Electoral Uncertainty and the Stability of Coalition Governments

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Abstract

In Parliamentary democracies coalitions frequently reshuffle the allocation of cabinet posts while in office, and governments terminate before the end of the legislative period. A possible explanation of these phenomena is that, while uncertain about the outcome of the next scheduled election, parties receive information regarding their expected electoral gains or losses through opinion polls. Therefore, parties’ incentives to terminate a government depend on electoral polls, and this may lead coalition parties to negotiate over whether to preserve the current government or not. In order to analyze the strategic interaction of parties as a reaction to electoral uncertainty, I develop and estimate a tractable dynamic model of government formation and termination. Using the estimated model I conduct counterfactual experiments aimed to evaluate the effects of poll informativeness and specific institutional features on the survival probabilities of the coalition types that form in equilibrium.

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1 Introduction

In parliamentary democracies, governments often terminate before the end of the legislature, and empirical works have shown that the lack of government stability may have severe consequences on future economic performance and growth\(^1\). The importance of government stability has motivated a growing research area aimed to understand its determinants. While the existing literature is rich with empirical studies of the political and economic factors affecting government duration\(^2\), an unexplored issue is whether parties’ reaction to electoral uncertainty plays any role in explaining cabinet reshuffles and termination. Intuitively, while uncertain about the outcome of the next scheduled election, parties receive information regarding their expected electoral gains or losses through opinion polls. Therefore, parties’ incentive to terminate a government will depend on electoral polls, and this may lead coalition parties to negotiate over whether to preserve the current government or not. Starting with Lupia and Strom (1995), there is a strand of the theoretical literature that focuses on electoral uncertainty as an input into a coalition bargaining process\(^3\), but the empirical literature has devoted little attention to the strategic interaction among parties. This paper develops and

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\(^1\) See, e.g., Alesina et al. (1996), Barro (1991), and Huber (1998).

\(^2\) See, e.g., King et al. (1989), Warwick (1994) and Merlo (1998). In general, they find that both the political environment (i.e. the number of parties represented in the parliament, length of negotiation period leading to the government formation, size of the ruling coalition, time horizon to the next scheduled election), and the economic conditions (i.e. current inflation, unemployment rates, number of workhours lost in strikes) affect the downfall probability of the government.

\(^3\) Lupia and Strom (1995) is a one-period bargaining model where public opinion shocks determines the electoral prospects of all parties if election were held immediately. Since the model is static, government reshuffles or government termination depends on the size of transaction costs. Baron (1998) proses a dynamic model of government stability, building on Diermeier and Feddersen (1998). In this model government dissolution emerges when the bargaining horizon is relatively short, and the discount factor is low. Diermeier and Merlo (2000) show that a two-period dynamic model of government formation and termination, can generate the formation of minority and surplus government, cabinet reshuffles, and government dissolution as equilibrium phenomena.
structurally estimates a dynamic model of government formation and termination that explains cabinet reshuffles and dissolution as optimal reactions of parties to electoral uncertainty.

Recent European political events provide anecdotal evidence that shifts in the electoral support may affect the strategic interaction of cabinet parties, and therefore the likelihood of cabinet reshuffles and termination. For instance, in April 2005 the Italian Prime Minister’s party suffered heavy losses in regional elections\(^4\), and one of the cabinet parties quit the coalition threatening the government’s survival. The NY times reported that the Italian Prime Minister “under pressure from his allies, said he was open to the idea of an early general election in October [...] but then he accepted to form a new government for the last year of the administration’s term avoiding the need for a snap election he would probably lose. [...] He said he would face both houses of Parliament to determine whether he has the support to continue until his mandate expires in 2006 and that ‘the reaction of Parliament’ would determine whether new elections would be called or the cabinet reshuffled”. This example seems to suggest that a renegotiation of office-holding benefits (in the form of a cabinet reshuffle) was necessary to avoid early elections and government termination.

There is also evidence that opinion-polls may lead to government dissolution. In fact, parties may strategically decide to hold early election if opinion poll ratings are high. The *Keesings Record of World Events* reported that in the fall of 1982 “whereas (the German) Parliament’s full four-year term was not due to expire until 1984, Dr. Kohl had declared his intention to seek an early general election in order to obtain a confirmation of broad national support for the new CDU-CSU/FDP coalition [...] the dissolution of the Bundestag and the calling of early elections could normally occur only if the Federal Chancellor requested, but failed to obtain, a vote of confidence from an absolute majority of the full membership of the Bundestag, thus obliging Dr. Kohl

\(^4\)It seems reasonable that the outcome of regional elections may be interpreted as a signal about the distribution of parliamentary seats if general elections were held.
deliberately to lose such a vote in order to achieve his aim [...]”. The polls released in the Fall of 1982 show that Dr. Kohl’s strategy was consistent with my framework. In particular, as reported in Table 1, a comparison of current and expected vote shares shows an electoral gain for the Prime Minister party and an electoral loss for the other coalition member. Furthermore, the results of the general election were remarkably close to the released polls.

<table>
<thead>
<tr>
<th>Old vote shares</th>
<th>Released poll</th>
<th>New vote shares</th>
</tr>
</thead>
<tbody>
<tr>
<td>CDU-CSU</td>
<td>45%</td>
<td>50%</td>
</tr>
<tr>
<td>FDP</td>
<td>10%</td>
<td>5.6%</td>
</tr>
<tr>
<td>SDP</td>
<td>43%</td>
<td>39.6%</td>
</tr>
</tbody>
</table>

To empirically investigate the impact of electoral polls on government duration, I develop and estimate a tractable dynamic model of government formation and termination. Following a general election, a government is formed and it can stay in office for a given number of periods. In any period prior to the end of the legislature, public opinion polls are released. After observing this signal, the ruling coalition may need to renegotiate the distribution of office-holding benefits in order to preserve (or not) the current government. After the renegotiation, all parties represented in the parliament decide whether to support the current government or not. If the ruling coalition still enjoys the support of the parliamentary majority, then it stays in office. If not, then general elections are held at the end of the period. If the government lasts until the end of the legislature, regularly scheduled elections take place in the next period.

I characterize the subgame-perfect equilibrium of this game. The equilibrium outcomes are the type (i.e., minority, minimum winning, or surplus) and size of the government coalitions, and the downfall probability of their governments.

I estimate the model through the simulated method of moments using a newly collected data set from eleven Western European parliamentary democracies with a
proportional electoral system (Austria, Belgium, Denmark, Finland, Germany, Ireland, Italy, Luxemburg, Netherlands, Portugal, Spain) over the period 1970-2000.

