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## Political Economy

# Coalition governments and comparative constitutional design<sup>☆</sup>

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### Abstract

In this paper we present a structural approach to the study of government formation in multi-party parliamentary democracies. The approach is based on the estimation of a stochastic bargaining model which we use to investigate the effects of specific institutional features of parliamentary democracy on the formation and dissolution of coalition governments. We illustrate our methodology by presenting the results of two (counterfactual) experiments of comparative constitutional design. © 2002 Elsevier Science B.V. All rights reserved.

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### 1. Introduction

West European countries are predominantly parliamentary democracies. The defining feature of a parliamentary democracy is the fact that the executive derives its mandate from and is politically responsible to the legislature. In multi-party democracies, this implies that government selection is usually not determined by an election alone, but is the outcome of a bargaining process among the parties represented in the parliament.

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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 in Western Europe, however, differ widely in the institutional details prescribing how governments are formed and how they terminate. A first distinction, for example, concerns whether the government needs an actual vote by parliament to legally assume office (the so-called “investiture vote”), or whether it can simply assume office through appointment by the head of state (e.g., a monarch or a president). A second distinction concerns whether the government can simply be voted out of office through a no-confidence vote by the parliament, or whether it needs to be replaced by an alternative government (the so-called “constructive vote of no-confidence”). A third distinction concerns whether in a bicameral legislature the government is responsible to only one chamber, or whether it is responsible to both chambers (the so-called “dual responsibility”).<sup>1</sup>

Both constitutional scholars and reformers have argued that these institutional details may have substantial effects on the type and quality of governments that form. For example, the German constitutional convention created the constructive vote of no-confidence with the explicit intent of preventing unstable governments. To achieve the same goal, Belgium in 1995 amended its constitution to eliminate the investiture vote, adopt the constructive vote of no-confidence, and remove the government’s responsibility to the upper chamber. Despite more than 40 years of research in political science, however, it remains largely an open question whether these intuitions are sound and how different institutions affect the type and stability of governments. One of the reasons for this shortcoming is that many of these arguments rely on counterfactuals (for example, “Italian governments would have been more stable without dual responsibility” or “Germany would have experienced more minority governments without the constructive vote of no-confidence”), which are notoriously difficult to assess empirically.

In this paper, we present an overview of our research aimed at investigating the effects of specific institutional features of parliamentary democracies (specifically, the investiture vote, the constructive vote of no-confidence, and dual responsibility) on the formation and dissolution of coalition governments. The main goal of this overview is to illustrate a novel methodology which can be used for (counterfactual) experiments of comparative constitutional design.<sup>2</sup> Specifically, we address the following three prominent questions in the study of parliamentary coalitions (Laver and Schofield, 1990):

1. Who gets in? That is, will the formation process yield a minority, a minimal winning, or a surplus majority government?
2. How long does it take? That is, how long is the duration of the government formation process?
3. Will it last? That is, what is the expected duration of the newly formed government?

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<sup>1</sup> For a more comprehensive account of institutional differences in West European countries see, for example, Muller and Strom (2000).

<sup>2</sup> Details can be found in Diermeier et al. (2000, 2001), henceforth DEM (2000, 2001).

Table 1  
Government formation statistics

	Average number of attempts	Average government duration (days)	Average government size (% in the House)
Belgium	2.4	495	62
Denmark	1.8	626	41
Finland	1.8	509	55
Germany	1.1	727	57
Iceland	1.6	802	55
Italy	1.8	321	51
Netherlands	2.6	810	62
Norway	1.1	755	47
Sweden	1.2	740	47
Average	1.7	611	53

Table 2  
Distribution of government types

	% Minority governments	% Minimal winning governments	% Surplus governments
Belgium	12	70	18
Denmark	83	17	0
Finland	31	14	55
Germany	12	71	17
Iceland	19	71	10
Italy	48	2	50
Netherlands	15	40	45
Norway	64	36	0
Sweden	65	35	0
Average	40	36	24

