Bargaining for Longevity

Abstract

I propose a theoretical framework of government coalitions in which a proposer with complete discretion over resource allocation between her and a partner faces a trade-off between immediate gains and long-term stability. I particularly focus on the role of dynamic outside options in driving this trade-off and show that the real benefit of being a proposer may not be in the share she appropriates within a coalition but rather in her choice of coalition longevity. The proposer sometimes concedes to her partner and buys his long-term support just so that she can be the one to time the dissolution of the coalition. This mechanism lends additional support to the lack of proposer advantage in portfolio allocation as well as the relative strength of weak parties discussed in the empirical literature. I further identify conditions under which parties may agree on their choice to use commitment devices.

Word Count: 9943

1 Introduction

Forming a coalition requires a compromise between two or more separate political parties. Few, if any, coalitions are thus expected to be permanent. The duration of such coalitions may of course depend on the compromise that the coalition initially strikes. Parties inherently face a trade-off between the terms and length of the agreement - the idea being that parties sacrifice immediate gains at hand for long-term cooperation (e.g., Diermeier, Eraslan and Merlo, 2003; Golder and Thomas, 2014; Indridason, 2015). This intuitive logic also implies that the present value of any coalition will be valued over time. While any coalition struck today might be the best available option for all of the coalition members, ruling out the possibility of this alignment of preferences changing is at odds with the high rate of coalitions ultimately collapsing.

Such changes in the bargaining environment have become more important given the trend of growing party system instability in the past several decades. Studies have consistently identified increasing and persistently high electoral volatility in many established and new democracies; established parties in older European democracies are becoming less popular with the voters (Pedersen, 1979; Drummond, 2006; Chiaramonte and Emanuele, 2017), and volatility in post-communist countries have opened doors to non-traditional parties and candidates (Birch, 2003; Sikk, 2005; Tavits, 2005, 2008; Powell and Tucker, 2014). This, coupled with the growing importance of media on public opinion (e.g., Kumlin and Esaiasson, 2012), implies that political events such as scandals or economic shocks are more likely to reshape the political landscape now than ever.

This paper's main contribution is to show that the real benefit of being a proposer may not be in the share she appropriates within a coalition but rather in her choice of *coalition longevity*. In my model, a proposer strategically offers a portfolio allocation to her partner in light of the future changes in the parties' outside options. Under some conditions, the proposer concedes to her partner and buys his long-term support just so that she can be the one to time the dissolution of the coalition.

Consider Israel in 2020. After the election in March, Netanyahu's Likud and Gantz's Blue and White agreed to form a coalition government. Despite the large disparity in Knesset members between the two blocs—the Likud bloc with 54 members and Blue and White with 20 members—the coalition agreed to have an equal number of cabinet ministers aligned with each bloc. Parties also agreed to a rotation government where Gantz succeeds Netanyahu as the Prime Minister of Israel for at least 18 months from November 2021. The terms of the agreement also provided that Gantz serves as defense minister when the new government is sworn in with Netanyahu as the Prime Minister.

Such generous terms of the agreement largely stemmed from Netanyahu's intention to determine the timing of a new election. Netanyahu was facing three criminal charges against him at the time of the election, and there was uncertainty about how the legal proceedings would unfold. Netanyahu made sure that he could stay in power for long enough, which would give him a platform to postpone his trial and also bolster his status as the representative who embodies the injustice of the courts and the legal system (Shamir and Rahat, 2022). He was also aware that Blue and White did not have many options at hand. Prior to the election, Gantz vowed to form a government that would not include Netanyahu. By reversing his stance and forming a coalition with Netanyahu, the party lost a sizable share of the alliance as well as voters. The poll rate in December 2020 indicated that Gantz's electoral prospects were bleak, expecting to win just five seats in the next election compared to 28 seats expected for Likud (Staff, 2020). Furthermore, Netanyahu was able to take advantage of the health and economic crises precipitated by the COVID-19 pandemic, which essentially prevented his opponents from having the Jewish majority necessary to establish an alternative government (Jamal, 2021). With such considerations of future electoral prospects, Netanyahu, while keeping Blue and White in the coalition, strategically "blocked the possibility of passing a two-year budget per the coalition agreement and negotiated for passing only a one-year budget in order to retain the option to topple the government whenever he sees fit (Jamal, 2021, p.14)." Netanyahu ultimately exploited the budget crisis and dissolved the government in December 2020.

For the remainder of the introduction, I first discuss previous empirical and formal works on two related areas of study and identify the gap in the literature that I aim to address with my model. I then move on to introduce a brief overview of the model and its main findings which may rationalize Netanyahu's move in 2020.

1.1 Outside Options in Coalition Bargaining

Past studies have considered coalition bargaining in the context of "outside options," or walk-away values. These values are what a negotiator secures by walking away from the bargaining table (Lupia and Strøm, 2006; Schleiter and Bucur, 2023). This concept has been used to encompass the notion of seat shares while at the same time incorporating other aspects of bargaining power, representing benefits from new elections that lead to a new regime and yield utilities or the willingness of other parties to start coalition negotiations with a party. It also means that the concept captures the dynamic aspects of future bargaining power rather than a static view of the future that models bargaining power simply as a function of legislative seat shares.

