

Empirically Modeling the Government Formation Process*

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Abstract

Following a legislative election or the resignation of a government in a parliamentary democracy, what factors influence the party composition of the next government? Although a consensus has recently emerged that the conditional logit (CL) model is the most appropriate empirical strategy for evaluating which parties make it into government, the CL model fails to capture the sequential and nested nature of the government formation process, makes the highly implausible assumption of the independence of irrelevant alternatives, and ignores unobserved factors that might influence the choice of government. We propose an alternative empirical model – a mixed nested logit – that is able to deal with all of these issues, thereby considerably narrowing the gap between theory and empirics. Our model allows us to evaluate a number of additional hypotheses that cannot be tested in the standard CL framework. We evaluate our hypotheses linking ideological, institutional, and ‘size’ variables to the choice of government using a new data set that we constructed containing information on almost 190,000 potential governments drawn from 402 government formation opportunities in 17 parliamentary democracies from 1945 to 1998.

Paper prepared for presentation at Visions in Methodology: A Workshop for Women in Political Methodology, Ohio State University, October 204, 2008.

*We would like to thank Kenneth Train, Brad Gomez, Michael Peress, Lanny Martin, Randolph Stevenson, and various audience members at the University of Essex, TAMU, the 2008 Annual Summer Meeting of the Society for Political Methodology, the 2008 Annual Meeting of the Midwest Political Science Association, and the 2007 and 2008 Annual Meetings of the American Political Science Association for their helpful comments on earlier versions of this paper. The data, codebook, and all computer code necessary to replicate the results and figures in this analysis will be made publicly available on publication. All statistical models were estimated using code we wrote in **R**.

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1 Introduction

Following a legislative election or the resignation of a government in a parliamentary democracy, what factors influence the party composition of the next government? Determining both ‘who gets in’ as well as the structure of the government formation process has received considerable attention from both theoretically and empirically-oriented scholars. This is not surprising given that the ideological makeup of parliamentary governments has important implications for things like democratic representation (Powell 2000, McDonald, Mendes & Budge 2004, Blais & Bodet 2006, Golder & Stramski 2008) and the types of policies that are adopted (Hibbs 1977, Garrett 1998, Hallerberg 2004, Iversen 2005). Normative concerns about whether voters have sufficient influence over the choice of government that arise due to the nature of post-election coalition bargaining has also led many scholars to pay particular attention to the government formation process (Powell 2000, Golder 2006). Laver and Schofield (1990, 89) go so far as to say that understanding “how a given election result leads to a given government is, when all is said and done, simply one of the most important substantive projects in political science.”

Although the theoretical literature on the government formation process is arguably among the largest and most developed areas in all of comparative politics (Baron & Ferejohn 1989, Laver & Schofield 1990, Austen-Smith & Banks 1988, Austen-Smith & Banks 1990, Baron 1991, Schofield 1993, Strøm, Budge & Laver 1994, Laver & Shepsle 1996, Laver 1998, Diermeier & Merlo 2000, Diermeier, Merlo & Eraslan 2002), scholars have provided relatively few attempts to empirically distinguish among different theoretical perspectives and predict actual governments in the real world. One reason for this is that, until quite recently, the methodological tools available to political scientists made it difficult for them to empirically evaluate different theoretical explanations of the government formation process in a cross-national multivariate setting. For example, it is not immediately obvious how a political scientist in the 1980s or even the 1990s could have appropriately modelled a government formation situation in which there were many potential governments that could end up in office. The precise number of potential governments in any particular government formation opportunity is $2^p - 1$, where p is the number of legislative parties. By ‘potential government’, we mean any individual party or combination of parties that could form a government in a given government formation opportunity. Thus, there are 16,383 potential governments in a country with fourteen parties like Belgium in 1981; only one of these potential cabinets actually gets to form the government. As Martin and Stevenson (2001, 33-34) noted in their ground-breaking article, “although most theorists have

formulated the basic problem as the selection of a single coalition from the set of all possible coalitions, none of the commonly used statistical models is able to accommodate a multichotomous dependent variable of this kind.”

The methodological innovation proposed by Martin and Stevenson to solve this problem was to use a conditional logit (CL) model to examine the government formation process. As they demonstrate, the CL model allows one to accurately capture the situation where a single government is chosen from the set of all potential governments. By proposing the CL model, Martin and Stevenson considerably narrowed the gap between theoretical and empirical research in the government formation literature. Fellow scholars have been quick to adopt this new approach for empirically modeling the government formation process. Indeed, a consensus has developed in a relatively short period of time that the CL model is the most appropriate methodological tool at our disposal to examine the factors influencing who makes it into government (Bäck 2003, Diermeier & Merlo 2004, Druckman, Martin & Thies 2005, Warwick 2005, Kang 2006, Golder 2006, Indriðason 2008, Skjæveland, Serritzlew & Blom-Hansen 2007, Bäck & Dumont 2008).

The use of a CL model is clearly a significant improvement over previous empirical approaches because we now have a method that captures our theoretical intuition that the unit of analysis is the government formation opportunity rather than the potential or successful government as in earlier research (Browne 1970, Franklin & Mackie 1984). Developing a solution for this fundamental problem allows us to now turn our attention to other areas in which our empirical tests fail to match our theoretical models of the government formation process. We argue that there are four characteristics of the government formation process that any empirical model of it should take into account. The first is that the government formation process involves the selection of a single government from the set of all potential governments. The second is that the government formation process is sequential and nested in nature – a formateur is initially chosen who then tries to form a government that contains her own party. The third is that the assumption of the independence of irrelevant alternatives (IIA) is highly implausible in the context of the government formation process where there can be tens, hundreds, or even thousands of often similar government alternatives. The fourth is that unobserved or unmeasured factors are likely to influence the government formation process. Despite its advantages over previous approaches, the CL model only takes into account the first of these characteristics. In this article, we propose an alternative empirical model – a mixed nested logit – that takes into account all four characteristics of the government formation process, thereby narrowing the gap

between theory and empirics still further.

In addition to these methodological benefits, the mixed nested logit model allows us to evaluate a number of additional hypotheses that cannot be tested in the standard CL framework. Most of these hypotheses relate to the choice of formateur and how this affects, and is, in turn, affected by, the entire government formation process. Importantly, our empirical strategy allows us to overcome some of the problems associated with recent studies of formateur selection (Warwick 1996, Diermeier & Merlo 2004, Mattila & Raunio 2004, Isaksson 2005, Bäck & Dumont 2008). For example, one of the problems with the existing literature in this area is that it examines the selection of the formateur in isolation from the overall government formation process. In contrast to these studies, we are able to examine the choice of formateur *within* the government formation process as a whole and evaluate things such as how the characteristics of potential governments influence the initial selection of a formateur. All of our hypotheses are tested on a new data set that we constructed containing information on almost 190,000 potential governments drawn from 402 government formation opportunities in 17 parliamentary democracies from 1945 to 1998. This data set is considerably larger and more detailed than any used in previous studies.

In the next section, we outline different theoretical approaches to the government formation process. We then draw on these theories to identify hypotheses linking ideological, institutional, and ‘size’ variables to the choice of formateur and government. In the third section, we discuss the most appropriate way to empirically model the government formation process. In particular, we demonstrate that our mixed nested logit model has a number of theoretical and methodological advantages over the CL model currently adopted by most researchers. Having described our data in section four, we then present and interpret the results from a series of empirical tests where we evaluate our hypotheses using a mixed nested logit.