West European countries differ greatly with respect to the composition of their government coalitions, the duration of their government formation processes, and the durability of their governments. Tables 1 and 2 illustrate these differences by reporting the average number of formation attempts, the average government duration, and the average size of the government coalition (Table 1), and the distribution of minority, minimum winning, and surplus governments (Table 2), for a sample of governments in nine West European countries over the period 1945–1995.<sup>3</sup> There are several observations that emerge from the data. Minority governments, for instance, account for 40% of all governments, but of the 30 Danish governments between 1945 and 1995, 25 were minority governments. Surplus governments compose about one-fourth of all

<sup>3</sup> The sample contains 255 observations. Additional details on the data are given in Section 3.

governments, but in Italy the fraction of surplus governments in the post-war period is equal to 50%. While Italian governments last on average less than a year, German governments frequently stay in office until a new election must be called (and, on average, they last more than twice as long as Italian governments). There is similar variation in the time it takes until a government forms. While almost all negotiations in Norway terminate within the first attempt, government formations in the Netherlands are on average much longer and may require as many as seven attempts.

In light of the richness and complexity of the evidence, each of the three questions listed above has received considerable attention in the literature. For the most part, however, the theoretical and the empirical literature on government formation and termination have been proceeding in parallel ways. Empirical studies have been typically concerned with establishing stylized facts outside the context of any theoretical model. By and large, they have been relying on reduced-form regression analysis to identify the effects of institutional variables on government outcomes using pooled cross-country data sets.<sup>4</sup> The theoretical literature had originally been dominated by cooperative game-theory.<sup>5</sup> Recently, non-cooperative game theory has become the dominant methodology in the theoretical study of multi-party governments. As in many applications of the non-cooperative approach, contributions have typically aimed at providing tractable models which are consistent with some of the stylized facts identified by the empirical literature.<sup>6</sup>

The main goal of our research is to provide a theoretical and empirical framework to assess quantitatively the role played by specific institutions in the formation and dissolution of coalition governments in parliamentary democracies. In contrast to the existing literature, our approach relies on the structural estimation of a game-theoretic model. The methodology we use consists of specifying a bargaining model of government formation, estimating the model's parameters, assessing the ability of the model to account for key features of the data, and then using the estimated structural model to conduct experiments of comparative constitutional design. This approach has the following merits. First, it allows us to interpret important features of the data as equilibrium phenomena. This is particularly important in the context of coalition bargaining, as the type of the chosen government, its duration, and the length of the government formation process are all determined simultaneously as equilibrium outcomes subject to institutional constraints. These considerations have serious implications for the interpretation of estimation results obtained using more traditional (reduced-form) empirical methods. Second, our approach allows us to conduct counterfactual experiments and to

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<sup>4</sup> For recent overviews of the large empirical literature on government formation and termination see Laver and Schofield (1990), Strom (1990), and Warwick (1994). An exception is 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.

<sup>5</sup> See Laver and Schofield (1990) for a non-technical overview of the cooperative approach and its application to multi-party democracies, and Laver and Shepsle (1990, 1996) and Austen-Smith and Banks (1990) for more recent contributions.

<sup>6</sup> See, for example, Austen-Smith and Banks (1988, 1990), Baron (1991, 1993, 1998), Baron and Diermeier (2001), Baron and Ferejohn (1989), Diermeier and Feddersen (1998), Diermeier and Merlo (2000), Laver and Shepsle (1998) and Lupia and Strom (1995).

assess quantitatively the equilibrium response of the outcomes of the government formation process to changes in the institutional environment. This offers two advantages over existing theoretical and empirical contributions. First, existing theoretical models allow us to assess the effects of differences in constitutions only qualitatively, and the direction of the predicted effects frequently depends on parameter values. Second, reduced-form estimation results may uncover empirical relations between institutional features and outcomes of the government formation process, but they cannot account for the equilibrium response of strategic parties to constitutional changes.