While both formal and empirical works have considered the effect of such changes in outside options on government termination and policy changes, these works mostly posit that parties strategically react to shocks *after* they occur; they do not examine how parties bargain *in expectation of* such potential changes in outside options. Some of the models most closely related to this work present a one-period (Lupia and Strøm, 1995) or an infinitely repeated (Baron, 1998) bargaining model where a public opinion shock provides parties with information about their future electoral prospects, and parties respond accordingly. They find that such shocks may result in dissolution when parties expect large benefits from an election and derive little value from the seats they currently control. Additionally, shocks might not always lead to coalition termination - parties may still extract benefits through non-electoral bargaining with parties that would lose seats in an early election. Diermeier and Merlo (2000) further this intuition by showing that minimal-winning coalitions may form if it is too expensive for the formateur to maintain surplus or minority coalitions over time. More recently, Becher and Christiansen (2015) highlight the effect of outside options with respect to the dissolution power and find that prime ministers with the power should have incentives to exploit public support for policy gains.

Other works take this perspective in empirical studies. Martin (2000) investigates the impact of public opinion shocks on government termination and observes that an expected increase in seats for coalition members leads to a noticeable impact on government termination only when the government gets closer to the end of its term in office. Walther and Hellström (2019) empirically investigate two different mechanisms that link popular support and government stability; high popular support leads to a greater likelihood of opportunistic elections, while low support leads to higher frequencies of a non-electoral replacement. Kayser and Rehmert (2021) and Kayser, Orlowski and Rehmert (2023) develop a novel measure of party leverage—coalition-inclusion probabilities—and find that shifts in these probabilities of green parties strongly predict environmental policy change, while seat shares and political polls do not.

These studies altogether highlight the notion that the ability of a government to remain in power depends upon its vulnerability to unexpected shocks in the political environment. However, they focus primarily on how parties respond after these shocks occur and not on how they act in anticipation of them. I argue that parties respond to exogenous events not only at the time of their occurrence but also preemptively during the initial portfolio allocation process and propose a theoretical framework that addresses this gap. A farsighted proposer in my model takes into account such potential changes when making the initial offer to her partner, which influences her expectations about the duration of the government and ultimately the portfolio allocation.

The framework, in this regard, also complements existing works that focus on the parties' trade-off between the terms and length of the agreement. A number of studies find that farsighted actors and their desire for stability can induce moderation in their division of resources in the short run. These works recognize that entering office does not result in an immediate one-time payoff; instead, it results in a stream of benefits that continues as long as the government stays in power (Golder and Thomas, 2014). Parties therefore may be willing to make concessions over the current benefit in exchange for the long-run stability value. In Penn (2009)'s model, a policy that is chosen in a round becomes the reversion point of the next round of bargaining and remains in effect until it is replaced by a new alternative. This consideration leads to the recognition that policies that fairly divide benefits between members of a winning coalition leave individual players best off in the long run. Indridason (2015) proposes a two-period model of legislative bargaining and shows that the formateur will prefer to compromise and form a coalition that will stay in place in the second period when he values the future enough.

A distinctive feature of this process in my model is that I incorporate how parties' future incentives to defect may vary dynamically over the life of a government as external circumstances and polls change. By examining the effect of changing outside options on the portfolio allocation process, we can understand how they affect the proposer's strategic considerations when deciding *how much* to value the future over the present. As detailed further in Section 7, incorporating this dynamic aspect of shocks lends additional support to several empirical results discussed in the literature, including the lack of proposer advantage in portfolio allocation, weak-party bias, and parties' willingness to publicly commit to a pre-electoral coalition.

1.2 Overview of Results

The baseline model in this paper consists of two stages. In the first stage, the proposer unilaterally decides on an allocation of resources between her and her partner. In the next stage, the proposed amount will be pitted against a random draw in each period. The partner then decides in each period whether to continue the partnership and receive the initial allocation or whether to end the game by choosing the draw. He leaves the relationship when he is unwilling to trade the present benefits of leaving against the expected value of remaining in the partnership. Following this strategy, the proposer must make strategic calculations about the allocation that will influence the future duration of the government. In an extension of the model, I endow both parties with the ability to leave. Note that this is a stylized version of coalition bargaining. As will be detailed later in the article, the process of proto-coalition formation or formateur selection is outside the model. The proposer and the partner are assumed to have already been selected prior to the game, and they simply bargain over the allocation of cabinet portfolios. However, this parsimonious framework is useful in clearly delineating how parties may bargain in consideration of future fluctuations in outside options and its implications on resource allocation and government duration.

Some key findings of this article are as follows. First, I identify an additional equilibrium class—buyout equilibrium—under which the proposer's advantage in terms of the portfolio share she appropriates may not be obvious. Existing formal models that emphasize future considerations find that proposer advantage may disappear when the proposer often foregoes her short-term interests to secure long-term cooperation (e.g., Morelli, 1999; Indridason, 2015). While the above mechanism is also present in my model, I further show that the proposer may optimally concede more of her share even when she has no interest in a stable relationship. The proposer in this case has a high outside option and is thus strongly motivated to leave after a favorable draw of her outside option. However, she wants to make sure that her partner won't leave first; she therefore buys the long-term support of the partner just so that she can be the one to time the dissolution of the coalition and ultimately a new election. This mechanism is present even after considering the presence of renegotiation or audience costs (see Section 6 and Appendix E, F for more details). Formal models that fail to take this equilibrium into account may lead to an overstatement of proposer advantage in the portfolio allocation we observe; the result, in this sense, further helps explain empirical results (Gamson, 1961; Browne and Franklin, 1973; Browne and Frendreis, 1980; Laver and Schofield, 1998; Warwick and Druckman, 2001, 2006) and lab experiments (Diermeier and Morton, 2005; Frechette, Kagel and Morelli, 2005) that observe no significant premia in portfolio allocation for proposer parties.[1] More importantly, this also implies that the lack of proposer advantage in terms of portfolio allocation should not be thought of as evidence of a lack of proposer advantage *in general*; the proposer may be conceding to the partner in return for the power to

