Technical Appendix: Measuring Exit Power

In this project, I generate a new measure of bargaining power that captures each actor's next best options in the event of a bargaining breakdown. In this context, where actors are government parties, a government dissolution constitutes a bargaining breakdown. Such a breakdown can be followed by early elections or a reshuffle of government parties, however, all parliamentary parties enter a new government formation process in such a situaion (Lupia and Strøm 1995). Thus, to generate the novel exit power measure, the unit of observation is each government formation process.

Table 1: The Number of Potential Governments

Parliamentary Parties	Potential Governments
3	7
4	15
5	31
6	63
7	127
8	255
9	511
10	1023
11	2047
12	4095

In any parliament containing n parliamentary parties, $2^n - 1$ potential governments can form. Table 5 reports the number of total potential governments for a parliament containing three to twelve parties. To adequately capture each government party's outside options, I simulate all $2^n - 1$ potential governments that can form during each formation process in developed democracies between the first democratic election after 1945 and 2012. The full sample of countries for which I generate this measure includes Australia, Austria, Belgium, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ice-

land, Ireland, Italy, Latvia, Lithuania, Luxembourg, the Netherlands, New Zealand, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, and the United Kingdom. In total, the number of potential governments is almost 120,000. I do not exclude any government a priori, that is, I simulate all single-party minority governments up to the government containing all parliamentary parties. Table 6 gives an example for a parliament containing four parliamentary parties, A, B, C, and D.

Table 2: Potential Governments in a 4-Party Parliament

Parliamentary Parties	Potential Governments
Single-party Governments	A, B, C, D
2-Party Coalitions	AB, AC, AD, BC, BD, CD
3-Party Coalitions	ABC, ABD, ACD, BCD
4-Party Coalition	ABCD

Two types of data are crucial for the exit power measure – each party's number of parliamentary seats and its ideological position. I obtain the number of parliamentary seats from a variety of sources and cross-validate them. If discrepancies appear between the first two sources, I consult additional sources. I use the election data from the ParlGov project (Döring and Manow 2012) as the baseline and merge the Comparative Manifestos Project (CMP) data (Budge et al. 2001; Klingemann et al. 2006; Volkens et al. 2013) to this data set to add in parties that are not covered by the ParlGov data. For European countries, I cross-validate the number of seats per party obtained from the ParlGov database with data from Parties and Elections (Nordsieck 1997–2016). In case the numbers diverge, I use the yearly political data from the European Journal of Political Research (EJPR 1974–2011) from 1973 onwards and the International Almanac of Electoral History (Mackie and Rose 1991) for elections prior to 1973. In some cases, I resolve discrepancies by consulting national

sources (e.g., Portugal[1]). For Australia, Canada, and New Zealand, I use national sources[2] and the International Almanac of Electoral History up until 1973 and the EJPR data from 1973 onwards to check the seat numbers obtained from the ParlGov database. In case of discrepancies, I opt to use the data obtained from national sources.

Parties' ideological positions can be obtained from the Comparative Manifestos Project (CMP) (Budge et al. 2001; Klingemann et al. 2006; Volkens et al. 2013), the Chapel Hill Expert Surveys (CHES) (Bakker et al. 2012), and a number of additional expert surveys (Castles and Mair 1984; Laver and Hunt 1992; Huber and Inglehart 1995; Benoit and Laver 2006). All ideological positions are based on the general lef-right dimension rather than more specific policy dimensions. I compare the coverage of parties and elections as well as the ideological positions of parties obtained from these sources. The total coverage of parties and elections is greatest for the CMP data as they cover all parties running for office in all general elections since 1945. The sample of parties covered and the temporal coverage in expert surveys, on the other hand, is smaller with the first data obtained in the early 1980s in Castles and Mair's work (Castles and Mair 1984). On the other hand, parties' positions are more volatile in the CMP data, with parties often leapfrogging ove others from one election to the next. Nonetheless, I choose to use the more comprehensive CMP data as the source of ideological positions because using expert surveys would exclude a considerable number of government parties, particularly new parties entering office after a short tenure in parliament.

Using all parliamentary parties' seats and ideological positions, I generate the following variables for each potential government: a dummy variable each denoting its status as a

[1]Assembly of the Republic of Portugal (2014)

[2]The University of Western Australia (2015); Parliament of Canada (2015); Elections Electoral Commission. New Zealand (2015)

single-party majority government, a majority government, a minimum winning coalition, an ideologically connected coalition, and one denoting its status as a surplus government. Finally, I also calculate the ideological range between the two most extreme parties in each potential government and generate a dummy variable indicating if the government in fact entered office. I use all of these variables in a conditional logit model to estimate each potential government's political viability, that is, the likelihood of it entering office (Martin and Stevenson 2001):

$$P_{ij} = \frac{exp(x_{ij}^{'}\beta)}{\sum_{k=0}^{m_i} exp(x_{ij}^{'}\beta)}$$

Here, I regress the government's status as having entered office on the remaining variables I generated and calculate a predicted value for each potential government. I use this value as the government's formation likelihood. As expected, only governments' surplus status and ideological range have a negative effect on their likelihood of entering office. This first component of the exit power measure ranges between zero and one and is the same for each member of the government.

