONF = 1$ or $CCONF = 0$). For each one of these four political systems, columns 1 through 6 report the results obtained under 6 alternative bargaining environments. In column 1, we eliminate incumbency effects in the selection of the formateur (i.e., we set $\alpha_2 = 0$). In column 2, we assume that the largest party is selected as formateur. In column 3, we assume that the probability a party is selected as formateur is equal to the fraction of parliamentary seats it controls. In column 4, we assume that the formateur makes all the offers. In column 5, we assume that the probability a party in a proto-coalition is selected as proposer is equal to the relative fraction of parliamentary seats it controls with respect to the size of the proto-coalition. Finally, in column 6 we assume that all parties in the political system are equally likely to be selected as formateur and all parties in a proto-coalition are equally likely to be selected as proposer.

We begin by considering the baseline case and comparing political systems that differ with respect to the two institutional characteristics we consider: the investiture vote and the constructive vote of no-confidence. The most stable political system is the one with no investiture vote and with a constructive vote of no-confidence, followed by a system with both an investiture vote and a constructive vote of no-confidence. The next political system in the ranking based on political stability is a system with neither an investiture vote nor a constructive vote of no-confidence, followed by a system with an investiture vote and with no constructive vote of no-confidence which is the most unstable. The mean normalized government duration for the most stable political system is 0.63 and the mean number of attempts is 1.16. Adding the investiture vote results in a 17% increase in the mean number of attempts and in a 12% decrease in the mean government duration. Removing the constructive vote of no confidence results in a 18% increase in the mean number of attempts

and in a 15% decrease in the mean government duration. Simultaneously implementing both features results in a 69% increase in the mean number of attempts and in a 30% decrease in the mean government duration.

The next observation concerns the propensity of different political systems to generate minority governments. Even though minority governments on average last less than majority governments, the ranking of political institutions with respect to the relative frequency of minority governments does not mirror their ranking based on stability. In fact, the most stable political institution has the second smallest fraction of minority governments and the least stable one has the third smallest fraction of minority governments. In general, the presence of the investiture vote or of the constructive vote of no-confidence appears to discourage minority governments from forming.

Turning our attention to the effects of changes in the bargaining protocol on the political stability of each of the four political systems we consider, there are four main observations that emerge. First, the effects of eliminating the incumbency advantage in the selection of the formateur (column 1) or making the choice of a formateur completely "egalitarian" (column 6), are negligible.

Second, none of the other features has an unambiguous effect on political stability for all political systems. In fact, features that are effective at inducing a higher level of political stability in a political system with neither an investiture vote nor a constructive vote of no-confidence, yield the opposite effect in all other political systems and *vice versa*. For example, giving to the proto-coalition formateur the power to make all government proposals (column 4) decreases the mean number of attempts and increases the mean government duration in all political systems except in a system with neither an investiture vote nor a constructive vote of no-confidence. In such a system, this feature increases the mean number of attempts and decreases the mean government duration.

Third, all constitutional features have an unambiguous effect on the fraction of minority

governments in all political systems. While most of the featuress we consider increase the frequency of minority governments (columns 1, 2, 3, and 6), some reduce it (columns 4 and 5). The two features with the largest (opposite) effects on the fraction of minority governments are to restrict the proposer selection process to always select the largest party (column 2) which increases the probability a minority government would form, or to give to the proto-coalition formateur the power to make all government proposals (column 4) which decreases the probability a minority government would form.

Fourth, the feature with the largest (positive or negative) effects on political stability is to restrict the proposer selection process to always select the largest party (column 2). This changes the mean number of attempts by from -2% to +10% and the mean government duration by from -6% to +2% depending on the political system. In particular, always selecting the largest party would be detrimental to political stability in all political systems except a system without an investiture vote and without a constructive vote of no-confidence, where it would *promote* stability. This is a particularly interesting finding in light of the fact that the only country whose constitution prescribes that the largest party be selected as formateur is Greece. In Greece there is an investiture vote and no constructive vote of no-confidence.[24]

6 Concluding Remarks

The framework developed in this paper can be extended to address a number of issues related to evaluating the performance of democratic institutions. In this paper, we have focused on two constitutional features of parliamentary democracies (i.e., the investiture vote and the constructive vote of no-confidence) and we have tried to quantify their effects on the outcomes of the government formation process. Also, we have investigated some of the likely consequences of constitutionally regulating the selection of a government's formateur.

[24]To assess the robustness of our results with respect to the number of parties we performed the same experiments for an artificial political system with four parties. All of our findings remain valid.

Possible extensions include the study of early elections and the appointment of the head of state.[25]

[25]For example, where some of the countries in our data set are headed by an elected president (Finland, Germany, Iceland, and Italy), other countries have a monarch as a head of state (Belgium, Denmark, Netherlands, Norway, and Sweden). Moreover, all countries but Norway (and to some extent Sweden) admit the possibility of dissolving parliament before the expiration of the parliamentary term (the duration of which varies across countries) and calling early elections.