[1] See Morelli (1999); Carroll and Cox (2007); Bassi (2013); Battaglini (2021) for other formal models that suggest different mechanisms behind the lack of first mover advantage.

defect at an opportune time.

A second implication of my model relates to the finding that a partner may be worse off with a higher outside option. A partner with a moderately higher outside option may, in equilibrium, receive a smaller offer and be worse off than one with a lower option, which speaks to the existing literature that has consistently identified a tendency for large parties to be under-compensated and for small parties to be overcompensated in the allocation of government portfolios (Browne and Franklin, 1973; Browne and Frendreis, 1980; Warwick and Druckman, 2006; Indridason, 2015).[2] Specifically, my model describes two mechanisms where such weak party bias would occur. First is the effect of the partner's outside option becoming too expensive to buy (Austen-Smith and Banks, 1988; Baron, 1991; Diermeier and Merlo, 2000; Snyder Jr, Ting and Ansolabehere, 2005). Under this mechanism, the proposer wants the partnership to last and therefore is willing to buy her partner's support. When the partner's outside option is sufficiently low, it can work as leverage for more compromise, inducing a larger offer and thus a higher payoff for the partner. However, if it is too high, the proposer may simply give up on persuading the partner, offer nothing in equilibrium, and let the partnership terminate. A partner with a lower outside option may thus be better off in equilibrium.

Additionally, we observe a qualitatively different weak party bias when the buyout equilibrium prevails. Now, the proposer overcompensates even when she has no incentives for stability. She is willing to concede to her partner insofar as the partner's outside option is low enough, as this

[2] Note that the literature on weak-party bias uses legislative seat shares as a measure of "relatively weak" parties, while my model defines them as parties with lower outside options. Empirical implications may thus not follow through directly, but the results are consistent in that more inequality in bargaining strength can sometimes lead to less *ex-post* inequality observed as bargaining terms.

allows her to keep the partner satisfied until the right time for dissolution arrives. Consistent with the above mechanism, the partner may be worse off as his outside option increases because he has now become too expensive to persuade (hence the weak party bias), but the strategic incentive behind the proposer's overcompensation is fundamentally different. This mechanism captures the logic that the proposer is willing to overcompensate small parties to retain their support throughout the government (Golder and Thomas, 2014; Indridason, 2015) while further uncovering a novel strategic consideration of the proposer regarding coalition termination.

Third, the model uncovers non-monotonic relationships among outside options, proposer compromise, and government duration that, if unaccounted for, will lead to an underestimation of their effect on one another. Studies have suggested that a larger compromise leads to a longer duration of the government (Lupia and Strøm, 1995; Huber, 1996; Martin, 2000; Heller, 2001; Diermeier, Eraslan and Merlo, 2003). My model shows that a reverse relationship can be possible: more compromise may lead to a *shorter* duration of government when the proposer's outside option is sufficiently high relative to her partner's. Such a non-straightforward relationship is driven by the ambiguous effect of an increase in the proposer's outside option on her optimal compromise. The buyout equilibrium predicts that the proposer sometimes compromises more as her outside option increases because she concedes in anticipation of her own defection in the future. These points altogether suggest that government duration needs to be considered in conjunction both with the degree of compromise as well as parties' outside options, and failing to consider the heterogeneous effects of outside options will underestimate the effect size of the proposer's compromise on government duration.

Lastly, the model provides insight into when parties may agree on the use of commitment devices. When outside options of both parties lie in an intermediate range, the proposer prefers to tie her hands and commit to the partnership rather than to have the option to leave. Interestingly, commitment forces her to concede more to her partner in equilibrium, but she still prefers this over being able to leave, as this leads to a longer duration of government. This result could help provide some explanation for when and why parties willingly agree to various institutions such as pre-electoral coalitions that work as commitment devices and constrain them from abandoning a coalition (Golder, 2005, 2006*a*,*b*; Carroll and Cox, 2007; Ibenskas, 2016; Hortala-Vallve, Meriläinen and Tukiainen, 2024).[3] Note that predictions about the content of the coalition agreement or whether parties follow through with the policy compromises are beyond the scope of this model. Instead, this model speaks to the role of pre-electoral coalitions as a credible signal to coalition partners about the commitment to govern together.[4] Conversely, both parties may also

[3] Of course, pre-electoral coalitions are not legally binding, and parties can still decide to leave the coalition after the government has formed. However, so long as they decrease voter uncertainty over which government coalition might form after the election and increase the credibility of the government in the eyes of the voters (Golder, 2005, 2006*a*,*b*; Carroll and Cox, 2007), we can assume that defecting from the agreement after a pre-electoral coalition will incur more costs to the parties than without. In this regard, pre-electoral coalitions work as a commitment device for parties. More formally, we could interpret parties' commitment as having to pay sufficiently high costs when they defect from the coalition.