Using the estimated model I conduct counterfactual experiments aimed to evaluate the impact on government survival probabilities of (i) polls informativeness, and (ii) alternative institutional environments. As for the former experiment, I investigate how parties react to electoral uncertainty when the polls become perfectly informative (the noise of the signal is assumed to be zero). As for the latter experiments, I evaluate the effects of specific institutional features, such as changing the length of the inter-election period (that in turn changes the number of bargaining periods left with the same coalition parties), no dissolution of the Parliament in the first year following an election, and changing the process selecting the prime minister.

The paper is organized as follows. In Section 2, I describe the model, I characterize the equilibrium, and I discuss the solution method. In Section 3, I describe the data, and the empirical procedure. In Section 4, I present the counterfactual experiments and conclude.

2 The Model

I consider a model where there are \( N \) (non-extremist) parties represented in the parliament. Each party \( h = \{1, ..., N\} \) can either be the Prime Minister party \((k)\), or a member of the coalition \((i)\), or stay at the opposition \((j)\). Time is discrete, and parties are infinitely-lived and can stay in power at most \(A\) periods of time with the same cabinet.\(^5\) Let \( a = 0, ..., A \) denote the age of the government, and let \( c_0 \) denote the government coalition formed after an election. Let \( \pi_0 = (\pi_0^1, ..., \pi_0^N) \), where \( \pi_0^h \in (0, \frac{1}{2}] \), and \( \sum_{h \in N} \pi_0^h \leq 1 \) denote the distribution of seat shares after an election, and \( \pi^{ext} = 1 - \sum \pi_0^h \) the seat share controlled by the extremist parties.\(^6\) Finally,

\(^5\) \( A \) is the end of the legislature. In my sample it is either 4 or 5 years.

\(^6\) I define an extremist party as a party that is always at the opposition. In order to make the solution of the model feasible, I do not model the strategic behavior of extremist parties, and I
\[ \Pi_{c_0} = \sum_i \pi_0^i + \pi_0^k \] denotes the coalition size.

### 2.1 Timing

After a general election (following the end of a legislature or the resignation of the incumbent government) nature chooses a *formateur* \( k \) who selects the proto-coalition parties. The *formateur* can either form a single-party government or announce a proto-coalition. If all parties in the proto-coalition accept the offer then a coalition government is formed, otherwise a single-party government is formed.

At each age an observable signal about the distribution of parliamentary seats if elections were held in the next period \( \pi_a = (\pi^1_a, \ldots, \pi^N_a) \) is realized. After observing \( \pi_a \), the Prime Minister proposes a reshuffle of office-holding benefits among the coalition parties as follows: he sequentially makes a take-it-or-leave-it offer to each party. Transfers \( y_a = (y^1_a, \ldots, y^N_a) \) are contingent on supporting the government or not, and the sequence of the offers is chosen by the Prime Minister. The coalition parties sequentially respond by either accepting or rejecting the offer. If a coalition party accepts the prime minister’s offer, then they both commit to vote according to the new agreement. If all coalition parties reject the offer, they all vote as if no transfers were allowed\(^7\).

All parties represented in the parliament decide whether to support the current government or not. If the ruling coalition enjoys the majority support, then it stays in office. If not, general elections are held next period.

At age \( \overline{A} \) the government terminates and regularly scheduled elections take place summarize their voting behavior in a parameter \( e \), that is the proportion of extremists that do not support the government.

\(^7\)For tractability purposes, government policies are not modelled. In the tradition of the previous theoretical studies, I abstract from the effect that a policy might have on electoral polls.

Even if I allow parties to bargain over the policy, it is not clear how to identify and measure the effect of a policy in the data (short versus long run effects, and how different groups in the electorate perceive the policy).
next period.

\[
\Omega_a = (\pi_0, k, c_0, \pi_a)
\]
denote the set of state variables and \( Q = (q, A) \) denote the features of the institutional environment, where \( q \) is the parliament qualified majority necessary to keep a cabinet in power. The current payoff of party \( h \) is

\[
U_a^h = U_a^h(c_0, \pi_0, k) + y_a^h(\Omega_a, Q),
\]

where

\[
y_a^h(\Omega_a, Q) = 0 \quad \text{and} \quad U_a^h(c_0, \pi_0, k) = \begin{cases} 
\frac{\pi_a^h}{\Pi_{c_0}}(\gamma \phi_a - b) & \text{if } h = i \\
\frac{\pi_a^h}{\Pi_{c_0}}(\gamma \phi_a - b) + b & \text{if } h = k \\
0 & \text{if } h = j,
\end{cases}
\]

and \( b \in [0,1) \) is a bonus for \( k \)'s party, and \( \phi_a \) is the level of surplus generated by office-holding benefits when the government reaches age \( a \), and \( \gamma \) a coefficient that is coalition-type specific. I assume that only the cabinet controls the allocation of perks, and when parties form a government, they agree on allocating office-holding benefits according to the relative strength of each party in the governing coalition.
(which is measured by its relative seat share).\footnote{This particular sharing rule is an equilibrium outcome of several “demand-based” bargaining models (e.g., Morelli, 1999). Moreover, some empirical work (e.g., Browne and Frendreis, 1980) supports this theoretical result.} After observing the public opinion poll, the coalition parties can renegotiate their agreement, and transfers $y_a^k$ and $y_i^k$ are determined in equilibrium.

2.3 Recursive formulation & equilibrium characterization

The first period begins after a general election. Each party $h$ is selected to be a \textit{formateur} with a probability that is determined as follows,

$$\Pr\left(\pi_h^0, k_{-1}\right) = \begin{cases} 
1 & \text{if } \pi_h^0 \geq 0.5 \\
\frac{\exp\left(\alpha_0 \pi_h^0 + \alpha_1 I_h\right)}{\sum_{n \in N} \exp\left(\alpha_0 \pi_n^0 + \alpha_1 I_n\right)} & \text{if } \pi_h^0 < 0.5, \forall h \in N \\
0 & \text{if } \exists n \neq h : \pi_n^0 \geq 0.5,
\end{cases} \tag{1}$$

where $k_{-1} \in N$ denotes the party of the former prime minister, and $I_h$ is an indicator variable that takes value 1 if $k_{-1} = h$, and zero otherwise.

The \textit{formateur} can either form a single-party government, $c_0 = k$, or announce a proto-coalition and sequentially ask these parties to join the coalition. I assume that at most two parties can be included in the proto-coalition.\footnote{In an extension of this model I allow for coalitions being formed by 4 parties.} Hence $c_0 \in \{(k, i_1), (k, i_1, i_2)\}$

To economize on notation, in the following sections, I suppress the party index if a variable is defined in the same way for all parties.