2 Theory and Hypotheses

We are interested in how governments – that is, the prime minister and her cabinet – form in parliamentary democracies. To be in office, parliamentary governments depend on the support, either tacit or explicit, of a legislative majority.¹ When a government formation opportunity arises, either because there has been an

¹We follow the authors of the Constitutional Change and Parliamentary Democracies (CCPD) research project and define parliamentary government as “a system of government in which the Prime Minister and his or her cabinet are accountable to any majority of the members of parliament and can be voted out of office by the latter, through an ordinary or constructive vote of no confidence” (Müller, Bergman & Strøm 2003, 13). As a result, we include countries that are sometimes referred to as mixed or semi-presidential, in which the government is responsible to both the legislature and an independently-elected president. We include

election or the incumbent government has resigned, it is nearly always the case that there are many different potential governments, more than one of which might be acceptable to a legislative majority. But which one gets chosen, and why?

Virtually all formal and non-formal models of the government formation process make reference to some actor whose job it is to form the government (Austen-Smith & Banks 1988, Baron 1991, Laver & Schofield 1998, Laver 1998).² This actor is typically referred to as a ‘formateur’ or ‘proposer’. In effect, these models describe the government formation process as having two steps. In the first step, a formateur is chosen out of the set of all possible formateurs. In the second step, the formateur chooses a government out of the set of all possible governments that include her party.³ If there are multiple potential governments that would be able to successfully take office, then the formateur obviously plays an important role in determining which one is chosen. To take the sequential nature of the government formation process seriously, we need to identify factors that influence the choice of the formateur as well as factors that influence the choice of the government.

2.1 Choice of Formateur

What determines the identity of the formateur who forms the government?⁴ Although the literature examining the identity of the government has a long history spanning many decades, it is only relatively recently that political scientists have begun to examine which party is chosen as the formateur in any real detail (Warwick 1996, Stevenson 1997, Diermeier & Merlo 2004, Mattila & Raunio 2004, Isaksson 2005, Bäck

these countries because we believe that the government formation process exhibits important commonalities across all countries in which the government needs the support (explicit or implicit) of a legislative majority to be in office. For more information on the CCPD project, see <http://www.pol.umu.se/ccpd/CCPD/index.asp>.

²Numerous other studies note the role that a formateur plays in the government formation process (Laver & Shepsle 1996, Warwick 1996, Merlo 1997, Morrelli 1999, Baron & Diermeier 2001, Warwick & Druckman 2001, Diermeier, Merlo & Eraslan 2002, Diermeier, Merlo & Eraslan 2003, Diermeier & Merlo 2004, Ansolabehere et al. 2005, Fréchette, Kagel & Morelli 2005, Diermeier 2006, Warwick & Druckman 2006, Laver 2006). Although there are a few models of the government formation process, primarily cooperative game-theoretic models, that make no explicit reference to a formateur (Schofield 1993, Schofield 1997), the fact that they ignore the institutional context in which the government formation process takes place has led some to claim that they lack a certain amount of “realism” (Laver 1998, 18).

³If the formateur is non-partisan – something generally ignored by models of the government formation process and typically quite rare in practice, then she chooses among the set of all possible governments. In our upcoming empirical analyses, we drop the nine government formation opportunities where the formateur is non-partisan.

⁴It is worth noting that we are interested in the party of the formateur and not the identity of the particular politician who is designated to manage the bargaining process. It is not uncommon for a formateur to fail to form a government at the first or even second attempt in some countries. For instance, it took seven different government proposals over 106 days for a government to finally form after the 1979 Belgian elections (De Winter, Timmermans & Dumont 2000). In our upcoming empirical analyses, we examine the factors that influence the identity of the ‘successful’ formateur, not the ‘first’ formateur. As Laver, de Marchi and Mutlu (2008) note, it is, for all practical purposes, impossible to successfully identify the identity of the first formateur from secondary sources anyway; only the successful formateur is systematically recorded.

& Dumont 2008). Many of these studies have focused on the size or party seat share associated with each potential formateur. This is not a surprise given that most formal models of the government formation process assume that formateurs are chosen either sequentially in order of size starting with the largest party (Austen-Smith & Banks 1988) or probabilistically where the likelihood of being selected is proportional to the formateur's share of legislative seats (Baron & Ferejohn 1989). We evaluate both of these selection procedures in our upcoming empirical analyses.

- Formateur Hypothesis 1: A party is more likely to be chosen as formateur if it is the largest party.
- Formateur Hypothesis 2: A party is more likely to be chosen as formateur the larger its seatshare.

Theory also suggests that the formateur is likely to be influenced by the party of the previous prime minister in many circumstances (Laver, de Marchi & Mutlu 2008). For example, a popular prime minister who has to call constitutionally-mandated elections or one who has strategically called early elections at a time when he expects to do well in the polls (Lupia & Strøm 1995, Strøm & Swindle 2002, Smith 2003, Smith 2004, Kayser 2005) is likely to be in a strong position to be chosen as the formateur in the upcoming government formation process. Moreover, some countries, like the United Kingdom, have a continuation rule whereby the outgoing prime minister can make the first attempt to form the new government.⁵ For these various reasons, a good predictor of the next formateur might be the party of the incumbent prime minister.

- Formateur Hypothesis 3: The party of the previous prime minister is more likely to be chosen as formateur than other parties.

Theory suggests that the ideological location of the parties should also matter for formateur choice. Many models of the government formation process indicate that the median ideological party is likely to be in the government and play a significant role in the policy-making process. As Laver and Schofield (1998, 111) note, the party that controls the median legislator is “effectively a dictator on policy” in one-dimensional theories of coalition bargaining.⁶ Given that the ideological position of the median party gives it a significant amount of influence in the government formation process, we might expect one of its members to be chosen as the formateur.

⁵Of course, a continuation rule is no guarantee that an outgoing prime minister will be successful, particularly if her party has suffered a massive electoral defeat.

⁶It should be noted that the importance of the median party is independent of the size of the party or government coalition in a one-dimensional setting. “It makes no difference whether the core party governs alone, in a minority coalition, in a minimal winning coalition, in a surplus majority coalition, or even in a grand coalition. It makes no difference if it goes off on holiday to Bermuda and sits on the beach getting a suntan” (Laver & Schofield 1998, 111).

- Formateur Hypothesis 4: The party with the median ideological position is more likely to be chosen as formateur.

Previous studies of formateur choice have, on the whole, focused on just these four hypotheses. However, we believe that it is also important to take account of the strategic role that the head of state plays in selecting the formateur. In our sample of parliamentary democracies, the head of state is either a monarch if the country is a constitutional monarchy or a president otherwise. Since no monarch is explicitly affiliated with a particular political party and a monarch is very clearly supposed to fulfil only a symbolic role, we do not consider them in our empirical analyses. Presidents, though, are a different story. Although the position of president in a parliamentary democracy is a largely ceremonial one, the president typically officially appoints the formateur and there are times when she might have some latitude as to who gets appointed (Kang 2006). Under such conditions, we might expect the president to favor her own party.

Although presidents are typically portrayed as ‘senior statesman’ types, these heads of state are usually drawn from the ranks of career politicians, and it is probably reasonable to think that they would retain many of their partisan convictions upon becoming president. As Bergman et al. (2003, 148) note, although the role played by presidents in the government formation process is supposed to be formal and symbolic, country experts have identified a number of “episodes in which the President has been more consequential in the making of cabinets (and other political decisions)”. Although these particular authors single out the presidents of Italy, Portugal, Austria, Finland, and France for the consequential role they frequently play in the government formation process, one could also add the distinctly partisan role played by presidents in Iceland and the Czech Republic. For example, the Icelandic president’s prerogative of choosing the formateur was critical in the formation of a coalition between the Social Democratic Party and the Independence Party that governed from 1959 to 1971 (Kristinsson 1999). Following legislative elections in June 2006, which resulted in an equal number of left-wing and right-wing legislators gaining seats, the Czech president, Vaclav Klaus, was able to influence the government formation process in a starkly partisan way because of his power to appoint the formateur (Golder forthcoming).