The remainder of the paper is organized as follows. In Section 2, we describe the model. In Section 3, we present an overview of the data and the empirical methods. In Section 4, we present the results of two experiments of comparative constitutional design. The first experiment consists of removing the constructive vote of no-confidence from the German constitution. The second experiment consists of removing the government responsibility to the upper chamber from the Italian constitution. For each experiment, we assess both qualitatively and quantitatively the model-predicted impact of the constitutional change on the type of governments that form and their relative stability. Concluding remarks are presented in Section 5.

## 2. The model

We model government formation as a multi-stage stochastic bargaining game.<sup>7</sup> Let  $N = \{1, \dots, n\}$  denote the set of parties represented in the parliament and let  $\pi^C \in \Pi^C = \{(\pi_1^C, \dots, \pi_n^C) : \pi_i^C \in [0, 1], \sum_{i \in N} \pi_i^C = 1\}$  denote the vector of the parties' relative shares in parliamentary chamber  $C \in \{H, S\}$ , where  $H$  denotes the "House" (lower chamber) and  $S$  denotes the "Senate" (upper chamber).<sup>8</sup> If the parliament only has one chamber (the House), or if the constitution prescribes that the government is only responsible to the House (even when the parliament is bicameral), then we set  $\pi^S = (0, \dots, 0)$ .<sup>9</sup>

Each party  $i \in N$  has linear Von Neumann–Morgenstern preferences over the benefits from holding office  $x_i \in R_+$  and the composition of the government coalition  $G \subseteq N \cup \{\emptyset\}$ ,

$$U_i(x_i, G) = x_i + \lambda u_i^G, \quad (1)$$

where

$$u_i^G = \begin{cases} \varepsilon_i^G & \text{if } i \in G, \\ \eta_i^G & \text{if } i \notin G \end{cases} \quad (2)$$

and  $\varepsilon_i^G > \eta_i^G$ ,  $\varepsilon_i^G, \eta_i^G \in R$ . 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,

<sup>7</sup> We present here a broad outline of the model. Details can be found in DEM (2000, 2001).

<sup>8</sup> The shares are determined by the outcome of a general election which is not modelled here.

<sup>9</sup> In the case of bicameral parliaments without dual responsibility (like, for example, Germany or the Netherlands), the upper chamber only plays a legislative role, but does not participate either in the appointment or the dismissal of the executive.

$\varepsilon_i^G$  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 model, we abstract from these aspects and summarize all policy-related considerations in Eq. (2).<sup>10</sup> Let  $\beta \in (0, 1)$  denote the common discount factor reflecting the parties' degree of impatience.

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  $\bar{T}$  denote the *time horizon* to the next scheduled election (which represents the maximum amount of time a new government could remain in office) and  $\sigma \in \Sigma$  denote the current *state of the world* (which summarizes the current political and economic situation).<sup>11</sup> While  $\bar{T}$  is constant, we assume that the state of the world  $\sigma$  evolves over time according to an i.i.d. stochastic process with state space  $\Sigma$  and probability distribution function  $F(\cdot)$ .

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  $\mathbf{k} \in N$  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. In particular, we assume that each party  $i \in N$  is selected to be a formateur with probability  $p_i(\pi^H, \pi^S, I)$ , such that  $p_i(\cdot) \in [0, 1]$ ,  $\sum_{i \in N} p_i(\cdot) = 1$ , and if  $\pi_i^H \geq 0.5$  or  $\pi_i^S \geq 0.5$ , then  $p_i(\cdot) = 1$ , where  $I = (I_1, \dots, I_n)$  is a vector of indicator variables  $I_i \in \{0, 1\}$  denoting whether party  $i$  is the party of the former prime minister (in which case  $I_i = 1$ ).<sup>12</sup> We denote the party of the former prime minister by  $\mathbf{k}_{-1}$ . 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.<sup>13</sup> It also reflects the fact that if a party has an absolute majority in either chamber of the parliament (where an absolute majority in the Senate is relevant only if the constitution prescribes dual responsibility), then it has to be selected as the formateur.