[4] In the context of my model, these commitment devices are binding only for the proposer. In other words, I compare a case where both parties can defect from the partnership with the one where only the partner can choose to leave. This is mainly coming from the fact that the proposer unilaterally proposes a contract to the partner in my model; if both parties are constrained to never leave the agreement, it is always a weakly dominant strategy for the proposer to offer nothing to the partner. Alternatively, this can be interpreted as the proposer having a higher defection cost than the partner, which is supported by the finding that terminations are electorally costlier for prime

prefer not to form a pre-electoral coalition; this occurs when the relative difference between both parties' outside options is sufficiently large.

2 The Baseline Model

There are two players in the model, Party 1 (she) and Party 2 (he). Below I describe the two stages of the game: contracting stage and maintenance stage.

Contracting Stage. Party 1 chooses a division of dollar $(1-x, x)$ where $x \in [0, 1]$. The key issue of the bargaining process that parties face when forming a coalition government is the allocation of government resources, e.g., cabinet portfolios. The term x in my model represents Party 1's offer on the allocation of these resources, normalized to a value between 0 and 1; larger x means more compromise.[5] Note that this is a type of "dictator game" in that Party 1 provides a one-time offer to Party 2, after which the game moves on to the next stage and Party 2 is unable to veto the offer right away. However, while Party 1 unilaterally decides on the value of x, only Party 2 can decide whether or not to withdraw from the partnership in the subsequent stage.[6]

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ministers' parties than for junior parties (e.g., So, 2023).

[5] We need not assume the dollar to represent the entire government resources or portfolio allocation. Rather, it more closely depicts the resources or portfolios subject to distributive conflicts, such as the distribution of "bonus ministries above parties' proportional shares," which builds on the framework of Browne and Franklin (1973), and Baron and Ferejohn (1989); Becher and Christiansen (2015) more broadly.

[6] My model can be generalized to cases where there is no designated formateur. Similar to the approach of Herrera, Reuben and Ting (2017), one can also envision that at some time in the future, the second party becomes the formateur, and so forth in alteration for future periods. The

Maintenance Stage. In each period $t \in \{0, 1, 2, \ldots\}$ of the maintenance stage, Party 2 receives an outside option ω_2^t independently drawn from a Bernoulli distribution defined by $\omega_2 > 0$ and $p \in (0, 1)$. That is, Party 2's outside option in period t is $\omega_2^t = 0$ with probability $1 - p$ and $\omega_2^t = \omega_2$ with probability p.[7] After Party 2 privately observes his ω_2^t, he chooses $a_2^t \in \{0, 1\}$. If Party 2 chooses to stay ($a_2^t = 0$), parties receive their per-period payoffs $(1 - x, x)$ and the game continues to the next period $t + 1$. If Party 2 chooses to leave ($a_2^t = 1$), parties receive their per-period payoffs $(0, \omega_2^t)$ and the partnership is over (see Table 1). Therefore, the game continues as long as Party 2 chooses to stay. Each party's total utility is the discounted sum of his or her per-period payoffs, discounted by an exogenous and commonly known discount factor $\delta \in (0, 1)$.

	Party 2: $a_2^t = 0$	Party 2: $a_2^t = 1$
Party 1: $a_1^t = 0$	$(1 - x, x)$	$(0, \omega_2^t)$

Table 1: Payoff Structure

Important parameters. A non-zero outside option ω_2 and the probability of drawing it p can be interpreted in largely two ways. First is to think of ω_2 as the value of a potential partnership with an outside party. Outside option ω_2 in this sense will be the continuation value that takes into account the future value of a new partnership. We can rewrite this as $\omega_2 = \kappa/(1 - \delta)$, where κ represents a new offer from an alternative party. Then, the probability of drawing a favorable

one-shot asymmetric game equilibrium described here remains an outcome of this more complex repeated interaction. Introducing a probabilistic formateur selection rule will also not change the core results of the model.

[7] In Appendix G, I also consider the case where ω_2 is continuous and drawn from a Normal(μ, σ) distribution.

outside option p represents the volatility in the political environment. What will the party's coalition inclusion probability be in a given period (Kayser and Rehmert, 2021; Kayser, Orlowski and Rehmert, 2023)? How likely will a new party emerge during the government that might change the political landscape?

Relatedly, outside option ω_2 may also represent the benefit a party gains from defecting at an opportune time. For instance, a party at the time of the bargaining might be faced with a scandal. The party's high outside option would be its expected popularity after the party comes out ahead of the scandal. Alternatively, an immigration crisis might be on the horizon; the outside option in this case represents the party's payoff from refusing to compromise with his partner who prefers a more lenient policy toward the absorption of asylum seekers and maintaining a firm stance on the issue. Probability p in this regard will be the prospect of the party's scandal, or how likely a particular issue will be salient at a given time.

3 Interpreting the Assumptions

Prior to analyzing the model, I offer a few comments on this model's assumptions.