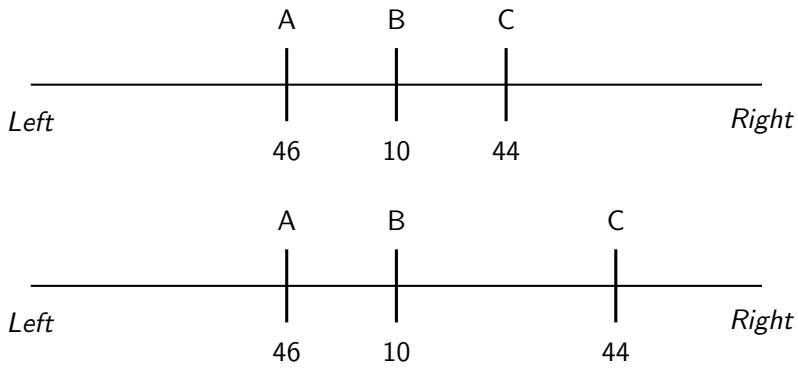
The second component of the bargaining measure ought to capture how attractive each outside option is to each of its members. Thus, this component varies across government members. I calculate each government's seat share-weighted average ideological position and the distance between this and each member's own ideological position. For single-party governments, this distance is zero as the government's average ideological position is the same as the party's position. Thus, as this distance measures each government's *dis*utility, I re-scale the measure by subtracting the empirical maximum disutility per country. For ease of interpretation, I multiply this measure by (-1) to restrict it to positive values. Moreover, I take the square root of the value to account for likely overestimation of movement in the CMP data as can be seen from the many leapfrogging cases.

Finally, for each government party, I multiply the viability of each of its outside options

by its attractiveness and sum these expected utilites. I exclude the incumbent government and generate each party's exit power as the share of exit power it contributes to the sum of all government parties' exit power. Again, this measure is one for all single-party governments. In sum, I calculate this new exit power measure for almost 1,200 parties in government.

By measuring both each potential government's viability and ideological appeal, this measure can account for changes in the expected utility of an outside option that stem from a change in either its viability, ideological attractiveness, or both. Figures 6 and 7 depict a parliament containing three parliamentary parties A, B, and C. They start with the classic kingmaker case and illustrate changes in the expected utility of outside options deriving from a change in its attractiveness (Figure 6) and its viability (Figure 7).

Figure 1: Change in Ideological Attractiveness



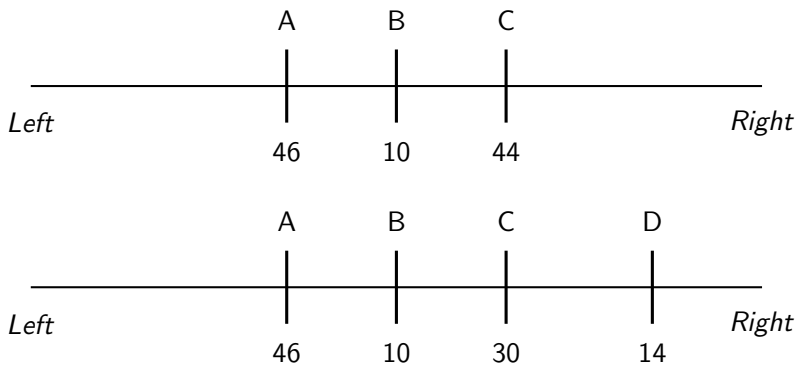
Suppose that in both Figures, parties A and B are in a two-party coalition together. In

the top panel, party B has greater relative exit power than party A because B can enter a majority coalition with C as well, and C is equally close to B's ideal position as A. In the lower panel, however, B's exit power decreases. While it can still enter a majority government with C, party C's ideological position is now farther away from B's, so B's threats to exit the coalition with party A are less credible in the lower panel than in the top panel.

The top panel of Figure 7 is identical to that of Figure 6. Again, party B can credibly threaten to exit the incumbent coalition and enter a coalition with party C. In the lower panel, however, a new party enters parliament, garnering some of party C's votes. Party C is still equally close to B as in the top panel, however, the coalition of parties B and C now does not cross the parliamentary majority threshold any longer. Thus, again, compared to the top panel party B's exit threats are less credible because its outside option of entering office with C is less viable. In reality, both ideological positions and parliamentary seats change from one election to the next, and the exit power measure captures changes to each party's exit power stemming from a change in viability, ideological appeal, or both.

The fact that exit power can reflect changes in parties' bargaining power caused by changes in the distribution of seats across all parliamentary parties as well as changes in the ideological position of all parliamentary parties constitutes an advantage over other measures of bargaining power. Moreover, exit power is measured based on all potential governments that can form, not excluding any subset of governments a priori. Finally, not all of those governments are treated as equally likely to occur. Instead, I estimate the formation likelihood of every single one using a number of factors that have been shown to influence whether or not a potential government in fact enters office.

Figure 2: Change in Ideological Attractiveness



In contrast, existing measures of bargaining power, such as the Banzhaf index (Banzhaf 1965) and the Shapley Shubik index (Shapley and Shubik 1954) measure the share of minimum winning coalitions for which parties are pivotal. Similarly, voting weights are based on the number of minimum winning coalitions parties can enter (Ansolabehere et al. 2005). Moreover, in all three measures, all minimum winning coalitions are weighted equally (Leech 2013), irrespective of which particular parties comprise the coalition. While restricting the set of coalitions to be considered to minimum winning coalitions greatly simplifies computation, in reality less than half of all coalitions that form are, in fact, minimum winning. In the post-war era, one third of all coalitions that formed are minority governments (Crombez 1996; Strøm 1984), and one fourth are surplus governments (Volden and Carrubba 2004). Thus, by excluding these coalitions that can be viable and attractive, existing measures of bargaining power miss important aspects of inter-party bargaining. In contrast, exit power

adequately captures these dynamics.

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