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Table 1: Descriptive statistics

Variable	Mean	Standard Deviation	Minimum	Maximum
Number of attempts	1.57	0.99	1	7
Government duration	571.74	440.82	9	1474
Time to next election	1170.06	412.78	58	2078
Normalized government duration	0.51	0.34	0	1
Number of parties	7.66	2.80	4	14
Size of government coalition	0.54	0.12	0.12	0.89
MINORITY	0.35	0.48	0	1
MAJORITY	0.65	0.48	0	1
INVEST	0.35	0.48	0	1
CCONF	0.09	0.29	0	1

Table 2: Estimated parameters of the model

Parameter	Estimate	Standard error
α_1	0.101	0.010
α_2	1.582	0.177
α_3	0.152	0.015
α_4	0.021	0.175
β	0.354	0.021
γ_1	0.635	0.030
γ_2	-0.577	0.020
γ_3	0.986	0.072
γ_4	0.376	0.023
γ_5	-3.815	0.068
γ_6	-0.603	0.017
γ_7	-0.898	0.090
γ_8	0.067	0.238
γ_9	0.888	0.042
γ_{10}	-0.026	0.362
λ	0.064	0.007
Log-likelihood	-3206.76	

Table 3: Density functions of negotiation duration and goodness-of-fit test

Attempt	Data	Model
1	0.665	0.664
2	0.186	0.201
3	0.089	0.074
4	0.038	0.031
5	0.017	0.014
6	0.000	0.007
7-	0.004	0.004
8+	0.000	0.005
χ^{-2} test $Pr[\chi^{-2}(7) \geq 4.501]$	4.501 0.721	
Mean number of attempts	1.572	1.591

Table 4: Density functions of normalized government duration and goodness-of-fit test

Interval	Data	Model
[0.0-0.2]	0.250	0.289
(0.2-0.4]	0.212	0.120
(0.4-0.6]	0.148	0.126
(0.6-0.8]	0.114	0.158
(0.8-1.0]	0.275	0.307
χ^{-2} test $Pr[\chi^{-2}(4) \geq 22.344]$	22.344 0.001	
Mean normalized government duration	0.510	0.510

Table 5: Density functions of government coalition size and goodness-of-fit test

Interval	Data	Model
[0.0-0.2]	0.008	0.004
(0.2-0.4]	0.102	0.080
(0.4-0.6]	0.657	0.797
(0.6-0.8]	0.186	0.082
(0.8-1.0]	0.047	0.037
χ^{-2} test $Pr[\chi^{-2}(4) \geq 40.747]$	40.747 0.000	
Mean government coalition size	0.536	0.505
Fraction of minority governments	0.347	0.342

Table 6: Policy experiments*

	Base - line	1	2	3	4	5	6
INVEST = 0 and CCONF = 0							
Mean Number of attempts	1.365	1.364 (- 0.1)	1.337 (- 2.1)	1.355 (- 0.7)	1.373 (0.6)	1.368 (0.2)	1.365 (0.0)
Mean normalized government duration	0.542	0.542 (0.0)	0.550 (1.5)	0.545 (0.6)	0.541 (- 0.2)	0.541 (- 0.2)	0.542 (0.0)
Fraction of minority governments	0.766	0.768 (0.3)	0.904 (18.0)	0.812 (6.0)	0.557 (- 27.3)	0.758 (- 1.0)	0.768 (0.3)
INVEST = 1 and CCONF = 0							
Mean Number of attempts	1.950	1.950 (0.0)	2.004 (2.8)	1.961 (0.6)	1.915 (- 1.8)	1.949 (- 0.1)	1.950 (0.0)
Mean normalized government duration	0.445	0.445 (0.0)	0.438 (- 1.6)	0.443 (- 0.4)	0.449 (0.9)	0.445 (0.0)	0.445 (0.0)
Fraction of minority governments	0.501	0.502 (0.2)	0.678 (35.3)	0.550 (9.8)	0.340 (- 32.1)	0.482 (- 3.8)	0.503 (0.4)
INVEST = 0 and CCONF = 1							
Mean Number of attempts	1.155	1.155 (0.0)	1.212 (4.9)	1.167 (1.0)	1.118 (- 3.2)	1.149 (- 0.5)	1.156 (0.1)
Mean normalized government duration	0.634	0.633 (- 0.2)	0.599 (- 5.5)	0.627 (- 1.1)	0.651 (2.7)	0.637 (0.5)	0.633 (- 0.2)
Fraction of minority governments	0.267	0.269 (0.7)	0.455 (70.4)	0.312 (16.9)	0.082 (- 69.3)	0.228 (- 14.6)	0.273 (2.2)
INVEST = 1 and CCONF = 1							
Mean Number of attempts	1.347	1.348 (0.1)	1.481 (9.9)	1.374 (2.0)	1.298 (- 3.6)	1.334 (- 1.0)	1.349 (0.1)
Mean normalized government duration	0.560	0.560 (0.0)	0.524 (- 6.4)	0.553 (- 1.3)	0.570 (1.8)	0.563 (0.5)	0.560 (0.0)
Fraction of minority governments	0.107	0.108 (0.9)	0.200 (86.9)	0.128 (19.6)	0.037 (- 65.4)	0.090 (- 15.9)	0.110 (2.8)