2.3.1 The equilibrium outcome of the coalition formation game

As mentioned previously, the \textit{formateur} can either form a single-party government or announce a proto-coalition. If all parties in the proto-coalition accept the \textit{formateur}’s offer, then the expected payoff of each party $i$ is given by

$$EV_i^0\left(\pi_0, k, c_0, \pi_a\right).$$
If at least one party rejects, then the expected payoff of each party $i$ is given by

$$EV_i^0(\pi_0, k, k, \pi_a),$$

where the expectation is taken over the realization of the polls in the first period. If, for example, $c_0 = (k, i)$, party $i$ accepts if $EV_i^0(\pi_0, k, c_0, \pi_a) \geq EV_i^0(\pi_0, k, k, \pi_a)$ and rejects otherwise.

The formateur chooses the proto-coalition that maximizes his expected payoff:

$$V_{0}^{k^*}(\Omega_0) = \max_{c_0 \in C_0} EV_{0}^{k}(\Omega_0),$$

where the expectation is taken over the realization of the signal.

### 2.3.2 The equilibrium outcome of the renegotiation game

At each $a < A$, $\pi_a$ is realized and the incumbent government can renegotiate its agreement. After observing the public opinion poll, the prime minister proposes a reshuffle of office benefits ($y_a$) among the coalition parties. He makes a take-it-or-leave-it offer of transfers contingent on supporting the government or not. The coalition parties sequentially respond by either accepting or rejecting the offer. The order in which they respond is chosen by the prime minister. If a coalition party accepts the prime minister’s offer, then they both commit to vote according to the new agreement. If a coalition party rejects the offer, then they vote as if no transfers were allowed. After the proposal, all parties represented in the parliament decide whether to support or not the current government. If the ruling coalition enjoys the majority support, then it stays in office. If not, general elections are held next period. Let $\pi'_0$ denote the vector of the new shares. I assume that the signal is observed with noise, that is $\pi'_0 = \pi_a + \varepsilon$.

Let $s$ denote the event of government survival and $f$ the event of government termination. The payoff of each coalition party is:
\[ V_a (\Omega_a) = \begin{cases} 
\overline{U}(c_0; \Omega_0) + y_a (\Omega_a; s) + \beta E (V_{a'} (\Omega_{a'}) | \Omega_a; s), \\
\underline{U}(c_0; \Omega_0) + y_a (\Omega_a; f) + \beta E (V_{0}^{*} (\pi_0', k') | \pi_a; f), 
\end{cases} \]

where \( \beta \) is the discount factor and \( y \) are equilibrium transfers.

Before transfers are implemented, if the government survives, the continuation value of the government is

\[ \overline{U}_a(c_0; \Omega_0) + \beta E(V_{a'} (\Omega_{a'}) | \Omega_a; s), \]

where the expectation is taken over the realization of the signal. If the government falls, the continuation value of having a new government is

\[ \overline{U}_a(c_0; \Omega_0) + \beta E(V_{0}^{*} (\pi_0', k') | \Omega_a; f), \]

where the expectation is taken over the identity of the new prime minister, and the noise in the signal. Hence, the transfer that would make a party indifferent is defined as follows:

\[ w_a (\Omega_a) = \beta \{ EV_{0}^{*} (\cdot) - EV_{a'} (\cdot) \}. \]

In what follows, I suppress all arguments in \( w_a, y, \) and \( U. \)

Notice that the price a party is willing to pay depends on his continuation value in the two scenarios (\( s \) and \( f \)). For instance, if \( w > 0 \) then a party needs to be paid at least \( w \) in order to vote in favor of the current government, or a party might pay at most \( w \) in order to shut the current government down. On the contrary, if \( w < 0 \) then a party might pay at most \( |w| \) in order to remain with the current government, or a party needs to be paid at least \( |w| \) in order to vote against the current government. Finally, if \( w = 0 \) then a party is indifferent, and without loss of generality I assume that he chooses to support the current government.

Recall that \( e \) denotes the fraction of the extremist parties voting against the current government. Let \( \Pi^+ = \sum_j \pi^j I(w^j > 0) + e \pi^{ext} \) denote the size of opposition parties that will vote against the current government, and let \( \Pi^- = \sum_j \pi^j I(w^j \leq 0) + \pi^{ext} \).
\( (1 - e) \pi^{ext} \) denote the size of opposition parties that will vote in favor of the current government.

In describing the equilibrium outcome of the renegotiation game, I consider different scenarios separately. The outcome depends on the number of coalition members, their willingness and ability to pay, and the distribution of the seat shares. If only one party is in office, then no transfers can be implemented. The government will fall if the parties with an incentive to terminate the government can reach a qualified majority. A more interesting case is the one in which parties can renegotiate their agreement. First, I characterize the SPNE outcome with two coalition parties, and then with three coalition parties. Without loss of generality I assume that \( k \) makes an offer only if accepted, and I follow this convention in the specification of the SPNE outcome.

If \( c_0 = \{k, i\} \), first \( k \) makes a take-it-or-leave-it offer of a renegotiation of benefits \((y^k, y^i)\) contingent on supporting or not the government, then \( i \) either accepts \((A)\) or rejects \((R)\) the offer. Hence, the actions of \( k \) and \( i \) are \((y^k, y^i)\) and \((A, R)\), respectively.

Notice that a party is able to transfer at most his current benefits \((U)\) and he is willing to transfer at most \(|w|\). Hence, the maximum feasible transfer is

\[
\hat{y} = \min \{ |w|, U \}.
\]

**Proposition 1** Suppose that \( c_0 = \{k, i\} \), and \( w^k > 0, w^i \leq 0 \).

If \( \pi^i + \Pi^j > q \):

1. if \( \Pi_{c_0} + \Pi^j > q \) and \(|w^i| \leq \hat{y}^k\), then the SPNE outcome is \((w^i, |w^i|, A)\) and the government falls;

2. if \( \Pi_{c_0} + \Pi^j < q \) or \(|w^i| > \hat{y}^k\), then the government survives with no transfers implemented.

If \( \pi^i + \Pi^j \leq q \):

1. if \( \Pi_{c_0} + \Pi^j > q \) and \( \hat{y}^i \geq w^k \), then the SPNE outcome is \((\hat{y}^i, -\hat{y}^i, A)\) and the government survives;

2. if \( \Pi_{c_0} + \Pi^j \leq q \) or \( \hat{y}^i < w^k \), then the government falls with no transfers implemented.
The intuition is as follows. Suppose that \( i \) reaches the qualified majority with the other parties supporting the current government, that is \( \pi^i + \Pi^j > q \). Since \( i \) does not need to buy \( k \)'s support to survive, he rejects any offer of transferring benefits to \( k \) in order to survive. On the other hand, \( k \) needs \( i \)'s support to fall (because \( \pi^k + \Pi^j < q \) and the lowest price he needs to pay is \( |w^i| \), that is the amount of transfer that makes \( i \)'s indifferent. It follows that \( k \) will offer a set of transfers \((w^i, |w^i|)\) if: i) \( k \) is willing and able to do so \((|w^i| \leq \hat{y}^k) \) and, ii) a qualified majority to fall is reached \((\Pi_{c0} + \Pi^j > q)\).