Proto-coalition. I assume that Party 2 has already been invited to join the coalition and parties are bargaining on terms. While this formulation is restrictive in terms of the general question of how parties choose their negotiating partners (Golder, Golder and Siegel, 2012), note that my model also incorporates the possibility of a negotiation failure, as highlighted in the literature (Ecker and Meyer, 2020). In the maintenance stage, Party 2 is able to leave in the very first period, which effectively means that the offer is rejected and the duration of the coalition is 0, i.e., coalition broke down immediately.

Ideological preferences. I omit explicit considerations of ideological differences between parties, although they are implicit in my model in two ways. First, Party 1's offer x can be understood as an ideological compromise normalized to a value between 0 and 1. If the parties have absolute loss preferences, then any policy in their Pareto set in a unidimensional model is equivalent to a divide-the-dollar game. In this sense, preference divergence already exists in my model; but how divergent it is is not the main focus. Later I include an extension in Appendix B, where I explore the case where Party 1 can offer a negative x, extracting policy compromise from Party 2.[8]

Second, I look at an extension where the probabilities of parties drawing a positive outside option are correlated. I use parameter r to represent the conditional probability; when $r > p$ the two probabilities are positively correlated, and when $r < p$ they are negatively correlated. High r substantively means that an exogenous shock is more likely to affect the parties jointly. This could be interpreted as the parties sharing similar ideological stances and thus being subject to the same shocks in the political environment. A complete analysis of this extension is in Appendix C.

4 Equilibrium Analysis

I now proceed to characterize and describe the equilibrium behaviors of Party 1 and Party 2. I analyze this game by backward induction.

[8] Results show that even when Party 1 *extracts* $|x|$ from Party 2, the partnership can still last for a positive amount. This is because Party 2 is willing to pay the cost to wait for a potential draw of a high outside option, ω_2.

Optimal strategy of Party 2 given x. The solution concept I employ is stationary Markov perfect equilibrium (MPE). I restrict attention to pure strategies for simplicity. Since the stability of the agreement is maintained if only Party 2 prefers to sustain it, the expectation of what outside options he would draw and how he would behave is crucial to understanding how Party 1 will allocate the resources. Leaving is weakly dominated when $\omega_2^t = 0$; Party 2's strategy therefore hinges on what to choose when $\omega_2^t = \omega_2$. It follows that Party 2 will leave when $x < x^\dagger \equiv (1-\delta)\omega_2$ and he never leaves when $x > x^\dagger$. In other words, Party 2 never leaves only when his continuation value is greater than the payoff from taking the outside option, and this holds when x is sufficiently large.

Party 1's optimal choice of x. Given exogenous parameters ω_2, p, and δ, Party 1's choice of x in the contracting stage determines Party 2's choice of action and hence the equilibrium outcome in the maintenance stage.

Figure 1 illustrates how the optimal choice of x and its corresponding equilibrium outcome depend on ω_2 and p. When ω_2 is sufficiently low and p is sufficiently high, Party 1 in equilibrium offers $x^\dagger > 0$ and Party 2 never leaves the agreement. Under these conditions, Party 2's walk-away value is not high (low ω_2) although it is sufficiently frequently drawn (high p). Party 1 thus chooses a good enough offer that induces Party 2 to stay in the agreement, securing her stream of payoffs. When ω_2 is sufficiently high and p is sufficiently low, however, Party 1 offers nothing to Party 2 ($x^* = 0$) and Party 2 will leave. Since the outside option is less frequently available (low p) in this region, Party 1 does not compromise and lets the relationship continue only until Party 2 draws ω_2. I formally state this result below.

Proposition 1 *In equilibrium,*

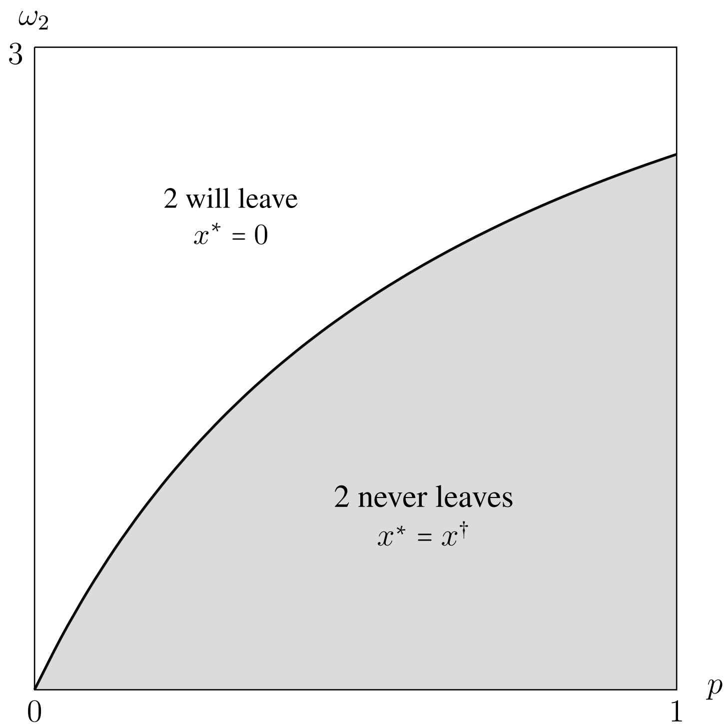

Figure 1: Equilibrium Outcomes in the Baseline
$\delta = 0.6$

- *Party 1 offers* $x^\dagger \equiv \omega_2(1-\delta)$*; Party 2 never leaves if*

$$\omega_2 < \widetilde{\omega}_2 \equiv \frac{p}{(1-\delta)(1-\delta(1-p))}.$$

- *Party 1 offers* 0*; Party 2 will leave if*

$$\omega_2 > \widetilde{\omega}_2.$$

Proposition 1 tells us that Party 1 compromises a positive amount to make the partnership stable only when ω_2 is sufficiently low (or p is sufficiently high). In this region, the exit threat of Party 2 is not too high and Party 2 draws ω_2 often enough that Party 1 is willing to pay to keep him in the partnership.