We argue that the extent to which a president can be expected to influence the formateur selection process to the advantage of her own party should depend on the institutional environment in which she acts (Strøm et al. 2003). In particular, it should depend on (i) whether she is directly or indirectly elected and (ii) whether there is an investiture vote or not. Although a directly elected president has her own, independent

mandate, an indirectly elected president is somewhat beholden to her party for her position. As a result, we might expect an indirectly elected president to attempt to influence the choice of formateur on behalf of her party more than a directly elected president. The ability of any president to influence the choice of a successful formateur is likely to be constrained in countries where the government must pass an investiture vote. The argument here is similar to those made elsewhere to explain why minority governments might find it hard to form when there is a required investiture vote (Strøm 1990, Bergman 1993). The idea is that a proposed government, and a proposed formateur, have to enjoy a higher level of explicit support in the legislature when there is an investiture vote than when there isn't one. When there is an investiture vote, the onus is on the government to demonstrate that it is supported by a legislative majority. In contrast, when there is no investiture vote, the onus is on the legislature to show that the government is not tolerated. This distinction between being *supported* and *tolerated* suggests that investiture votes might act as a constraint on the ability of presidents to influence the formateur selection process.

- Formateur Hypothesis 5: The party of the president is more likely to be chosen as formateur. This is less likely to be the case if there is an investiture vote and/or the president is directly elected.

Having examined factors that might influence the choice of formateur, we now turn to factors thought to influence the party composition of the government.

2.2 Choice of Potential Government

What determines the party composition of the government? To some extent, we have already begun to isolate some features of a potential government that might make it more likely to enter office inasmuch as we are assuming that the successful formateur's party will be in the government. We need to consider, though, whether the same factors that influence formateur selection also affect the party composition of the cabinet independently of formateur choice. For instance, theory would suggest that potential coalitions containing the party with the median legislator should be more likely to get into office even if the formateur is not from that party. This is because a government containing the median party is more likely to be able to effectively make policy than a government that is faced with the median legislator as part of the opposition. In other words, the median ideological party is likely to influence both the choice of formateur and the choice of government. In contrast, it is not immediately obvious whether potential coalitions containing the party of the previous prime minister or those containing the largest party will be more likely to form once the

choice of formateur is taken into account. For example, a situation in which the party of the formateur has changed hands may well reflect a substantial change in the bargaining environment. If this is the case, it is possible that the new formateur will try to avoid potential coalitions containing the previous prime minister's party. Whether this is what happens or not is ultimately a matter for empirical analysis. Importantly, our methodological approach allows us to say something about how these sorts of factors affect the choice of government and whether their effect is conditioned on the choice of formateur. The theoretical literature has focused on the role of size, ideology, and institutions in shaping the government formation process. We now examine the role of each of these factors in turn and generate hypotheses.

2.2.1 Size

Many of the early theories of the government formation process developed in the 1960s and 1970s focused on the effects of a potential government's size on its chance of forming. Are majority governments more likely to form than minority governments? Are minimal winning coalitions (MWCs) more likely to form than other types of government, and so on? In terms of size, we can distinguish potential governments into four exhaustive and mutually exclusive types: minority, single party majority, minimal winning coalition, and surplus majority.⁷ All previous empirical studies of the government formation process have ignored formation opportunities where a single party controls a majority of the legislative seats. The implicit assumption in these analyses is presumably that the identity of the majority party is equivalent to the identity of the government that will form and no further analysis is necessary. The problem is that this assumption is not borne out by the empirical evidence. As Laver and Schofield (1998, 1) note, "Even in this apparently cut-and-dried situation, it is not unknown for political parties to bargain and for a coalition administration to be formed." In the formation opportunities in our sample, a party controlling a majority of the legislative seats actually goes on to form a surplus majority government in 20% of the cases. Since we see no theoretical reason to throw away useful data, we prefer to include all government formation opportunities and estimate how the presence of a potential single party majority government affects the identity of the government that forms rather than drop them from our sample. We do, however, expect single-party majority governments to be more likely to take office than other government types. If no single party controls a majority of the

⁷Minority governments comprise parties that do not directly control a majority of the legislative seats. A minimal winning coalition is a coalition in which no single party can be removed from office without the government losing its majority status. A surplus majority coalition is one in which a single party can be removed from the cabinet without losing its majority status.

seats, then a minimal winning coalition should form (Riker 1962). The logic behind both predictions is that parties seeking office will want to form governments that do not include any unnecessary members so as to maximize their own share of the office benefits. Thus, governments should control a majority, but not have 'extra' parties.

- Government Hypothesis 1: A potential government is more likely to form if it is a single party majority government.
- Government Hypothesis 2: Potential governments are more likely to form if they are minimal winning coalitions.
- Government Hypothesis 3: Potential governments are less likely to form if they are minority or surplus majority governments.

Various other hypotheses relating to a potential government's size can be found in the theoretical literature as well. For example, Leiserson (1968) has argued that potential governments with fewer parties will be more likely to form since they should find it easier to reach agreement. Others have argued that potential governments that include the largest legislative party are also more likely to form because the largest party is often a crucial actor in the government formation process that cannot be excluded (Van Deemen 1989, Peleg 1981).

- Government Hypothesis 4: Potential governments are more likely to form the fewer parties that comprise them.
- Government Hypothesis 5: Potential governments are more likely to form if they contain the largest legislative party.

2.2.2 Ideology

The theoretical literature provides several hypotheses about how the ideological composition of potential governments influences the government formation process. These hypotheses generally come from policy-seeking models, which assume that political parties are motivated by policy goals rather than a desire to simply hold office. The most common prediction from these models is that potential governments are less likely to take office the more ideologically diverse they are (Axelrod 1970, De Swaan 1973). One reason

for this is that parties wish to minimize the policy concessions they need to make when building majority legislative support. Another reason is that it is harder for ideologically diverse governments to reach an agreement on a coalition policy (Martin & Stevenson 2001, 35).

- Government Hypothesis 6: Potential governments are less likely to form the more ideologically diverse they are.

A second prediction is that governments containing the median ideological party are more likely to enter office. As we noted earlier in our discussion of formateur selection, the logic behind this is that the median legislator is “effectively a dictator on policy” in one-dimensional models of government formation (Laver & Schofield 1998, 111). A third prediction is that minority governments are more likely to enter office if the ‘majority’ opposition is ideologically divided (Laver & Schofield 1998, 80-81). The reason is that minority governments are better able to exploit issue-by-issue differences between opposition parties to make policy and remain in office (Strøm 1990). A final ‘ideological’ prediction is that a potential government is more likely to form the closer its ideological position to that of the formateur; that is, formateurs will want to form government coalitions that are close to them ideologically (Austen-Smith & Banks 1988, Baron 1991).

- Government Hypothesis 7: Potential governments are more likely to form if they contain the median ideological party.
- Government Hypothesis 8: Potential minority governments are more likely to form the greater the ideological divisions in the opposition.
- Government Hypothesis 9: Potential governments are more likely to form the closer they are ideologically to the formateur.

Note that testing this last hypothesis effectively requires that we link the choice of government with the choice of formateur in a single empirical framework. As such, this hypothesis cannot be tested with the standard CL models of government choice that are predominant in the literature.⁸

⁸One might think to take the choice of successful formateur as given and simply examine whether potential governments that are closer to this particular formateur are more likely to be chosen. However, there are two reasons to question the utility of this approach. The first is that, in our opinion, taking the choice of successful formateur as given somewhat defeats the purpose of actually modelling the government formation process. The second is that it ignores the fact that the initial choice of formateur is likely to be endogenous to the characteristics of the set of potential governments from the which the formateur must choose. The endogeneity of formateur choice is something that we will return to in the next section.