Suppose now that \( k \) reaches a qualified majority with the other parties that do not support the current government, that is \( \pi^k + \Pi^j > q \). It follows that \( i \) needs to buy \( k \)'s support to survive, and accepts to pay any price \( y^i \leq \hat{y}^i \) if \( \Pi_{c0} + \Pi^j > q \). Hence, \( k \) will extract all the surplus from \( i \), that is \((\hat{y}^i, -\hat{y}^i)\), if it makes him better off than falling \((\hat{y}^i \geq w^k)\). Otherwise, \( k \) does not propose a renegotiation of the agreement and the government falls.

A similar argument applies if \( w^k \leq 0 \) and \( w^i > 0 \). See appendix A for the equilibrium characterization in this scenario.

**Proposition 2** Suppose that \( c_0 = \{k, i\} \) and \( w^k > 0, w^i > 0 \).

The government terminates if \( \Pi_{c0} + \Pi^j > q \). Otherwise the government survives. In both cases, no transfers are implemented.

In this scenario both coalition parties have an incentive to terminate the current government. The government falls if the coalition parties can reach a qualified majority with the opposition parties that have a \( w > 0 \). A similar argument applies if \( w^k \leq 0 \) and \( w^i \leq 0 \). See appendix A for the equilibrium characterization in this scenario.

Next, I characterize the SPNE outcome when the coalition is formed by three parties. Let \( \Pi^i = \sum_i \pi^i I(w^i > 0) \) and \( \Pi^i = \sum_i \pi^i I(w^i \leq 0) \).

**Proposition 3** Suppose that \( c_0 = \{k, i_1, i_2\} \) and \( w^k > 0, w^{i_1} > 0, w^{i_2} > 0 \).
The government terminates if $\Pi_c + \Pi^i > q$. Otherwise the government survives. In both cases, no transfers are implemented.

In this case the same argument as in Proposition 2 applies. A similar argument also applies if $w^k \leq 0, w^{i_1} \leq 0$ and $w^{i_2} \leq 0$. See appendix A for the equilibrium characterization in this scenario.

**Proposition 4** Suppose that $c_0 = \{k, i_1, i_2\}$ and $w^k \leq 0, w^{i_1} > 0, w^{i_2} > 0$.

If $\Pi^i + \Pi^j > q$:

1. if $\hat{y}^k \geq \min\{w^{i_1}, w^{i_2}\}$, $\pi^k + \pi^{i_1} + \Pi^j > q$, and $\pi^k + \pi^{i_2} + \Pi^j > q$ then $y^k = -\min\{w^{i_1}, w^{i_2}\}$ and the government survives;

2. if $\hat{y}^k \geq w^{i_1}, \pi^k + \pi^{i_1} + \Pi^j > q$, and $\pi^k + \pi^{i_2} + \Pi^j \leq q$ then $y^k = -w^{i_1}$ and the government survives;

3. if $\hat{y}^k \geq w^{i_2}, \pi^k + \pi^{i_1} + \Pi^j \leq q$, and $\pi^k + \pi^{i_2} + \Pi^j > q$ then $y^k = -w^{i_2}$ and the government survives;

4. if $\hat{y}^k \geq w^{i_1} + w^{i_2}, \pi^k + \pi^{i_1} + \Pi^j \leq q$, $\pi^k + \pi^{i_2} + \Pi^j \leq q$, and $\Pi_c + \Pi^j > q$ then $y^k = -(w^{i_1} + w^{i_2})$ and the government survives;

otherwise the government falls without transfers being implemented.

If $\Pi^i + \Pi^j \leq q$:

1. if $\hat{y}^{i_1} + \hat{y}^{i_2} < |w^k|$ or $\Pi_c + \Pi^j < q$ then the government survives without transfers being implemented;

2. if $\Pi_c + \Pi^j > q$, and $\max\{\hat{y}^{i_1}, \hat{y}^{i_2}\} \geq w^k$ then $y^k = \max\{\hat{y}^{i_1}, \hat{y}^{i_2}\}$ and the government falls;

3. if $\Pi_c + \Pi^j > q, \hat{y}^{i_1} + \hat{y}^{i_2} > |w^k|$, and $\max\{\hat{y}^{i_1}, \hat{y}^{i_2}\} < w^k$ then $y^k = \hat{y}^{i_1} + \hat{y}^{i_2}$.

The intuition is as follows. If $\Pi^i + \Pi^j > q$, then $k$ needs to transfer benefits to one or both coalition parties in order to survive. For instance, if $k$ reaches a qualified majority with either $i^1$ or $i^2$, then $k$ will buy the support of the cheapest coalition party, provided that the price is lower than his willingness to pay, that is $\hat{y}^k > \min\{w^{i_1}, w^{i_2}\}$, and the government will survive. On the contrary, if $k$ needs to buy the support of
both in order to reach a qualified majority, he will offer to pay \( w^{i_1} + w^{i_2} \), provided that the price is lower than his willingness to pay, that is \( \hat{y}^k \geq w^{i_1} + w^{i_2} \). Finally, if parties are not willing to renegotiate the agreement, the government falls.

Now suppose that \( \Pi^{i_1^+} + \Pi^{j_1^+} \leq q \). In this case, \( k \) can ask one or both coalition parties to transfer benefits to him in order to fall, and the coalition party/parties accept to pay only if \( \Pi_c^0 + \Pi^{j^+} > q \). If \( \hat{y}^{i_1} + \hat{y}^{i_2} > |w^k| \), then it would be optimal for \( k \) to ask to be paid in order to fall. In particular, if both parties are able to buy \( k \)’s support alone, then it is optimal for \( k \) to start renegotiating with the party \( i \) that has the lowest \( \hat{y}^i \).\(^{10}\) In fact, since the proposal is sequential, the first coalition party that gets the offer will always reject to pay it if the second player is able to buy \( k \)’s support alone. Notice that if both \( i_1 \) and \( i_2 \) accept to renegotiate with \( k \), then the order of the offers is irrelevant. Finally, if parties are not willing to renegotiate, the government will survive.

A similar argument applies if \( w^k > 0, w^{i_1} \leq 0 \) and \( w^{i_2} \leq 0 \). See Appendix A for the equilibrium characterization in this scenario.