Comparative Statics. With the equilibrium conditions in hand, I move on to discuss the comparative statics with respect to ω_2. In Figure 2, I display Party 1's optimal choice x^* as a function of Party 2's outside option ω_2.

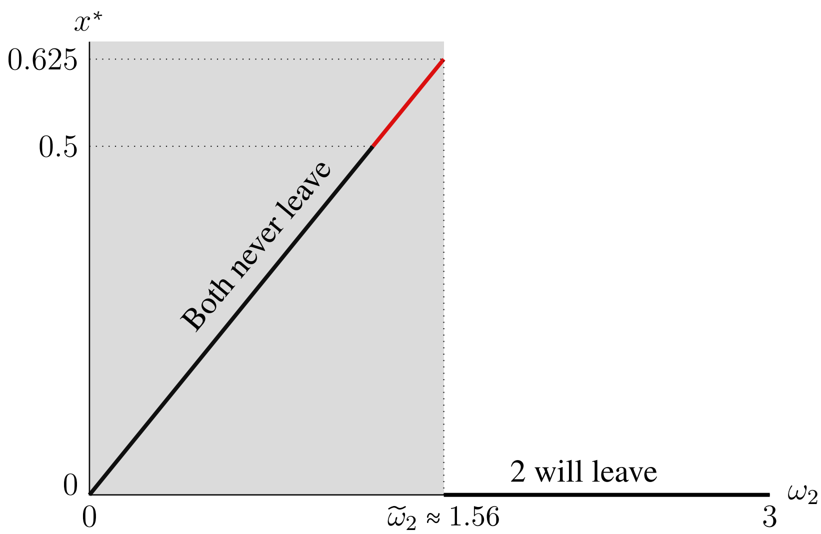

Figure 2: Optimal Political Compromise
$\delta = 0.6, p = 0.4$

Two noticeable aspects of this figure are that the optimal compromise is not monotonically increasing in ω_2 and that Party 1 sometimes proposes more than half to Party 2 despite having a unilateral proposal power. When ω_2 is sufficiently low, Party 1 is willing to make a compromise ($x^* = x^\dagger$) to sustain the partnership. This equilibrium holds until the outside option reaches $\widetilde{\omega}_2$. Afterward, however, Party 1 has to compromise too much to incentivize Party 2 to stay in the partnership. Therefore, she chooses $x^* = 0$ and lets the agreement break down as soon as Party 2 draws a high outside option, which is the discontinuous drop in Figure 2. This threshold is represented by the curved line ($\omega_2 = \widetilde{\omega}_2$) in Figure 1. Offering 0 means that the duration of the agreement is finite. This is a conscious choice of Party 1 choosing terms over length - she prefers to play a short-lived game with Party 2 and refuses to compromise, knowing that the relationship will end soon.

Corollary 1 *Party 1's optimal offer x^* in equilibrium is larger than half when Party 2's outside option ω_2 is sufficiently low, but not too low:*

$$\frac{1}{2(1-\delta)} < \omega_2 < \widetilde{\omega}_2.$$

Corollary 1 tells us that there exists a region where Party 1 concedes more than half (represented by the red line segment in Figure 2), and characterizes the conditions under which we don't observe a proposer advantage even when the model confers the strongest possible power to Party 1 in the sense that she has complete discretion over the terms of bargaining.