The formateur then chooses a *proto-coalition*  $D \in \Delta_{\mathbf{k}}$ , where  $\Delta_{\mathbf{k}}$  denotes the set of subsets of  $N$  which contain  $\mathbf{k}$ . Intuitively, a proto-coalition is a set of parties that agree to talk to each other about forming a government together. Let  $\pi^D \equiv (\sum_{i \in D} \pi_i^H, \sum_{i \in D} \pi_i^S)$  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,  $x^D = (x_i^D)_{i \in D} \in R_+^{|D|}$ . Following Merlo (1997), we assume that cabinet portfolios generate a (perfectly divisible) unit level of surplus in every period a government is in power and we let  $T \in [0, \bar{T}]$  denote the duration of a government.

<sup>10</sup> For a richer, spatial model of government formation where government policies are endogenously determined, see Diermeier and Merlo (2000).

<sup>11</sup> We summarize all political and economic events, which are not modelled here, in the state  $\sigma$ .

<sup>12</sup> Note that in the data it is never the case that one party has the absolute majority in one chamber and another party has the absolute majority in the other chamber. We therefore ignore this possibility.

<sup>13</sup> For empirical support for this specification see Diermeier and Merlo (1999).

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, whether the government is responsible to two chambers, 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., 1990; Merlo, 1998; Warwick, 1994). Let  $Q$  denote the vector of institutional characteristics (possibly) affecting government duration and let  $\pi^G$  denote the size of the government coalition. Hence,  $T$  can be represented as a random variable with density function  $g(t|\sigma, \bar{T}, Q, \pi^G)$  over the support  $[0, \bar{T}]$ .<sup>14</sup>

Given the current state  $\sigma$  and given the vector of (time-invariant) characteristics  $(\bar{T}, Q, \pi^D)$ , let

$$y^D(\sigma, \bar{T}, Q, \pi^D) = E[T|\sigma, \bar{T}, Q, \pi^D] \tag{3}$$

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,  $y^D(\cdot) \in (0, \bar{T})$  represents the total expected benefits from forming a government in state  $\sigma$ . Given proto-coalition  $D$ , for any state  $\sigma$ , let

$$X^D(\sigma, \bar{T}, Q, \pi^D) \equiv \left\{ x^D \in R_+^{|D|} : \sum_{i \in D} x_i^D \leq y^D(\sigma; \bar{T}, Q, \pi^D) \right\} \tag{4}$$

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  $\sigma$ , the formateur chooses either to pass or to propose an allocation  $x^D \in X^D(\sigma; \bar{T}, Q, \pi^D)$ . If  $\mathbf{k}$  proposes an allocation, all the other parties in the proto-coalition sequentially respond by either accepting or rejecting the 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  $\sigma'$  is realized in the next period according to the probability distribution function  $F(\cdot)$  and some party  $i \in D$  is selected to make a government proposal with probability  $\tilde{p}_i(\pi^H, \pi^S, D)$ , such that  $\tilde{p}_i(\cdot) \in [0, 1]$ ,  $\sum_{i \in D} \tilde{p}_i(\cdot) = 1$ , and if  $\pi_i^H \geq 0.5$  or  $\pi_i^S \geq 0.5$ , then  $\tilde{p}_i(\cdot) = 1$ . We refer to the selected party  $\ell \in D$  as the *proposer*. The bargaining process continues until some proposed allocation is unanimously accepted by the parties in the proto-coalition.

An outcome of this bargaining game  $(\tau^D, \chi^D)$  may be defined as a stopping time  $\tau^D = 0, 1, \dots$  and a  $|D|$ -dimensional random vector  $\chi^D$  which satisfies  $\chi^D \in X^D(\sigma_{\tau^D}, \bar{T}, Q, \pi^D)$  if  $\tau^D < +\infty$  and  $\chi^D = 0$  otherwise. Given a realization  $\sigma_{\tau^D}$ ,  $\tau^D$  denotes the period in which a proposal is accepted by proto-coalition  $D$ , and  $\chi^D$  denotes the proposed allocation that is accepted in state  $\sigma_{\tau^D}$ . Define  $\beta^\infty = 0$ . Then an outcome  $(\tau^D, \chi^D)$  implies