**Proposition 5** Suppose that \( c_0 = \{k, i_1, i_2\} \) and \( w^k \leq 0, w^{i_1} \leq 0, w^{i_2} > 0 \).

If \( \pi^{i_2} + \Pi^{j^+} > q \):

1. if \( \hat{y}^k \geq w^{i_2} \), and \( \Pi_c^0 + \Pi^{j^-} > q \), then \( y = (-w^{i_2}, 0, w^{i_2}) \) and the government survives;
2. if \( \hat{y}^k < w^{i_2}, \hat{y}^k \geq y^k \), and \( \Pi_c^0 + \Pi^{j^-} > q \), then \( y = (\hat{y}^{i_1} - w^{i_2}, \hat{y}^{i_1}, w^{i_2}) \) and the government survives;

otherwise the government falls without transfers being implemented.

If \( \pi^{i_2} + \Pi^{j^+} \leq q \):

1. if \( \pi^k + \pi^{i_2} + \Pi^{j^+} \leq q, \Pi_c^0 + \Pi^{j^+} > q \), and \( w_k \leq \hat{y}^{i_2} - |w^{i_1}| \), then \( y = (\hat{y}^{i_2} - |w^{i_1}|, |w^{i_1}|, -\hat{y}^{i_2}) \) and the government falls; otherwise the government survives without transfers being implemented.

\(^{10}\)If the offers were simultaneous there could be multiple equilibria because of free-riding.
2. if \( \pi^k + \pi^{i2} + \Pi^{j+} > q \) and \( \hat{y}^{i1} + |w^k| < \hat{y}^{i2} \), then \( y = (\hat{y}^{i2}, 0, -\hat{y}^{i2}) \) and the government falls.

3. if \( \pi^k + \pi^{i2} + \Pi^{j+} > q, \hat{y}^{i2} > |w^k| \) and \( \hat{y}^{i1} + |w^k| \geq \hat{y}^{i2} \) then \( y = (\hat{y}^{i1}, -\hat{y}^{i1}, 0) \) and the government survives. However if \( \hat{y}^{i2} < |w^k| \) then the government survives without transfers being implemented.

The intuition is as follows. Suppose that \( \pi^{i2} + \Pi^{j+} > q \). In this case, if \( \hat{y}^k \) is sufficient to buy \( i_2 \)'s support, then \( i_1 \) will refuse to transfer part of his utility to \( i_2 \). However, if \( k \) is not able or willing to buy \( i_2 \)'s support, then \( i_1 \) has to pay \( i_2 \), and \( k \) pays or gets the residual, to survive. Let \( y^k = \hat{y}^{i1} - w^{i2} \). If \( y^k \geq 0 \) it means that \( \hat{y}^{i2} \) is sufficient to repay \( i_2 \) and \( k \) gets the residual transfer \( y^k \). If \( y^k < 0 \), also \( k \) needs to transfer part of his utility to \( i_2 \) to survive and he does so if and only if \( \hat{y}^{i2} \geq y^k \).

Finally, if none of them is able and willing to implement the transfer, then the government will fall without a renegotiation of the agreement.

Now suppose that \( \pi^{i2} + \Pi^{j+} \leq q \). Here, there are two subcases that need to be considered: \( \pi^k + \pi^{i2} + \Pi^{j+} > q \) and \( \pi^k + \pi^{i2} + \Pi^{j+} \leq q \).

If \( \pi^k + \pi^{i2} + \Pi^{j+} \leq q \), either \( i_2 \) pays \( k \) and \( i_1 \) to fall or the government survives without a renegotiation of the agreement.

If \( \pi^k + \pi^{i2} + \Pi^{j+} > q \), \( k \) can ask to be paid either from \( i_2 \) to fall or from \( i_1 \) to survive. However if \( \hat{y}^{i2} < |w^k| \), that is \( \hat{y}^{i2} \) is not sufficient to repay \( k \), then the government survives without transfer\(^{11}\).

Finally, note that the same argument applies if \( w^k \leq 0, w^{i1} > 0 \) and \( w^{i2} \leq 0 \), and a similar one if \( w^k > 0, w^{i1} > 0 \) and \( w^{i2} \leq 0 \). See appendix A for the equilibrium characterization in this scenario.

At age \( \bar{A} \) the government terminates and regularly scheduled elections will take place next period. The final value is determined according to:

\[
V_{\bar{T}}(\Omega_{\bar{T}}) = \overline{U} + \beta E(V^*_0(\pi'_0, k') | \pi_{\bar{T}}).
\]

\(^{11}\)Recall that if \( i_1 \) rejects the offer they vote as if no transfers are allowed.
where $V_0^*$ is the value of forming a new government.\(^{12}\)

Note that the equilibrium of the whole game is a SPNE, because parties behave optimally at each node.

### 2.4 The solution method

The solution of the model is not analytic. The numerical solution algorithm consists of the following steps. For each party, given an initial guess of the value of forming a government $V_0^*$ for all parties, I compute the terminal-age value function $V_A$. The value functions and the decision rules for each age $a = 1, ..., A - 1$ can be found by backwards recursion from $A - 1$. Next, I compute the new value of $V_0^*$, and I iterate until I find the fixed point of the $N$ value functions $V_0^*$. Since the party system varies across countries (i.e. average party’s share, number of coalition members, etc.), I solve the model for each country separately.

In order to solve and estimate the model I make some distributional assumption about the signal, the noise of the signal, and the exogenous selection of the formateur. I recover the probabilities $\Pr(\pi_a|\pi_0)$ and $\Pr(\pi'_0|\pi_a)$ from the data. I also estimate the likelihood of party $h$ being selected to be a formateur $\Pr(\pi_h^0, k_{-1})$ in equation (1). Table 1 reports the maximum likelihood estimates of $\alpha_0$ and $\alpha_1$.

\(^{12}\)The formation of a new government can also follow from the resignation of the incumbent one with no dissolution of the chamber. In this model, I do not allow for government replacements in order to make the solution of the model feasible. If I allow for that, the numerical solution of the model will require to iterate not only over the value functions at age 0 for all parties and countries, given that there are $A$ periods left, but also over the the value functions at age 0 for all parties, and countries, and all possible potential durations, i.e. $A = \overline{A}, \overline{A} - 1, ... 1$. 