2.2.3 Institutions

More recent theories have explicitly focused on the role that institutions play in structuring the government formation process. Some of these institutionalist theories emphasize the role that particular actors play in forming governments. Earlier, we presented arguments suggesting that the president and/or incumbent prime minister may, under certain circumstances, be able to influence the formateur selection process (Lupia & Strøm 1995, Strøm & Swindle 2002, Smith 2004, Kayser 2005, Kang 2006). The same theoretical arguments might lead one to wonder whether these actors can also influence the choice of government. For example, is it the case that potential governments containing the party of the president or incumbent prime minister are more likely to form?

- Government Hypothesis 10: Potential governments are more likely to form if they contain the president's party.
- Government Hypothesis 11: Potential governments are more likely to form if they contain the incumbent prime minister's party.

Other theories focus on specific institutions or arrangements that are thought to affect the likelihood that particular governments take office. For example, a number of scholars have suggested that minority governments are less likely in countries that require a formal investiture vote (Strøm 1990, Strøm, Budge & Laver 1994, Bergman 1995). To a large extent, investiture votes are essentially rubber stamps if the government seeking approval already controls a legislative majority. As a result, one would not expect an investiture vote to influence the likelihood that a majority government takes office. In contrast, there are reasons to believe that minority governments will find it harder to take office in countries where there is an investiture vote. These reasons are the same as we noted earlier to explain why investiture votes might constrain the ability of presidents to influence the selection of the formateur. In effect, minority governments must be explicitly supported rather than simply tolerated if there is an investiture vote. Another 'institution' thought to influence the identity of the government is the presence of pre-electoral coalitions in which political parties commit to form certain governments prior to elections (Golder 2006). By their very nature, pre-electoral coalitions can only affect the government formation process in post-election formation opportunities.

- Government Hypothesis 12: Potential minority governments are less likely to form if there is an

investiture vote.

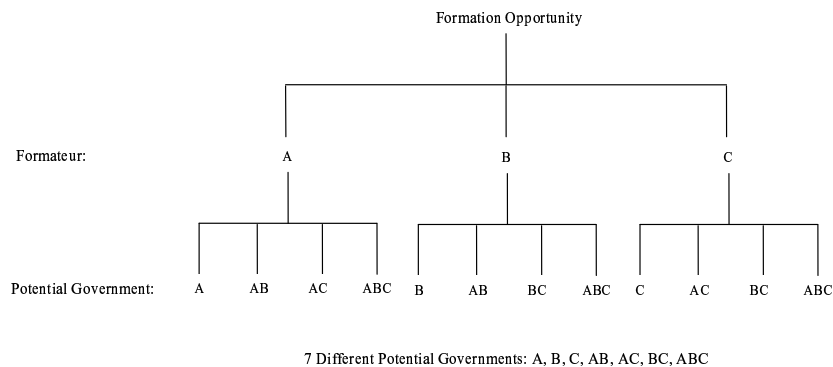
- Government Hypothesis 13: Potential governments based on pre-electoral agreements are more likely to form in post-election formation opportunities.

We have drawn on both formal models and empirical accounts of the government formation process to identify five hypotheses relating to formateur selection and another thirteen hypotheses relating to government selection. We now turn to a discussion of the most appropriate way to empirically model the government formation process and evaluate these hypotheses.

3 Empirically Modelling the Government Formation Process

We argue that there are four characteristics of the government formation process that any empirical model of it should take into account. None of these characteristics will come as a surprise to anyone who has read descriptive accounts of the government formation process. The first is that the government formation process involves the selection of a single government from the set of all potential governments. The second is that the government formation process is sequential and nested in nature – a formateur is initially chosen who then tries to form a government that contains her own party. We illustrate this two-step government formation process in Figure 1 for a government formation opportunity in a country with three parties, A, B, and C. In the first step, one of the three parties is chosen as the formateur. The formateur then chooses one

Figure 1: Sequential Nature of the Government Formation Process



of the four possible governments that include his or her own party. Figure 1 indicates that although there are

seven potential governments that differ in terms of their party composition (A, B, C, AB, AC, BC, ABC), there are actually twelve different ways that these governments can form. For example, coalition AB can result from a process where formateur A chooses AB or a process where formateur B chooses AB; the prime minister is from party A in the former case and from party B in the latter case. This is an important point given the significance of being prime minister in a parliamentary democracy. For politicians (and voters) who care about office and policy, a coalition AB with formateur A will not be seen as interchangeable with a coalition AB with formateur B.⁹ This is something that an empirical model of the government formation process should ideally recognize.

Not only does Figure 1 illustrate the sequential nature of the government formation process, but it also highlights the fact that the choice of the formateur will likely be influenced by the characteristics or party composition of the potential governments available in the second stage. Although this strategic aspect of formateur selection is something that is explicitly recognized by a few recent models of the government formation process where the formateur is endogenously chosen (Morrelli 1999, Diermeier, Merlo & Eraslan 2003, Bassi 2008), it is ignored by all previous empirical analyses of the choice of formateur.

The third characteristic of the government formation process that an empirical model should recognize is that the assumption of the independence of irrelevant alternatives (IIA) is highly implausible. The IIA assumption basically states that the stochastic component associated with each government alternative is uncorrelated with the stochastic components for the other alternatives. Put somewhat differently, IIA requires that the ratio of choosing any two government alternatives depends only on the attributes of these two choices and not on the presence or absence of other alternatives in the choice-set. Practically speaking, IIA is likely to be violated whenever two alternatives are similar or are perceived as substitutes for one another. It will also be violated if we omit a variable that is common to two alternatives since the omitted variable will be captured in the stochastic components of the two alternatives, thereby making them appear correlated. The likelihood that IIA holds in the context of government formation where there can be tens, hundreds, or even thousands of alternatives that are often similar is extremely implausible. As an example, it is relatively

⁹As an example, consider the 2005 government formation process in Germany. During negotiations over the formation of a new government, it soon became apparent that the only viable option for a majority government was a “grand coalition” between the CDU/CSU and the SPD. Despite this, there was a considerable delay in the formation of this coalition government with the leader of the CDU, Angela Merkel, and the leader of the SPD, Gerhard Schröder, both insisting that they should be Chancellor. What made this government formation process particularly interesting was that Schröder claimed that he should be Chancellor on the grounds that the SPD was the largest *party*, whereas Merkel claimed that she should be Chancellor on the grounds that the CDU/CSU together formed the largest single *group* in the Bundestag. The point here is that the two party leaders clearly thought that it mattered whether the grand coalition would be led by the CDU/CSU or the SPD.

common for countries to have multiple parties from the same ideological party family (Budge et al. 2001). It seems likely that government alternatives that are identical except for the fact that they contain different parties from the same ideological family, say the Greens, will be considered, at least partial, substitutes for one another. If this is the case, then the assumption of IIA is unreasonable. This is important because if the assumption of IIA is violated, then estimates from models requiring this assumption will be inconsistent. Given the nature of the government formation process in parliamentary democracies, therefore, it is almost certainly an inappropriate estimation strategy for examining the choice of government to employ models that require the assumption of IIA.

Finally, empirical models should recognize that unobserved or unmeasured factors are likely to influence the government formation process. In other words, some potential government alternatives may be more (or less) attractive than others for reasons that are not fully captured by the independent variables in our models. For example, government alternatives that contain parties from particular ideological families, say the far right family, might be more or less acceptable in some countries than in others due to historical or other reasons. In general, it is easy to think how features specific to particular countries or elections might make some government alternatives more or less attractive than others.