<sup>14</sup> In this model, 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 (2000).

a Von Neumann–Morgenstern payoff to each party  $i \in D$  equal to  $E[\beta^{\tau^D} \chi_i^D] + \lambda \varepsilon_i^D$ , and a payoff to each party  $j \in N \setminus D$  equal to  $\lambda \eta_j^D$ . Let

$$V_{\mathbf{k}}(D, \bar{T}, Q, \pi^D) \equiv E[\beta^{\tau^D} \chi_i^D]. \tag{5}$$

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

$$W_{\mathbf{k}}(D, \bar{T}, Q, \pi^D) = V_{\mathbf{k}}(D, \bar{T}, Q, \pi^D) + \lambda \varepsilon_{\mathbf{k}}^D. \tag{6}$$

Hence, party  $\mathbf{k}$  chooses the proto-coalition to solve

$$\max_{D \in \Delta_{\mathbf{k}}} W_{\mathbf{k}}(D, \bar{T}, Q, \pi^D). \tag{7}$$

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

The bargaining model described 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  $\sigma$ , coalition  $D$  agrees in that state if and only if  $y^D(\sigma, \bar{T}, Q, \pi^D) \geq y^*(D, \bar{T}, Q, \pi^D)$ , where  $y^*(\cdot)$  solves

$$y^*(D, \bar{T}, Q, \pi^D) = \beta \int \max\{y^D(\sigma', \bar{T}, Q, \pi^D), y^*(D, \bar{T}, Q, \pi^D)\} dF(\sigma'). \tag{8}$$

Hence, delays can occur in equilibrium. Second, the equilibrium of the game satisfies the *separation principle* (Merlo and Wilson, 1998): Any equilibrium payoff vector must be Pareto-efficient, and the set of states where parties agree must be independent of the proposer’s identity. This implies that in the proto-coalition bargaining stage distribution and efficiency considerations are independent. Third, using the general characterization theorems contained in Merlo and Wilson (1998) and Eq. (8) above, for any formateur  $\mathbf{k} \in N$ , the equilibrium proto-coalition choice  $D_{\mathbf{k}} \in \Delta_{\mathbf{k}}$  is given by

$$D_{\mathbf{k}} = \arg \max_{D \in \Delta_{\mathbf{k}}} \left( \frac{1 - \beta(1 - \tilde{p}_{\mathbf{k}}(\pi^H, \pi^S, D))}{\beta} \right) y^*(D, \bar{T}, Q, \pi^D) + \lambda \varepsilon_{\mathbf{k}}^D. \tag{9}$$

During proto-coalition bargaining, the reservation property implies a trade-off between delay in the formation process and expected duration. Intuitively, coalitions may want to wait for a favorable state of the world that is associated with a longer expected government duration. On the other hand, delay is costly depending on  $\beta$ . In equilibrium, agreement is reached when these opposite incentives are balanced. Conditional on having formed a government, however, this implies that longer government formation processes are correlated with longer governments, since less-stable governments are “screened out” during the formation process (Merlo, 1997).

When choosing a proto-coalition, a formateur faces a trade-off between “control” (i.e., his share of the cake) and “durability” (i.e., the overall size of the cake). On the one hand, majority governments are associated with longer expected durations than minority governments, leading to a larger cake. On the other hand, because of proto-coalition bargaining, the formateur would receive a smaller share of the cake by including additional parties in his coalition. Formateurs may thus select minority coalitions because members of a more durable majority proto-coalition cannot commit to a certain allocation before entering proto-coalition bargaining.