Table 1: Maximum Likelihood Estimates

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Estimate</th>
<th>Standard Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\alpha_0$</td>
<td>11.978</td>
<td>1.148</td>
</tr>
<tr>
<td>$\alpha_1$</td>
<td>1.801</td>
<td>0.285</td>
</tr>
</tbody>
</table>

Likelihood = -192.436

Finally, since parties are interested in the distribution of legislative seats, I need to transform the expected vote shares into expected seat shares. Following Besley and Preston (2005) I estimate the mapping of votes share $v^h$ into seats share $\pi^h$ for each country, using the the following OLS model:

$$\ln \left( \frac{\pi^h}{1 - \pi^h} \right) = \delta_0 + \delta_1 \ln \left( \frac{v^h}{1 - v^h} \right)$$

where $\delta_0$ measures the advantage that a party may have over another when they have the same vote shares, and $\delta_1$ measures the deviation of the electoral system from proportional representation. Notice that if $\delta_0 = 0$ and $\delta_1 = 1$ the electoral system is perfectly proportional. The country-specific estimates of the parameters $\delta_0$ and $\delta_1$ are reported in Table 2.
3 Empirical analysis

3.1 Data

The unit of observation of the empirical analysis is a government, which is characterized by the identity of the Prime Minister and the coalition parties. I have collected data about 130 governments formed after a general election in eleven Western European parliamentary democracies with a proportional electoral system (Austria, Belgium, Denmark, Finland, Germany, Ireland, Italy, Luxemburg, Netherlands, Portugal, Spain)

\[\text{Table 2: OLS estimates of } \delta_0 \text{ and } \delta_1\]

<table>
<thead>
<tr>
<th>Country</th>
<th>(\delta_1)</th>
<th>(\delta_0)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>1.03 (.03)</td>
<td>.07 (.03)</td>
</tr>
<tr>
<td>Belgium</td>
<td>1.13 (.02)</td>
<td>.23 (.03)</td>
</tr>
<tr>
<td>Denmark</td>
<td>1 (.005)</td>
<td>.04 (.01)</td>
</tr>
<tr>
<td>Finland</td>
<td>1.2 (.018)</td>
<td>.37 (.03)</td>
</tr>
<tr>
<td>Germany</td>
<td>1.01 (.007)</td>
<td>.06 (.01)</td>
</tr>
<tr>
<td>Ireland</td>
<td>1.08 (.02)</td>
<td>.14 (.03)</td>
</tr>
<tr>
<td>Italy</td>
<td>1.11 (.005)</td>
<td>.19 (.01)</td>
</tr>
<tr>
<td>Luxemburg</td>
<td>1.21 (.05)</td>
<td>.32 (.07)</td>
</tr>
<tr>
<td>Netherlands</td>
<td>1.02 (.005)</td>
<td>.07 (.008)</td>
</tr>
<tr>
<td>Portugal</td>
<td>1.34 (.04)</td>
<td>.39 (.06)</td>
</tr>
<tr>
<td>Spain</td>
<td>1.09 (.02)</td>
<td>.27 (.03)</td>
</tr>
</tbody>
</table>

Standard Errors in parenthesis

\[\text{3. Since the model does not allow parties to form a new coalition without holding an election, I have excluded those replacement governments characterized by a coalition that differs from the previous one. It reduced the initial sample size by 20%. Moreover, my sample does not include those governments that have failed to obtain the investiture vote.}\]
over the period 1970-2000. The information about parties’ vote and seat shares in each
election are taken from the *European Journal of Political Research*. The information
about each government (i.e. the coalition size, coalition and opposition parties, the
prime minister party, duration, etc.) are taken from Makie and Rose (1990), and
Woldendorp et al. (2000).

I collected data about public opinion polls from the Eurobarometer Survey. This
survey releases data twice a year (Spring and Fall). This is a repeated cross-sectional
sample of persons aged 15 and over, residing in the EU member countries. Respondents
are asked about their voting behavior, including their intention to vote in the next
general elections, and (if so) the party they would vote for, and the party they voted
for in the last national elections.14

In the sample about 70 to 80% of the respondents answer they would go to vote.
This is consistent with the actual turnout in West European Countries. Among those
that have declared their intention to vote, 15% decided to cast their vote differently
from the previous election. In order to measure polls I have used the survey question:
"If there were a general election tomorrow which party would you support?", and I have
simply calculated the proportion of respondents voting for each party.

Figure 1 shows the empirical distribution of the deviation of the expected from the
current vote shares (shock) over all countries, waves, and parties. A natural question
is how noisy the signal is. I can roughly measure how informative the polls are simply
by looking at the polls data released in the period in which I have observed an election,
and computing the deviation of the expected from the realized vote shares.

Figure 2 shows the empirical distribution of the noise over all countries and waves.

Finally, notice that it is very difficult to get an empirical measure of the transfers
that are central to our model (they could be interpreted as a change in the allocation
of cabinet portfolios, board seats on public companies, transfers to interest groups and

14Demographic and other background information provides respondents’ age, gender, marital status,
the household composition, education, occupation, religion, household income, region of residence, etc.
party foundations, etc.). However, I can compute the amounts of transfers through the theoretical model as the difference between the expected continuation value of sustaining the current government ($V^s$) and the value of terminating it ($V^e$).

![Figure 1: Empirical distribution of the deviation of expected from current vote shares](image1)

Figure 1: Empirical distribution of the deviation of expected from current vote shares

![Figure 2: Empirical distribution of the noise](image2)

Figure 2: Empirical distribution of the noise

Next I show the salient features of the data. Table 3 presents the cross-national variation in the government type\textsuperscript{15} and duration.

\textsuperscript{15}A minority coalition controls less than 50\% of the seats. A minimum winning coalition controls
We observe that parties form different types of governments: 25% of the governments are minority governments, 42% are minimum winning coalitions, 23% are surplus coalitions, and the remaining 10% are single majority governments. On average the coalition controls more than 50% of the seats. Most coalitions are formed by two and three parties (about 24% are single party governments, 40% has two coalition parties, 19% three coalition parties, 13% four coalition parties, and the remaining 4% five coalition parties). In 25% of the cases the coalition has been reappointed after an election.

Figure 3 reports the number of type-specific governments terminating between year $t$ and $t+1$. It is interesting to notice that while on average a government lasts for two more than 50% as long as no party withdraws from the coalition. A surplus coalition controls more than 50% even if a party withdraws from the coalition.
and a half years, each coalition type displays different duration paths.

Minority governments tend to last shorter than majority governments. Minority either fall early or they reach at least the third year. Minimum winning coalitions are on average more stable than surplus coalition. Single majority governments always last till the end of the legislature.

Before turning our attention to the empirical implementation, a final remark is in
order. If we are interested in measuring government stability it would be interesting to look not only at the average duration but also at the survival probabilities because they can give a richer picture of government stability. For instance, while governments in Belgium last on average twice as long as those in Italy, they have similar downfall probabilities up to 1 year. Therefore, if we look only at the mean duration we might infer that government coalitions are remarkably more stable in Belgium than in Italy, disregarding the fact that in both countries only 50% of the governments survive more than one year. Furthermore, Spain and Netherlands display a close average duration, but while in Spain governments always last more than 18 months, in Netherlands only 60% do so.