3.1 Conditional Logit

Following Martin and Stevenson (2001), a consensus has quickly developed that the conditional logit (CL) model is the most appropriate empirical strategy for modeling the government formation process. As we noted earlier, the CL model is a remarkable step forward over previous empirical strategies since it accurately captures the view of most theorists that the government formation process is one in which a single government is chosen from the set of all possible governments. Traditional linear regression models are simply unable to model this choice situation appropriately. As Martin and Stevenson (2001, 38) point out, one of the main problems with the earlier regression-based approach to examining the government formation process is that “each coalition in a formation opportunity enters the estimation as a single case. Thus, including countries such as Italy or Denmark, with a large number of parties at any given time, means that thousands of cases enter the estimation and completely swamp out relationships in other countries.”¹⁰ It is partly for this reason that Martin and Stevenson (2001, 38-39) chose to “model government formation as an

¹⁰Although it is possible to try to weight cases in an attempt to avoid this problem (Browne 1970), evidence suggests that the results that are obtained are heavily influenced by the particular weighting scheme being used (Franklin & Mackie 1984).

unordered discrete choice problem where each formation opportunity (*not* each potential coalition) represents one case and where the set of discrete alternatives is the set of all potential combinations of parties that might form a government . . . Since the unit of analysis is the formation opportunity and not the potential coalition, adding a country with a very large number of potential coalitions per formation opportunity is not problematic.” The particular model that they chose to use is McFadden’s (1973, 1974) conditional logit model.

According to the conditional logit model, the probability that government alternative m is chosen in observation i when the dependent variable y has J unordered, discrete alternatives is:

$$P(y_i = m|x_i) = \frac{e^{x_{im}\beta}}{\sum_{j=1}^J e^{x_{ij}\beta}} \quad (1)$$

where β represents a vector of coefficients and x_{im} represents a matrix of independent variables associated with alternative m in observation i (Long 1997). The model is called ‘conditional’ because it is specified conditional on the attributes of each potential alternative. This means that the coefficients for the independent variables are the same for each alternative (β is not indexed by alternative m) but the values taken by the independent variables for each observation do differ across alternatives (x is indexed by both m and i).

Despite its advantages over previous approaches, the CL model only takes into account the first of the four characteristics of the government formation process outlined above. The CL model ignores the sequential and nested nature of the government formation process and does not allow for alternative-specific constants, thereby ignoring the fact that unobserved or unmeasured factors are likely to influence the government formation process.

The CL model also makes the restrictive assumption of IIA. We should note that there are Hausman tests for IIA violations (Hausman 1978, Hausman & McFadden 1984). However, these tests have typically been employed in settings where the number of alternatives is relatively small. It is unclear how these tests would be appropriately conducted in a setting where there are thousands of alternatives as in the government formation process. Moreover, there is some uncertainty about the power and performance of the Hausman tests even in the more traditional settings where the number of alternatives is quite small (Holly 1982, Hausman & McFadden 1984). In their article, Martin and Stevenson (2001, 39) propose a procedure for testing the IIA assumption that has been adopted by subsequent government formation scholars. They begin by randomly dropping 10% of the alternatives from each formation opportunity (never dropping the government that actually formed) and conducting a Hausman test for IIA. They then repeat

this process 20 times and report the average p -value of the Hausman tests. Subsequent studies drop up to 50% of the alternatives, but otherwise follow the exact same procedure. Although Martin and Stevenson cite Hausman and McFadden (1984), as well as McFadden (1974), as providing a justification for this procedure, we find no mention of such a procedure in the two cited articles and we are unaware of any examination of the properties of their proposed test in the existing econometric literature. Furthermore, their test procedure seems obviously flawed. This is because an insignificant average p -value from the Hausman tests does not necessarily mean that IIA has not been violated – if *any one* Hausman test is significant, then the IIA assumption is violated. For example, if most potential government coalitions are independent, but a small subset are correlated, then the average p -value on a set of Hausman tests might be insignificant but the IIA assumption would still be violated.

To better test for IIA violations, we must think of what types of choices might be seen as substitutes by decision makers, and drop choice alternatives in a systematic way to test these possibilities. In our context the most likely type of substitution would seem to be one party for another in a potential coalition. Thus, we estimated a set of Hausman tests for IIA violations, with each test dropping all choice alternatives that contained a particular party in a particular election (2005 total tests). We also performed a set of tests that dropped all choice alternatives that contained a particular party in a particular country, across all elections (181 total tests). Even after a Bonferroni correction for the test p -values, we found clear IIA violations (13 in the first set of tests, 17 in the second). That is, we found clear evidence that formateurs did in fact view some parties, and thus some potential coalitions, as substitutes for unobserved reasons in some cases. Thus, we require a model that can deal with IIA violations.

In what follows, we present an alternative empirical model – a mixed nested logit – that deals with all of these issues.¹¹ Given that this is the first time that a mixed nested logit model has been employed in a political science application, we will discuss its set-up and component parts in some detail.¹²

¹¹One might think that a fully structural model of the government formation process like those found in other areas of political science (Signorino 1999, Lewis & Schultz 2003, Signorino & Tarar 2006) would provide an even closer fit between theory and empirics. Unfortunately, we do not believe that it is possible to construct such a model of government choice. The problem is that one cannot simply transform the illustrative tree in Figure 1 into a ‘game-tree’ that applies to all government formation opportunities because the number of parties, and, hence, the number of branches, varies both within and between countries. Although Diermeier, Eraslan and Merlo (2003) present a structural model of government formation, their model is not designed to, and is incapable of, predicting the identity or party composition of the government. In sum, we believe that the mixed nested logit model that we propose comes as close as is currently possible to a fully structural model of government choice.

¹²There are a limited number of applications of a mixed nested logit model similar to the one that we present here in other disciplines, mainly transportation economics (Bhat & Guo 2004, Hess, Bierlaire & Polak 2004).

3.2 Nested Logit

The mixed nested logit model builds off of the more standard nested logit model that allows for sequential and nested decision-making processes (McFadden 1981, Greene 2003). The nested logit model is sometimes referred to as the structured logit or sequential logit model. In a nested logit model with two levels as shown in Figure 1, the probability that alternative i is chosen in the first level and alternative j is chosen in the second level is simply the product of two probabilities – the probability that i is chosen in level one multiplied by the probability of choosing j in level two given that i was chosen in level one. This can be written as:

$$\begin{aligned} Pr_{ij} &= Pr_i \times Pr_{j|i} \\ &= \frac{e^{w_i\gamma + \lambda_i I_i}}{\sum_{m=1}^M e^{w_m\gamma + \lambda_m I_m}} \times \frac{e^{x_{ij}\beta/\lambda_i}}{\sum_{k=1}^K e^{x_{ik}\beta/\lambda_i}} \end{aligned} \quad (2)$$

where M and K are the unordered, discrete choices available in levels one and two respectively, γ , β , and λ are vectors of coefficients, w_i is a matrix of independent variables associated with alternative i in the first level, and x_{ij} is a matrix of independent variables associated with alternative ij in the second level.¹³ I_i is called the inclusive value for alternative i and is defined as $I_i = \ln \left\{ \sum_{k=1}^K e^{x_{ik}\beta/\lambda_i} \right\}$; it captures the expected value of the alternatives available in the second level if alternative i is chosen in the first level. The fact that the inclusive value (I_i) forms part of Pr_i in Eq. (2) indicates that the set of alternatives available in the second level can influence the choice of alternative in the first level. In terms of our focus on the government formation process, this means that the nested logit model takes account of the fact that the set of potential governments in the second level may influence the choice of formateur in the first level. Although the possibility of this effect is recognized in the formal government formation literature allowing for the endogenous selection of the formateur (Morrelli 1999, Diermeier, Merlo & Eraslan 2003, Bassi 2008), it has not, as we noted earlier, been incorporated into previous empirical studies of formateur choice (Warwick 1996, Diermeier & Merlo 2004, Mattila & Raunio 2004, Isaksson 2005, Bäck & Dumont 2008).¹⁴

¹³There are two versions of the nested logit model in the statistics literature. The nested logit outlined in Eq. (2) is sometimes referred to as the *normalized* nested logit model and is consistent with a random utility model setup.