### 3. Data and estimation

Our sample of observations consists of 255 governments in 9 West European countries over the period 1945–1995. The countries represented in the sample are Belgium (34 governments), Denmark (30 governments), Finland (29 governments), Germany (24 governments), Iceland (21 governments), Italy (46 governments), Netherlands (20 governments), Norway (25 governments), and Sweden (26 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 until 1995 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 1995, Belgium), the vote establishes whether the current government has the support of a parliamentary majority, and the government has to resign if defeated, leading to a new government formation process. On the other hand, in Germany and Belgium (since 1995), the vote establishes whether the current government is preferred by a parliamentary majority to an alternative government coalition, which must be specified before the vote takes place (the so-called *constructive vote of no-confidence*). Third, in three countries (Italy, Belgium until 1995, and Sweden until 1970) the government faces *dual responsibility* (i.e., each government must maintain the confidence of both parliamentary chambers). The other countries are either unicameral (Denmark, Finland, Iceland, Norway, and Sweden after 1970) or bicameral (Germany and Netherlands), but the power to sustain or terminate a government rests exclusively with the lower chamber.

An observation in the sample is defined by the identity of the formateur party,  $\mathbf{k}$ , the composition of the proto-coalition,  $D_{\mathbf{k}}$ , the duration of the negotiation over the formation of a new government (i.e., the number of attempts),  $\tau^{D_{\mathbf{k}}}$ , the sequence of proposers (one for each attempt) if the formateur does not succeed to form the government at the first attempt,  $\ell_2, \dots, \ell_{\tau^{D_{\mathbf{k}}}}$ , and the duration of the government following that negotiation (i.e., the number of days the government remains in power),  $t^{D_{\mathbf{k}}}$ . For each element in the sample we also observe the vector of institutional characteristics,  $Q$ , the time horizon to the next scheduled election,  $\bar{T}$ , the set of parties represented in the parliament,  $N$ , the vector of their relative seat shares,  $\pi^H$  and  $\pi^S$ , and the party of the former prime minister,  $\mathbf{k}_{-1}$ .

*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. Several other country-specific sources (such as local newspapers and databases) were used to confirm questionable entries in Keesings. 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 Archive* (<http://dodgson.ucsd.edu/lij>). Institutional characteristics of the countries included in our study were obtained from Lijphart (1984) and Muller and Strom (2000).<sup>15</sup>

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,  $\sigma$ , given the vector of (time-invariant) characteristics,  $(\bar{T}, Q, \pi^D)$ . 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. Thus,  $T^D$  is a random variable with conditional distribution function  $G_T(t^D|y^D; \bar{T}, Q, \pi^D)$ .

We (the econometricians), however, do not observe the state of the world  $\sigma$ . Hence, from the perspective of the econometrician,  $y^D(\sigma, \bar{T}, Q, \pi^D) \equiv E[T^D|\sigma, \bar{T}, Q, \pi^D]$  is a random variable with conditional distribution function  $G_y(y^D|\bar{T}, Q, \pi^D)$ . In addition, we do not observe the formateur's tastes for its coalition partners, so that  $\varepsilon_k^D$  is also a random variable with distribution function  $G_\varepsilon(\varepsilon_k^D)$ . Upon specifying parametric functional forms for the functions  $p(\pi^H, \pi^S, I)$ ,  $\tilde{p}(\pi^H, \pi^S, D)$ ,  $G_y(y^D|\bar{T}, Q, \pi^D)$ ,  $G_T(t^D|y^D; \bar{T}, Q, \pi^D)$  and  $G_\varepsilon(\varepsilon_k^D)$ , we can derive from our analysis a 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  $(\mathbf{k}, D_k, \tau^{D_k}, \ell_2, \dots, \ell_{\tau^{D_k}}, t^{D_k})$  conditional on the vector of (exogenous) characteristics  $(\bar{T}, Q, N, \pi^H, \pi^S, \mathbf{k}_{-1})$ , given the vector of the model's parameters  $\theta = (\beta, \lambda, p, \tilde{p}, G_y, G_T, G_\varepsilon)$ . Given the structure of our model and our equilibrium characterization, this probability can be computed and the parameter vector  $\theta$  can be estimated by maximum likelihood using the data described above.<sup>16</sup>

#### 4. Two counterfactual experiments

In this section, we describe the results of two counterfactual experiments of comparative constitutional design conducted using our estimated structural model. The two experiments are performed using the estimates reported in DEM (2000) and DEM (2001), respectively. Both experiments consist of changing one aspect of the constitution of one country (that is, a specific component of the vector of institutional characteristics  $Q$ ), while leaving all other exogenous variables constant. In particular, the set of parties represented in parliament and their relative shares are held constant.<sup>17</sup>

<sup>15</sup> For a detailed description of the data see DEM (2000).