3.2 Estimation method & Results

To maintain computational tractability I restrict the number of parties to 4. I focus on parties that have been in a coalition at least twice over the sample period, and I merge parties with similar characteristics. For instance, in the case of Belgium I classify the language subdivisions of a party into one category.

The estimation of the model is based on the simulated method of moments. The parameters are estimated to minimize the weighted distance between the sample moments and the moments that are predicted through the simulation of the model. The moments are: the proportion of minority, minimum winning, and surplus governments; the average coalition size; the survival probabilities by coalition type at each age; and the survival probabilities given the government life span. Table 4 shows the preliminary estimates of the parameters of the model. To assess how well the model reproduces the main features of the data, in Table 5 I report the actual and model predicted fraction of type-specific governing coalitions. The model closely reproduces the distribution of governments types and the average coalition size. Moreover, in Table 6 I report the actual and the model predicted survival probabilities for each coalition type. Here the model captures the fact that minority governments are more unstable than minimum
winning coalitions, but it overpredicts the stability of surplus coalitions at the first ages of the government, and it underpredicts the stability of minority coalitions at the first ages.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>discount factor $\beta$</td>
<td>0.89</td>
</tr>
<tr>
<td>cake at age 1 $\phi_1$</td>
<td>0.51</td>
</tr>
<tr>
<td>cake at age 2 $\phi_2$</td>
<td>0.65</td>
</tr>
<tr>
<td>cake at age 3 $\phi_3$</td>
<td>0.65</td>
</tr>
<tr>
<td>cake at age 4 $\phi_4$</td>
<td>0.65</td>
</tr>
<tr>
<td>cake at age 4 $\phi_5$</td>
<td>0.65</td>
</tr>
<tr>
<td>bonus $b$</td>
<td>0.2</td>
</tr>
<tr>
<td>$\gamma_{\text{min}}$</td>
<td>0.62</td>
</tr>
<tr>
<td>$\gamma_{\text{smaj}}$</td>
<td>1.02</td>
</tr>
<tr>
<td>$\gamma_{\text{mw}}$</td>
<td>0.88</td>
</tr>
<tr>
<td>$\gamma_{\text{surp}}$</td>
<td>1.12</td>
</tr>
<tr>
<td>extreme against $e$</td>
<td>0.75</td>
</tr>
</tbody>
</table>

To assess how well the model reproduces the main features of the data, Figure 2.1 reports the actual and model predicted fraction of type-specific governing coalitions. The model closely reproduces the distribution of governments types, and the average coalition size. Figure 2.2-2.4 present the fit of the model of the survival probabilities for each coalition type. As shown in Figure 2.2 the fit on duration paths of minority governments is good. The model replicates the shape of duration data for minimum winning coalitions (Figure 2.3). The duration path of surplus governments is captured generally well, though it overpredicts the stability of surplus coalitions especially at the last age of the government (Figure 2.4).
Figure 1: Distribution of Government Types

Figure 2: Survival Probabilities of Minority Governments
Figure 3: Survival Probabilities of Minimum Winning Coalitions

Figure 4: Survival Probabilities of Surplus Governments
4 Conclusion

In this paper, I have specified a dynamic model of government formation and termination. The main contribution is that it is the first empirical work that focuses on the strategic interaction of parties as a reaction to electoral uncertainty in order to explain cabinet reshuffles and termination. The model is estimated through the simulated method of moments using a newly collected data set from eleven Western European parliamentary democracies. While the estimation is still in progress, the preliminary results suggest that the model could fit reasonably well the salient features of the data. Next I will use the estimated model to conduct some counterfactual experiments to evaluate the effects of alternative institutional environments on the formation and stability of governments. The features of the electoral system play an important role in the termination of parliaments and governments. In all parliamentary democracies elections are held on a regular basis. The maximum term of the Lower House varies between 3 and 5 years. In Spain and Portugal no new dissolution of Parliament may take place before a year has passed since the previous one. My goal is to evaluate the effect of these specific institutional features. First, I will change the length of the inter-election period, which reflects a change in the number of bargaining periods left with the same coalition parties. Second, as in Spain and Portugal, I will impose that no new dissolution of Parliament may take place before a year has passed since the previous one. Therefore, if at least one year must pass before they can dissolve the chamber, no renegotiation of the agreement can take place in the first two periods. While this rule might prevent governments from falling early in their tenure, it might also increase the downfall probability in the following periods because more minority governments will be formed in first place. The explanation is that the prime minister faces a trade-off between ‘stability’ (larger coalitions produce larger cake) and ‘control’ (larger coalitions imply lower proportion of the cake eaten by each member). Third, as in Greece, I will impose that the party with the highest seat share is selected to be the formateur. This in turn eliminates the uncertainty about the identity of the future
formateur.

Furthermore, I will evaluate how parties react differently with respect to polls that are more or less informative.
5 Appendix A

- Suppose that $w^k \leq 0$ and $w^i > 0$

If $\pi^i + \Pi^{i^+} > q$ (either $k$ will pay $i$ to survive or the government will fall without a renegotiation of the agreement):

$$fall = \begin{cases} 
0 \text{ and } \{(-w^i, w^i), A\} & \text{if } \hat{y}^k \geq w^i \text{ and } \Pi_{c_0} + \Pi^{i^-} > q; \\
1 & \text{otherwise}
\end{cases}$$

If $\pi^i + \Pi^{i^+} \leq q$ (either $i$ will pay $k$ to fall or the government survives without a renegotiation of the agreement):

$$fall = \begin{cases} 
1 \text{ and } \{(\hat{y}^i, -\hat{y}^i), A\} & \text{if } \hat{y}^i \geq |w^k| \text{ and } \Pi_{c_0} + \Pi^{i^+} > q, \\
0 & \text{otherwise}
\end{cases}$$

- Suppose that $w^k \leq 0$ and $w^i \leq 0$:

$$fall = \begin{cases} 
0 & \text{if } \Pi_{c_0} + \Pi^{i^-} > q \\
1 & \text{o.w.}
\end{cases}$$

- Suppose that $w^k \leq 0$, $w^{i_1} \leq 0$ and $w^{i_2} \leq 0$.

$$fall = \begin{cases} 
0 & \text{if } \Pi_{c_0} + \Pi^{i^-} > q \\
1 & \text{otherwise.}
\end{cases}$$