¹⁴One concern that someone might have with the use of a nested logit in the government formation setting is that potential coalitions appear to be a member of more than one ‘nest’. For instance, in Figure 1 we can see that potential coalition BC is in two nests, that for formateur B and that for formateur C. At first glance, this would seem to be a potential problem given that the standard nested logit model only allows alternatives to be a member of a single nest. One solution to this problem of overlapping nests would be to specify the model as a cross-nested logit, with alternatives allocated across nests by an allocation parameter, α (Hess, Bierlaire & Polak 2004, Vovsha 1997, Wen & Koppelman 2001). However, it turns out that this solution is not needed here. As we noted earlier, the two BC coalitions are not, in fact, identical and are not likely to be considered interchangeable by the actors

3.3 Mixed Logit

Recall that in addition to ignoring the sequential and nested nature of the government formation process, the CL model that predominates in the existing literature requires the restrictive assumption of IIA. As we noted earlier, this assumption is highly implausible in the context of the government formation process. The nested logit model that we just outlined helps to address some of the concerns with IIA since it relaxes the assumption that IIA holds *between* nests. However, it still assumes that IIA holds *within* the nests – the coalition formation opportunities for each formateur. We believe the likelihood that IIA holds within these nests is still highly implausible given the large number of often similar potential governments that can exist there. This is where the mixed logit (MXL) model comes in (Bhat 1998, Brownstone & Train 1999, Train 1998, McFadden & Train 2000, Glasgow 2001).

A mixed logit model is similar to a CL model except that it relaxes the IIA assumption by allowing the error terms to be correlated across choice alternatives.¹⁵ Rather than assuming that the error term for each alternative has an independently and identically distributed (IID) extreme value with mean 0, the error term in a mixed logit model is assumed to depend in part on some observed variables that can induce correlation in the error term across alternatives. Specifically, we assume that $e_{ij} = Z_{ij}\eta_i + \nu_{ij}$, where Z_{ij} is a row vector of independent variables associated with alternative j for decision maker i and ν_{ij} is an IID extreme value error term with mean 0. η_i is a vector of random terms with mean 0 that varies over decision makers according to the distribution $g(\eta|\Omega)$, where Ω are the fixed parameters of the distribution g .¹⁶ The fact that η_i varies across decision makers but not choice alternatives means that the IIA assumption is relaxed because it allows for correlation across choice alternatives for each decision maker. Different choices of Z_{ij} and assumptions about the distribution of η_i will lead to different discrete choice models that can account for any pattern of correlation across alternatives (McFadden & Train 2000).

In a mixed logit model, the probability that alternative m is chosen in observation i is obtained by

involved in the government formation process – a BC coalition with B as prime minister is different from a BC coalition with C as prime minister. As a result, each potential coalition *is* only a member of one nest and the standard nested logit model is perfectly appropriate. That the two BC coalitions are distinct and each only appears in a single nest becomes particularly apparent in our empirical analysis because we include a variable capturing the ideological distance between the BC coalitions and their respective formateurs (B or C).

¹⁵A multinomial probit (MNP) model is an alternative approach that also allows for the relaxation of the IIA assumption. Unfortunately for our purposes here, MNP models can still only be successfully estimated when the number of alternatives is relatively small. In any case, MXL models provide a more general treatment of the error terms than MNP models, which require the error terms to be distributed multivariate normal (Glasgow 2001, 119).

¹⁶Discrete choice models like the CL model that assume IIA do not estimate $Z\eta_i$, implicitly assuming that $\eta = 0$ for all i .

integrating over the general multivariate distribution of the random term g :

$$P(y_i = m|x_i) = \int_{\eta} \left[\frac{e^{x_{im}\beta + z_{im}\eta_i}}{\sum_{j=1}^J e^{x_{ij}\beta + z_{ij}\eta_i}} \right] g(\eta|\Omega) \partial\eta \quad (3)$$

If one recalls the CL model shown earlier in Eq. (1), it becomes obvious that the choice probability in an MXL model is just a mixture of CL probabilities, with the weight of each particular CL probability determined by the mixing distribution g . This mixing of CL probabilities is why this model is referred to as a ‘mixed logit’ model. Since the estimation of the MXL model generally involves the evaluation of multi-dimensional integrals, these models are normally estimated using some kind of simulated maximum likelihood technique that attempts to approximate the multi-dimensional error distribution through a Monte Carlo procedure.¹⁷

In addition to relaxing the IIA assumption, the MXL model also helps to address another criticism of the conditional logit approach to modeling the government formation process – the lack of alternative-specific constant terms. Discrete choice models like the CL model generally allow for the inclusion of alternative-specific constant terms to capture any unobserved or unmeasured attributes of alternatives that might influence choice behavior. However, this is not the case in the government formation setting because each potential government enters the data set exactly once. Including alternative-specific constants in this context would necessitate estimating as many constant terms as there are observations in the data – an obvious impossibility.¹⁸ By omitting these terms, though, scholars are implicitly forced to assume that there is nothing unobserved about each potential government that makes them more or less likely to be chosen than other potential governments. As we noted earlier, this assumption seems somewhat implausible.

The use of an MXL model helps to mitigate this problem because it allows us to capture many of the unobserved attributes that influence choice behavior through the random terms in the model. That is, rather than simply ignoring the unobserved attributes specific to each potential government, we can estimate the distribution of these unobserved attributes across potential governments, thereby leading to a better model fit. This is analogous to estimating a random-effects model rather than a fixed-effects model for time-series cross-section or panel data.

¹⁷For more information about how MXL models are estimated, see the Appendix in Glasgow (2001, 133-135).

¹⁸This problem does not normally arise in most political science settings where discrete choice models have traditionally been employed. For example, it is straightforward to include alternative-specific constants in models of party choice where large numbers of voters are selecting their favorite party or candidate from a fairly small choice set (Alvarez & Nagler 1995, Alvarez & Nagler 1998a, Alvarez & Nagler 1998b).

3.4 Mixed Nested Logit

Although the MXL model relaxes the IIA assumption and allows scholars to capture unobserved factors influencing the choice of government, it does not capture the sequential nature of the government formation process. It is for this reason that we combine the nested logit and MXL models to obtain a mixed nested logit model. This model captures all four of the characteristics of the government formation process outlined earlier.

In a mixed nested logit model with two levels as in Figure 1, the probability that alternative ij is chosen can be written as:

$$\begin{aligned} Pr_{ij} &= Pr_i \times Pr_{j|i} \\ &= \int_{\eta} \left[\frac{e^{w_i \gamma + \lambda_i I_i}}{\sum_{m=1}^M e^{w_m \gamma + \lambda_m I_m}} \times \frac{(e^{x_{ij} \beta + z_{ij} \eta_c})^{(1/\lambda_i)}}{\sum_{k=1}^K (e^{x_{ik} \beta + z_{ik} \eta_c})^{(1/\lambda_i)}} \right] g(\eta|\Omega) \partial \eta \end{aligned} \quad (4)$$

where $I_i = \ln \left\{ \sum_{k=1}^K (e^{x_{ik} \beta + z_{ik} \eta_c})^{(1/\lambda_i)} \right\}$. Note that the random term η_c is the same for each government formation opportunity c , which induces correlation across choice alternatives for each decision maker. As this term enters both the second level and the first level through the inclusive value I_i , this means that not only does the mixed nested logit model relax the IIA assumption within each second level nest (the choice of government coalition by the formateur), but it also relaxes the IIA assumption across choices in the first level (the choice of formateur). Furthermore, the model also improves on previous CL specifications by capturing some of the unobserved attributes that influence the choice of both formateur and government through the random terms in the mixed logit.