* Percentage change (relative to the baseline) in parentheses

Table 7: Number of parties

	3 parties	4 parties	% change
INVEST = 0 and CCONF = 0			
Mean Number of attempts	1.365	1.358	- 0.51
Mean normalized government duration	0.542	0.545	0.55
Fraction of minority governments	0.766	0.579	- 24.41
INVEST = 1 and CCONF = 0			
Mean Number of attempts	1.950	1.840	- 5.64
Mean normalized government duration	0.445	0.460	3.37
Fraction of minority governments	0.501	0.317	- 36.73
INVEST = 0 and CCONF = 1			
Mean Number of attempts	1.155	1.089	- 5.71
Mean normalized government duration	0.634	0.679	7.10
Fraction of minority governments	0.267	0.105	- 60.67
INVEST = 1 and CCONF = 1			
Mean Number of attempts	1.347	1.216	- 9.73
Mean normalized government duration	0.560	0.602	7.50
Fraction of minority governments	0.107	0.038	- 64.49

Figure 1: Histogram of negotiation duration

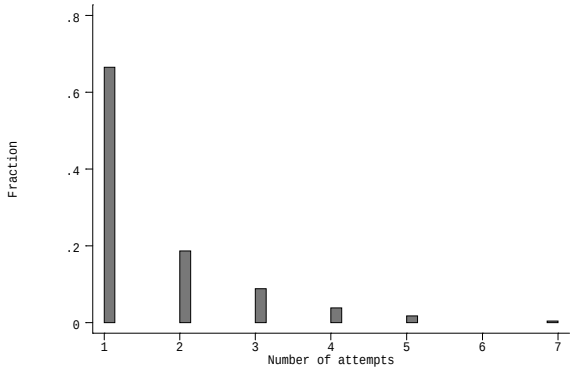

Figure 2: Histogram of normalized government duration

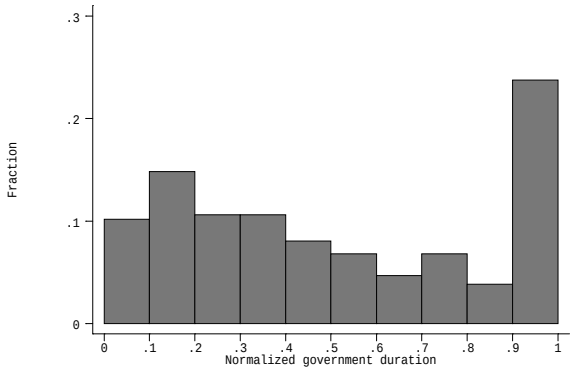

Figure 3: Histogram of normalized government duration
(investiture vote required)

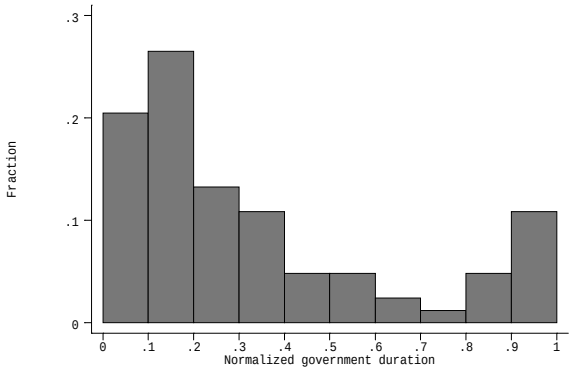

Figure 4: Histogram of normalized government duration (no investiture vote required)

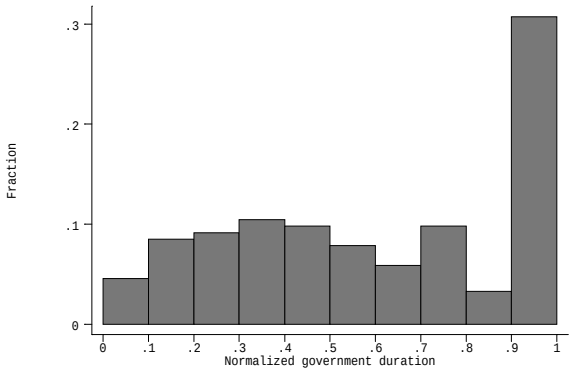

Figure 5: Histogram of government coalition size