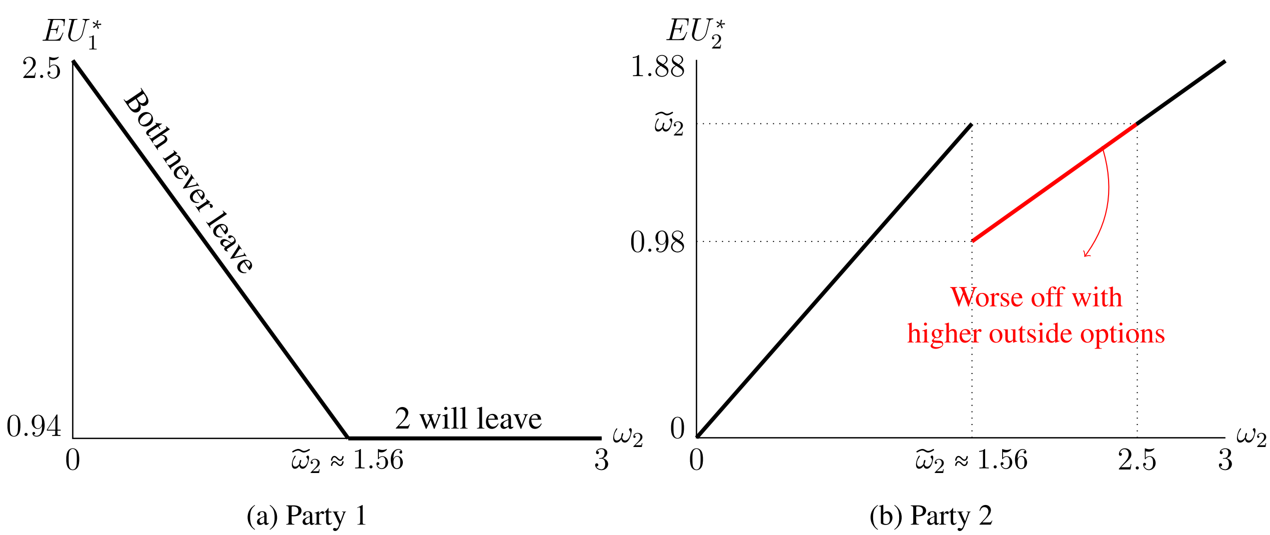

Figure 3: Equilibrium Expected Payoffs
$\delta = 0.6, p = 0.4$

Next, I lay out each party's equilibrium payoff as a function of ω_2. In Figure 3a, Party 1's utility decreases in ω_2 when ω_2 is sufficiently low ($\omega_2 < \widetilde{\omega}_2$) because optimal compromise $x^* = x^\dagger$ increases in ω_2; intuitively, it takes more to persuade Party 2 when he has a higher value of the outside option. When his outside option is high ($\omega_2 > \widetilde{\omega}_2$), Party 1 offers no compromise. Her utility in this region with respect to ω_2 is now constant, as it only depends on the expected timing of Party 2's defection.

In Figure 3b, we observe that Party 2's utility increases with respect to ω_2 in both equilibrium regions, but with a discontinuous drop. With low ω_2, an increase in ω_2 leads to a larger compromise from Party 1 since ω_2 is still not too high that it is optimal for Party 1 to compromise more and keep Party 2 in the agreement. However, when ω_2 goes above a threshold, an increase in ω_2 now means that persuading Party 2 is too expensive. We thus observe a discontinuous drop between the two regions, as Party 1 switches from offering $x^* = x^\dagger$ to offering no compromise $x^* = 0$. Party 2's payoff in the second region increases only as a function of an increase in his outside option. It follows that Party 2 is worse off with a moderately high outside option than with a lower outside option, which can be seen from the red line segment in Figure 3b.

Proposition 2 *Let EU_2^* be Party 2's expected utility in equilibrium as a function of exogenous outside option ω_2. Then, the following is always true.*

$$\lim_{\omega_2 \to \widetilde{\omega}_2^-} EU_2^*(\omega_2) > \lim_{\omega_2 \to \widetilde{\omega}_2^+} EU_2^*(\omega_2).$$

Proposition 2 shows that we always observe the aforementioned discontinuous drop. This result identifies the perverse consequences of a high outside option, as a partner with a lower outside option may be overcompensated and be better off because he is "easier to persuade." In this regard, more inequality in bargaining strength can sometimes lead to less *ex-post* inequality observed as bargaining terms.

5 Extension: No Commitment

The baseline model assumes that only Party 2 draws an outside option and can walk away in each period. In this extension, I allow Party 1 to also draw her outside option ω_1 with probability p and leave at any period after the initial compromise is proposed. The game continues as long as both parties choose to stay in each period ($a_i^t = 0$ for all i at time t). If either of the two parties chooses to leave, the party who leaves receives his or her lottery payoff, and the game ends. If a party stays while the other chooses to leave, he or she gets a 0. The payoff structure is summarized in the table below.

		Party 2	
		$a_2^t = 0$	$a_2^t = 1$
Party 1	$a_1^t = 0$	$(1 - x, x)$	$(0, \omega_2^t)$
	$a_1^t = 1$	$(\omega_1^t, 0)$	(ω_1^t, ω_2^t)

Table 2: Payoff Structure in the Extension

Equilibrium analysis for the extended version of the model is described in detail in Appendix A. In this section, I focus on the implications of additional equilibria newly identified in this extension and further examine parties' preferences for commitment.

Figure 4 illustrates Party 1's optimal choice of x and its corresponding outcome in the extension model. Note that in this version, Party 1 no longer has to try as hard to keep Party 2 in the relationship under some circumstances; for instance, if too much accommodation is necessary to keep Party 2 in the agreement, she can simply offer 0 and leave when her outside option is favorable. We thus see two additional equilibria: one where Party 1 offers 0 and both parties eventually leave after a good outside option, and another where Party 1 offers $x^{\ddagger} \equiv (1 - \delta(1 - p))\omega_2/(1 - p)$ that induces Party 2 to always stay while she leaves after drawing ω_1. I particularly