In this model we place a restriction on the parameter λ_i , which measures the average independence among alternatives within a nest. Although it is possible to estimate a different λ for each nest in the model, here we restrict λ_i to be equal for all nests. We do this because the nests in our empirical model are defined by party size (nest 1 is when the largest party is chosen as formateur, nest 2 is when the second largest party is chosen as formateur, etc.) and it is not clear that these nests are comparable across countries. We also do this because the alternatives within each nest overlap to a high degree. Although restricting λ_i in this way reduces the ability of the nested logit model to address correlations across alternatives, this problem is partially addressed through the random coefficients in the mixed logit part of the model.

As should be obvious from our description of the mixed nested logit model, we are able to evaluate a number of additional hypotheses about the government formation process that cannot be tested in the

standard CL framework. For example, we are able to examine various hypotheses regarding the choice of formateur. We are also able to explicitly examine how the selection of the formateur influences the overall party composition of the government. We can evaluate whether certain factors influence the choice of formateur, the choice of the government, or both. In addition, we are able to evaluate whether particular formateurs or governments are more likely to be chosen in some situations than in others for unobserved reasons. For instance, is it the case that having the largest seat share always makes it more likely that a party will be chosen as a formateur? Or, can having the largest seat share be a benefit in some situations but a hindrance in others for unobserved reasons? In the next section, we test the hypotheses outlined earlier linking ideological, institutional, and ‘size’ variables to the choice of formateur and government.

4 Empirical Analysis

4.1 Data

To create the data set to test our hypotheses, we began with the governments identified by the Constitutional Change and Parliamentary Democracies (CCPD) project (Müller & Strøm 2000, Strøm, Müller & Bergman 2003). From the 402 different government formation opportunities identified in seventeen parliamentary democracies from 1945 to 1998, we generated a data set with all potential governments in each formation opportunity. This resulted in almost 186,000 potential governments. We then created variables to capture characteristics of these potential governments that would allow us to test the hypotheses outlined earlier.¹⁹ The countries included in our data set are Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, and the United Kingdom.²⁰ The CCPD data provide the seats won by each party, identifies which party contains the median legislator, and whether a country requires an investiture vote for a new government. We were able to use the information provided in the CCPD data to create many of the independent variables we needed. For example, we created the following formateur-choice variables: the largest party, party seat share, whether

¹⁹As far as we are aware, this is the largest number of formation opportunities examined in any of the government formation literature thus far. As we noted earlier, it is substantially larger than the data used by Martin and Stevenson (2001), who test their hypotheses on 30,000 potential governments from 220 formation opportunities in 14 countries; their data only extend to the mid 1980s.

²⁰Although we have data for most of these countries for much of the post-war period, there are a few exceptions because some of these countries were not democracies during this entire time period. In particular, we only include government formation opportunities from Portugal, Spain, and Greece after these countries democratized in the 1970s.

an investiture vote is required, the previous prime minister’s party, and the party with the median legislator. Government-choice variables that we were able to construct from the CCPD data include the number of parties in a potential government, as well as whether a potential government would be a single-party majority government, be a minimal winning coalition, be a minority government, be a surplus majority government, contain the largest legislative party, contain the party with the median legislator, or contain the party with the previous prime minister. Variables indicating if a party is the party of the president, whether the president is directly or indirectly elected, and whether a potential coalition contains the president’s party are based on Golder (2005) and Kang (2006). We relied on Golder (2006) to determine whether the members of a potential government had formed a pre-electoral coalition.

Aside from the party containing the median legislator, all of the ideology variables are based on left-right measures of party policy positions from the Campaign Manifesto data (Budge et al. 2001). The ideology variables include a measure of the diversity of each potential government, a measure of the diversity of the opposition, and a measure of the distance between the party of the formateur and the estimated policy position of each potential government. To measure the ideological diversity of potential governments, we calculated the absolute distance from the left-most and right-most parties in the potential government, and normalized this measure by dividing it by the distance between the left-most and right-most parties in the entire legislature. This measure goes from 0 to 1, where 1 is as diverse as possible for a given set of legislative parties. To measure the ideological divisions in the opposition, we calculated the distance from the left-most and right-most parties that were *not* in the potential government. Again, we normalized this measure by dividing it by the distance between the left-most and right-most parties in the entire legislature. To test the hypotheses that a potential government is more likely to be chosen if it is closer ideologically to the formateur, we needed a measure of the ideological position of each potential government. The ideological position of each potential government is measured as the weighted average of the positions of the parties in the cabinet, in which the weights are the parties’ share of legislative seats controlled by the government.²¹

²¹More precisely, the ideological position of the potential government is measured as:

$$G = \sum_{i=1}^P \left(\frac{S_i}{S_{gov}} \right) P_i \quad (5)$$

where S_i is the number of legislative seats controlled by the i^{th} government, S_{gov} is the number of legislative seats controlled by the government as a whole, P_i is the ideological position of the i^{th} governmental party, and P is the number of governmental parties. An appealing aspect of this measure is that it is consistent with empirical research on Gamson’s Law showing that cabinet portfolios tend to be distributed among governmental parties in proportion to the number of seats that each party contributes to the government’s legislative support (Gamson 1961, Druckman & Warwick 2001, Druckman & Warwick 2006).

Once we have an ideological position for the potential government, it is a simple matter to measure the distance between the formateur's party and each potential government position in a particular government formation opportunity.

The dependent variables are formateur choice and government choice. That is, of all of the parties in a particular formation opportunity, which one is affiliated with the formateur? Of all of the possible potential governments that could form, which one is successful? The party of the successful formateur was determined by examining accounts in Keesing's (various years). The party composition of the successful government was based on information in the CCPD data. We ignore all formateur selection opportunities where the successful formateur is non-partisan. This led us to exclude nine formateur selection opportunities (seven in Finland, one in Greece, and one in Italy). Eleven additional selection opportunities are omitted because we have no observation for the party of the previous prime minister. We also omitted six formation opportunities following the 1953 Italian election, because the CCPD data provide incorrect seat information for some of the parties (and in particular, they code one of the parties that was in government during part of that period as having zero legislative seats). After these omissions, we are left with 378 formateur selection opportunities, 2418 potential formateurs, and 182,094 observations.

4.2 Preliminary Results

The preliminary results from three different models are shown in Table 1.²² The first two columns present the results from two mixed logits, one estimating formateur choice and the other estimating government choice. We then present the results from our full mixed nested logit model. A comparison of the results across these three models indicates how the results change as we go from modeling formateur and government choice separately to modeling them together as part of a unified government formation process.

²²Our results are preliminary because we have yet to (i) include a variable capturing the ideological distance between each potential coalition and their respective formateurs, (ii) include all countries (Belgium, Italy, and the Netherlands are currently omitted), (iii) think carefully enough about which variables should be specified as having random coefficients, (iv) conduct robustness tests, and (v) calculate quantities of interest and goodness of fit measures.

Table 1: What Determines the Choice of Formateur and Government?

Independent Variable	Model 1	Model 2	Model 3
Formateur Choice			
Size of Party	0.10*** (0.02)		0.08*** (0.01)
Largest Party	3.10** (1.44)		1.23** (0.52)
Std. Dev. Largest Party	2.06* (1.13)		
Median Ideological Party	0.92* (0.49)		-0.17 (0.42)
Previous Prime Minister	1.16*** (0.28)		0.68* (0.37)
President Party	0.73** (0.34)		1.77* (0.96)
President Party × Investiture	-3.04*** (1.15)		-1.95*** (0.73)
President Party × Directly Elected	-2.08* (1.23)		-0.99 (0.92)
Government Choice			
Surplus Majority		-2.90*** (0.40)	-2.57*** (0.83)
Minimal Winning Coalition		-0.69*** (0.25)	-0.36 (0.30)
Minority		-2.10*** (0.76)	-2.01* (1.05)
Number of Parties in Government		-0.40*** (0.13)	-0.75** (0.36)
Government Contains Largest Party		1.80*** (0.21)	-0.45 (0.55)
Std. Dev. Largest Party		0.22 (0.47)	0.40 (0.40)
Government Contains Prev. PM Party		0.51*** (0.20)	-0.29 (0.39)
Pre-electoral coalition		3.67*** (0.39)	4.20*** (1.41)
Government Contains Median Party		1.36*** (0.17)	1.45*** (0.53)
Government Diversity		-0.69** (0.31)	-1.03** (0.49)
Opposition Diversity		0.05 (0.35)	0.43 (0.50)
Minority × Opposition Diversity		0.51 (0.82)	0.41 (0.98)
Minority × Investiture		-0.86* (0.47)	-1.38* (0.83)
Logsum Coefficient (λ)			1.23*** (0.44)

Note: Models 1 & 2 are mixed logits. Model 3 is a mixed nested logit.