<sup>16</sup> For details on the parameterization, derivation, and estimation of the likelihood function see DEM (2000).

<sup>17</sup> Since in our model elections are exogenous, our analysis does not capture (possible) general equilibrium effects of constitutional changes on electoral outcomes.

Table 3  
Constitutional experiment in Germany

	Actual (constructive vote of no-confidence)	Predicted (constructive vote of no-confidence)	Predicted (no constructive vote of no-confidence)
Average number of attempts	1.1	1.2 (0.07)	1.7 (0.09)
Average government duration (days)	727	734 (45)	637 (38)
Average government size (% in the House)	57	57 (1)	56 (1)
% Minority governments	12	14 (8)	31 (9)
% Min. win. governments	71	69 (7)	54 (9)
% Surplus governments	17	17 (1)	15 (1)

Standard errors in parentheses.

Our first counterfactual experiment can be described as follows. Suppose in 1949 Germany had eliminated the constructive vote of no-confidence from its constitution. What would have been the effects on the composition and durability of German governments according to our model? The answer is presented in Table 3. In this table, column 1 summarizes the data relative to German governments, column 2 reports the model's predictions based on the actual German constitution (which contains the constructive vote of no-confidence), and column 3 contains the results of the constitutional experiment predicted by our model. Several observations are noteworthy. First, the model is capable of reproducing all the features of the data.<sup>18</sup> The ability of the model to fit the data is an important step toward building confidence in the quantitative implications of the model. Second, one of the predicted effects of abolishing the constructive vote of no-confidence is a 12% reduction in average government duration (from 727 to 637 days). At the same time, the increase in government instability is associated with a shift away from minimum winning governments (from 71% to 54%) and towards minority governments (from 12% to 31%). Third, taking into account the standard errors associated with the point predictions of the model, we see that while the direction of the predicted effects is clear-cut, there is a fair amount of uncertainty about their magnitude.

Our second counterfactual experiment can be described as follows. Suppose in 1947 Italy had eliminated government responsibility to the upper chamber from its constitution. What would have been the effects on the composition and durability of Italian

<sup>18</sup> In addition to fitting the averages well, the model also fits all other aspects of the empirical distributions well. In particular, standard chi-square goodness-of-fit tests (not reported here) do not reject the model at conventional significance levels.

Table 4  
Constitutional experiment in Italy

	Actual (dual responsibility)	Predicted (dual responsibility)	Predicted (no dual responsibility)
Average number of attempts	1.8	1.9 (0.03)	1.9 (0.03)
Average government duration (days)	321	330 (48)	332 (50)
Average government size (% in the House)	51	52 (4)	48 (5)
% Minority governments	48	46 (16)	75 (23)
% Min. win. governments	2	3 (33)	2 (30)
% Surplus governments	50	51 (18)	23 (9)

Standard errors in parentheses.

governments according to our model? The answer is presented in Table 4. In this table, column 1 summarizes the data relative to Italian governments, column 2 reports the model's predictions based on the actual Italian constitution (which prescribes the dual responsibility of the government), and column 3 contains the results of the constitutional experiment predicted by our model. Several interesting findings emerge from Table 4. First, like in the case of Germany, the model is capable of reproducing all the features of the data.<sup>19</sup> Second, the model predicts that abolishing dual responsibility would have had virtually no effect on the average duration of Italian governments, while at the same time producing a sizeable impact on their composition. According to our analysis, eliminating government responsibility to the Senate would significantly reduce the occurrence of surplus governments (from 50% to 23%) and increase the occurrence of minority governments (from 48% to 75%). Third, as it was true in the previous experiment, the sizes of the standard errors associated with the point predictions of the model indicate that there is a high degree of uncertainty around the quantitative assessment of the impact of the constitutional reform.