- Suppose that $w^k > 0$, $w^{i_1} \leq 0$ and $w^{i_2} \leq 0$. 
If $\Pi^i + \Pi^j > q$ ($k$ will pay either one or both $i$ to fall or the government will survive without a renegotiation of the agreement):

$$\text{fall} = 1$$

and

$$y^k =$$

$$
\begin{cases}
-w_{i1} & \text{if } \hat{y}^k \geq \min\{w_{i1}, w_{i2}\}, \pi^k + \pi^i_1 + \Pi^j > q, \\
\min\{w_{i1}, w_{i2}\} & \text{if } \hat{y}^k \geq \min\{w_{i1}, w_{i2}\}, \pi^k + \pi^i_1 + \Pi^j > q, \pi^k + \pi^i_2 + \Pi^j \leq q, \\
\min\{w_{i1}, w_{i2}\} & \text{if } \hat{y}^k \geq \min\{w_{i1}, w_{i2}\}, \pi^k + \pi^i_1 + \Pi^j \leq q, \pi^k + \pi^i_2 + \Pi^j > q, \\
-w_{i1} + w_{i2} & \text{if } \hat{y}^k \geq w_{i1} + w_{i2}, \pi^k + \pi^i_1 + \Pi^j \leq q, \pi^k + \pi^i_2 + \Pi^j \leq q, \\
& \text{and } \Pi_{c_0} + \Pi^j > q
\end{cases}
$$

and both $i$ accept the offer.

If none of the condition sets in (4) is satisfied, then the government will survive without transfers.

If $\Pi^i + \Pi^j \leq q$:

$$\text{fall} = 1 \text{ without transfers if } \hat{y}^{i_1} + \hat{y}^{i_2} < w^k \text{ or } \Pi_{c_0} + \Pi^j_0 < q; \quad (5)$$

if the conditions in (5) are not satisfied, that is $\hat{y}^{i_1} + \hat{y}^{i_2} \geq w^k$ and $\Pi_{c_0} + \Pi^j \geq q$, it would be optimal for $k$ to ask to be paid in order to survive, and $^{16}$

$$y^k = \begin{cases} 
\max\{\hat{y}^{i_1}, \hat{y}^{i_2}\} & \text{if } \max\{\hat{y}^{i_1}, \hat{y}^{i_2}\} \geq w^k \\
\hat{y}^{i_1} + \hat{y}^{i_2} & \text{otherwise} 
\end{cases}$$

- Suppose that $w^k > 0, w^{i_1} > 0$ and $w^{i_2} \leq 0$.

$^{16}$In the latter case, the best response of a coalition party may lead to multiple equilibria with simultaneous offers.
1) If $\pi^{i2} + \Pi^{j-} > q$ then $k$ and $i_1$ need to buy $i_2$’s support in order to fall. If $\hat{\gamma}^k$ is not sufficient, then either $i_1$ will pay $i_2$, and $k$ pays or gets the residual, to fall or the government will survive without a renegotiation of the agreement):

Let $y^k = \hat{\gamma}^{i1} - |w^{i2}|$. If $y^k \geq 0$ it means that $\hat{\gamma}^{i1}$ will be sufficient to repay $i_2$ and $k$ will get as a residual transfer $y^k$. On the contrary, if $y^k < 0$, also $k$ needs to transfer part of his utility to $i_2$ to fall and it is willing to do so if and only if $\hat{\gamma}^k \geq y^k$. Hence,

$$fall = 1 \text{ and } \{(w^{i2}, 0, |w^{i2}|), A, A\}$$

if $\hat{\gamma}^k \geq w^{i2}$, and $\Pi_{c0} + \Pi^{j-} > q$

$$fall = 1 \text{ and } \{(-\hat{\gamma}^{i1}, w^{i1}, 0), A, A\}$$

if $\hat{\gamma}^k \geq |w^{i2}|$, $\hat{\gamma}^k \geq y^k$ and $\Pi_{c0} + \Pi^{j+} > q$

$$fall = 0 \text{ otherwise}$$

2) If $\pi^{i2} + \Pi^{j-} \leq q$:

First suppose that $\pi^{k} + \pi^{i2} + \Pi^{j-} > q$:

If $w_{k} \leq \hat{\gamma}^{i2}$ ($k$ may ask to be paid from $i_1$ in order to fall or from $i_2$ in order to survive):

The SPE outcome is:

$$fall = 0 \text{ and } \{(\hat{\gamma}^{i2}, 0, -\hat{\gamma}^{i2}), A, A\} \text{ if } \hat{\gamma}^{i1} + w^k < \hat{\gamma}^{i2}$$

$$fall = 1 \text{ and } \{(-\hat{\gamma}^{i1}, 0), A, A\} \text{ otherwise}$$

Notice that if $\hat{\gamma}^{i2} < w_{k}$ then the government falls without a renegotiation of the agreement.

Now suppose that $\pi^{k} + \pi^{i2} + \Pi^{j-} < q$ (either $i_2$ will pay $k$ and $i_1$ to survive or the government will fall without transfers):

$$fall = 0 \text{ and } \{(\hat{\gamma}^{i2} - w^{i1}, w^{i1}, \hat{\gamma}^{i2}), A, A\} \text{ if } \Pi_{c0} + \Pi^{j-} > q, w_{k} \leq \hat{\gamma}^{i2} - w^{i1}$$

$$fall = 1 \text{ otherwise}$$

Final remark: the same argument applies if $w^k > 0, w^{i1} \leq 0$ and $w^{i2} > 0$. 31
6 Appendix B

The next table reports the identity of parties that have been at least twice in a cabinet coalition.

<table>
<thead>
<tr>
<th>Country</th>
<th>Party 1</th>
<th>Party 2</th>
<th>Party 3</th>
<th>Party 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>Social Democ</td>
<td>Austr. People</td>
<td>Freedom</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(SPO)</td>
<td>(OVP)</td>
<td></td>
<td>(FPO)</td>
</tr>
<tr>
<td>Belgium*</td>
<td>Chatolic</td>
<td>Liberal</td>
<td>Socialist</td>
<td>Volksunie</td>
</tr>
<tr>
<td></td>
<td>(CVP/PSC)</td>
<td>(PVV/PLP/PRL/PRLW)</td>
<td>(BSP/PSB PS)</td>
<td></td>
</tr>
<tr>
<td>Denmark</td>
<td>Conservative</td>
<td>Social Democ</td>
<td>Liberals</td>
<td>Centre Democ</td>
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<tr>
<td></td>
<td>(KF)</td>
<td>(SD)</td>
<td></td>
<td>(CD)</td>
</tr>
<tr>
<td>Finland</td>
<td>Social Democ</td>
<td>AgrarianUnion</td>
<td>National Coal</td>
<td>FinnishPeople</td>
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<td>(KESK)</td>
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<td>Christ. Democ</td>
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<td>(LAB)</td>
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Parties’ seat shares:

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Standard Errors in parenthesis

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35
7 References