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$ (two-tailed).

4.2.1 Formateur Choice

The results from the mixed logit model of formateur choice (Model 1) indicate that larger parties are more likely to be chosen as the formateur than smaller parties (the coefficient on SIZE OF PARTY is positive and significant). There is also strong evidence that the largest party is also more likely to be chosen as the formateur even after controlling for the size of other parties (the coefficient on LARGEST PARTY is positive and significant). This last result runs contrary to two recent empirical studies that claim that being the largest party has no significant effect on being chosen as the formateur (Diermeier & Merlo 2004, Bäck & Dumont 2008). The results in column 1 also indicate, as predicted by much of the theoretical literature, that the median ideological party and the party of the previous prime minister are significantly more likely to become the formateur than other parties.

In addition to the standard variables found in the existing literature on formateur choice, we also examined how presidents might influence the formateur selection process.²³ The positive and significant coefficient on PRESIDENT PARTY indicates that the president's party is significantly more likely to be chosen as the formateur when the president is indirectly elected and he is unconstrained by an investiture vote. This is exactly as predicted. Also as predicted, the probability that the president's party is selected as the formateur significantly diminishes if the president is directly elected and/or faces an investiture vote (the coefficients on PRESIDENT PARTY×INVESTITURE and PRESIDENT PARTY×DIRECTLYELECTED are both negative and significant). Although not explicitly shown in Table 1, the results indicate that the president's party is no more likely to be chosen as the formateur than any other party if the president is directly elected or there is an investiture vote.

Note that in our mixed logit model of formateur selection we also specify the coefficient on the dichotomous largest party variable to be a normally distributed random coefficient and estimate the standard deviation on this distribution.²⁴ With this particular specification we are examining the possibility that selecting the largest party to be formateur may be more desirable in some instances for unobserved reasons than in others. For example, if the head of state selecting the formateur agrees with the largest party ideologically, then the choice to have the largest party be the formateur is particularly attractive since it will very

²³Our hypotheses regarding the role that the president plays in the formateur selection process are conditional and require the use of multiplicative interaction terms. While the standard advice is to include all constitutive terms whenever interaction models are estimated (Brambor, Clark & Golder 2005), this is not possible here since the variables capturing whether the president is directly elected and whether there is an investiture vote do not vary within formateur selection opportunities.

²⁴The random coefficients for our mixed logit model is calculated using 150 Halton draws. See (Glasgow 2001) for more details on estimating mixed logit models.

likely lead to a government with the desired ideological makeup. However, if the head of state disagrees with the largest party on ideological grounds, then selecting the largest party as formateur would be undesirable as it would likely produce an ideologically unpalatable government.

Throughout the paper, we have argued that the mixed logit model is superior to the standard CL model for examining various aspects of the government formation process. In particular, we noted that the IIA assumption required for the estimation of consistent estimates in CL (but not mixed logit) models was extremely implausible in this setting. As we suspected, the results from Model 1 indicate that IIA is violated. This is because the standard deviation of the random coefficient on `LARGEST PARTY` is statistically significant. Substantively, this significant standard deviation means that the attractiveness of selecting the largest party as formateur varies considerably from one situation to another. Methodologically, it means that there is correlation across the formateur alternatives and, therefore, that the IIA assumption is violated.

4.2.2 Government Choice

The results from the mixed logit model of government choice (Model 2) indicate that minimal winning coalitions, minority governments, and surplus majority governments are all significantly less likely to form than single-party majority governments (the omitted category). Moreover, within these three types of governments, minority and surplus majority governments are much less likely to be chosen than minimal winning coalitions (the negative coefficients on `SURPLUS MAJORITY` and `MINORITY` are much larger than the negative coefficient on `MINIMAL WINNING COALITION`). All of these results are exactly as predicted by the government formation literature. As we noted earlier, a number of scholars have suggested that minority governments are less likely to be chosen in countries that require a formal investiture vote (Strøm 1990, Strøm, Budge & Laver 1994, Bergman 1995). Again, this seems to be borne out by the evidence presented here given the negative and significant coefficient on `MINORITY×INVESTITURE`. However, there seems to be no evidence that minority governments are less likely to form when the opposition is divided as some have claimed.

The other results from Model 2 are almost all in line with theoretical predictions. The likelihood that a potential government takes office declines as the number of parties it contains and its ideological diversity increases. In contrast, potential governments are more likely to enter office if they contain the largest legislative party, if they contain the party of the previous prime minister, if they are based on a

pre-electoral agreement, and if they contain the median ideological party.

4.2.3 Formateur and Government Choice

Given that this is only a preliminary analysis, we do not wish to interpret the results in Table 1 in too much detail. However, we would like to draw the reader's attention to the fact that there are significant differences between the results from the mixed nested logit model (Model 3) and the two separate mixed logit models (Models 1 and 2). For example, examining the choice of formateur and government choice separately suggested that parties that were the median ideological party were more likely to be chosen as the formateur and that government coalitions that contained the median ideological party were more likely to enter office. In contrast, the mixed nested logit, which models formateur and government selection as part of a unified government formation process, reveals that the identity of the median ideological party only matters for the choice of government and not for the choice of formateur. The results from the mixed nested logit model also indicate that the identity of the largest party only matters for the choice of formateur and not the choice of government; the results from the two separate mixed logit models had suggested that the identity of the largest party mattered for both formateur and government selection. In other words, the mixed nested logit model shows that a party that is the largest party is more likely to be chosen as a formateur, but taking this into account, potential governments that contain the largest party are no more likely to enter office than potential governments that do not contain this party. Although the two separate mixed logit models suggested that the party of the previous prime minister mattered for both formateur and government selection, the mixed nested logit model indicates that it only matters for the choice of formateur. In addition to these differences, it is worth noting how the size of the coefficients on some variables change quite markedly as we move across the different models. Overall, the results from Model 3 clearly demonstrate the potential for incorrect inferences to be drawn from modeling the choice of formateur and government as discrete processes as is done in the existing literature.

Although our mixed nested logit model is promising, there are still specification issues to address as we mentioned earlier. For example, although our Hausman tests showed clear IIA violations, the estimated standard deviation on the largest party variable was statistically insignificant in the mixed nested logit model. A better model specification with different random coefficients might better address potential IIA problems and produce more substantively interesting results.

5 Conclusion

A consensus has recently emerged that the conditional logit (CL) model is the most appropriate empirical strategy for evaluating which parties make it into government. The CL approach represents a significant narrowing of the gap between theory and empirics in the government formation literature. Despite this, the CL model is far from perfect. For example, it cannot capture the sequential nature of the government formation process posited by virtually all theoretical accounts. It also requires the assumption of IIA; something that we believe is almost guaranteed to be violated in the context of government formation. In this paper, we propose an alternative empirical model – a mixed nested logit. In addition to allowing us to capture the sequential way in which governments form, our empirical strategy enables us to avoid some of the methodological pitfalls that are, to a large extent, unavoidable when using a CL model. Specifically, the mixed nested logit allows us to relax the assumption of IIA and examine the influence of unobserved factors on the government formation process.

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