What is the intuition behind these findings? As stated in the Introduction, one of the advantages of our approach is that it allows us to provide an equilibrium interpretation for the results of our analysis. To explore this issue, recall that at the heart of our theoretical model there is a fundamental trade-off between “durability” (i.e., larger coalitions are typically more durable and hence are associated with larger cakes) and “control” (i.e., larger coalitions imply smaller shares of the cake for each coalition member)

<sup>19</sup> Again, in addition to fitting the averages well, the model also fits all other aspects of the empirical distributions well. In particular, standard chi-square goodness-of-fit tests (not reported here) do not reject the model at conventional significance levels.

which drives the equilibrium selection of government coalitions subject to the institutional constraints. The terms of this trade-off depend crucially on the relative durability of the different options which, in turn, depends on the institutional environment where government formation takes place. Changes in the institutional environment brought about by (either actual or counterfactual) constitutional reforms, induce changes in the terms of the trade-off which trigger an equilibrium response in the selection of the type of government coalitions that form and their relative stability. The magnitude of these changes, which depends on the size of the model's parameters, is of course critical to explain the different effects that may be induced by different reforms.

On the basis of these considerations, we can now interpret the results of our counterfactual experiments.<sup>20</sup> Let us first consider the effect of the constructive vote of no-confidence. By restricting the set of alternatives that can be implemented (recall that an alternative coalition has to be preferred by a majority to the current government coalition to induce turnover), this feature of the German constitution increases the expected duration of all governments. This effect, however, is not homogeneous across all types of governments, but increases the stability of majority coalitions relative to minority coalitions and, on average, makes minimum winning coalitions relatively more desirable. Thus, removing the constructive vote of no-confidence, while holding everything else constant, both decreases government stability and affects the margins of the trade-off between durability and control in favor of minority governments.

We now turn our attention to the effect of dual responsibility. When the government is responsible both to the House and the Senate, a vote of no-confidence in either chamber of parliament is sufficient to terminate the government. The equilibrium response to this institutional constraint is to form larger (surplus) coalitions (possibly constituting a majority in both chambers), to achieve the desired level of durability at the cost of a loss of control on the part of the formateur. Removing dual responsibility, while holding everything else the same, removes one source of instability and makes it possible to achieve the same level of durability by forming smaller coalitions. It is interesting to note that the existing literature on the subject argues that bicameralism encourages oversized coalitions (Lijphart, 1984) and leads to shorter government duration (Tsebelis, 2000). In particular, Tsebelis' (2000) findings are based on comparing government duration across countries with different institutional settings. Our analysis, on the other hand, relies on the results of counterfactual constitutional design experiments and thus accounts for the equilibrium response of political parties to changes in the institutional environment where government formation takes place.

## 5. Concluding remarks

In this paper we present a structural approach to the empirical study of coalition governments in parliamentary democracies based on a stochastic bargaining model. We estimate the structural model using data on nine West European countries in the

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<sup>20</sup> Note that some of the arguments are quantitative in nature and rely on the estimates of the model's parameters that are reported in DEM (2000, 2001).

post-war period and then analyze the effects of political constitutions on the composition of coalition governments and their relative stability. We illustrate our methodology by presenting the results of two counterfactual experiments of comparative constitutional design: the removal of the constructive vote of no-confidence in Germany, and the elimination of the government's responsibility to the upper chamber in Italy.

Our approach can be extended in a number of directions aimed at investigating the political economy effects of constitutional reforms. 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, like for example Belgium, Italy and Sweden, have also recently experimented with changes in their constitution. Moreover, the process of European unification may lead to the formation of a "European state" whose constitution presumably would draw from the existing constitutions of its member states. These considerations highlight the importance of developing a coherent framework to evaluate and interpret the impact of constitutional experiments.

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