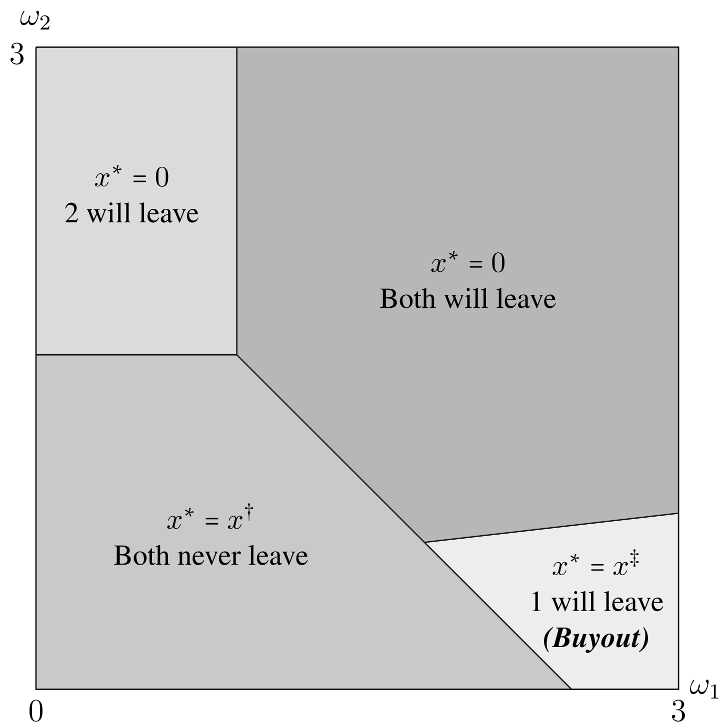

Figure 4: Equilibrium Outcomes in the Extension
$\delta = 0.6, p = 0.4$

focus on the second outcome where Party 1 leaves in equilibrium. I denote this region as the **buyout equilibrium** and explain its various implications below.

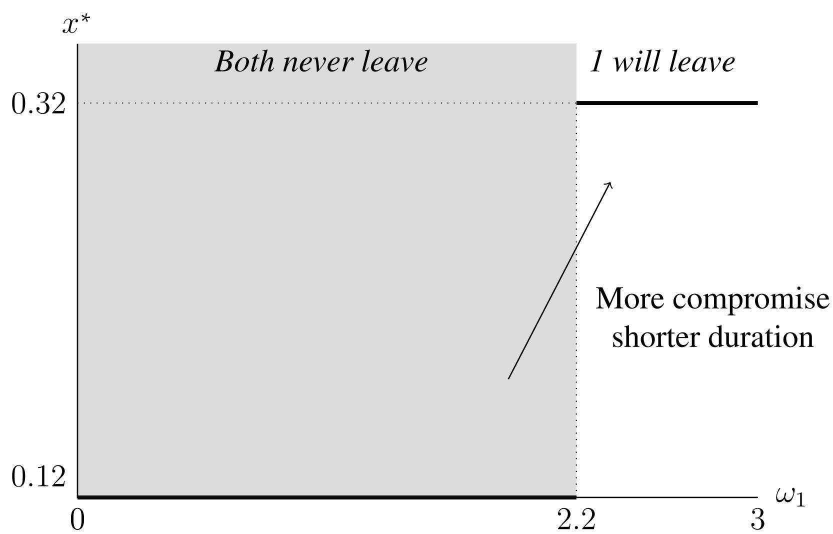

Figure 5: Optimal Political Compromise
$\delta = 0.6, p = 0.4, \omega_2 = 0.3$

Figure 5 depicts the effect of an increase in Party 1's outside option on her optimal choice of x and its implications on the duration of partnership between the two parties. Equivalently, it is a horizontal slice of Figure 4 at $\omega_2 = 0.3$. Note that as ω_1 increases, her optimal level of compromise also increases. This is somewhat counter-intuitive since we would normally expect an increase in Party 1's outside option ω_1 to lead to a decrease in the amount Party 1 concedes to Party 2, yet we observe a larger level of compromise. The underlying mechanism behind the buyout equilibrium (the region where $\omega_1 > 2.2$ in Figure 5) is quite straightforward. Now that Party 1 has a higher outside option she wants to leave, but she wants to do it *with certainty*. This means that she is willing to pay Party 2 more in order to keep him in the relationship, just so that she can leave on her own terms.

This equilibrium leads to three important observations. First, note that Party 1 may optimally offer more than half in this equilibrium as well.[9] This model thus identifies an additional equilibrium class where the proposer advantage is not obvious. In the baseline model, Party 1 concedes more than half only when she has preferences for stability. In this equilibrium, Party 1 is also willing to give up her present per-period benefit and buy the long-term support of Party 2, but this is not because she wants government stability; it is rather to capitalize on her outside option with certainty in the future.[10]

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[9] This holds if $\omega_2 > (1-p)/(2-2\delta(1-p))$.

[10] A simple but important point is worth noting here. Comparing the model's results to a version where outside options are drawn with probability 1 ($p = 1$), I find three crucial differences: (1) the buyout equilibrium does not exist; (2) parties never defect unilaterally; and (3) parties never agree on the use of commitment devices. A formal model that assumes the outside options to be static thus fails to explain these empirical patterns.

Second, and relatedly, a party with a lower outside option may be overcompensated in equilibrium. While this dynamic is also reproduced in the baseline model (see Figure 3b), Party 1 in such a case is willing to concede to Party 2 only when she wants to bargain for longevity. Here, the weak-party bias occurs when Party 1 has no such incentives. The proposer is willing to overcompensate Party 2 precisely because she knows the relationship will terminate soon, not because she is trading the present benefit for its future value. Notably, the discontinuity in Party 2's payoff still occurs because Party 2 becomes too expensive to buy as his outside option increases, but the strategic incentive behind Party 1's compromise is distinct.

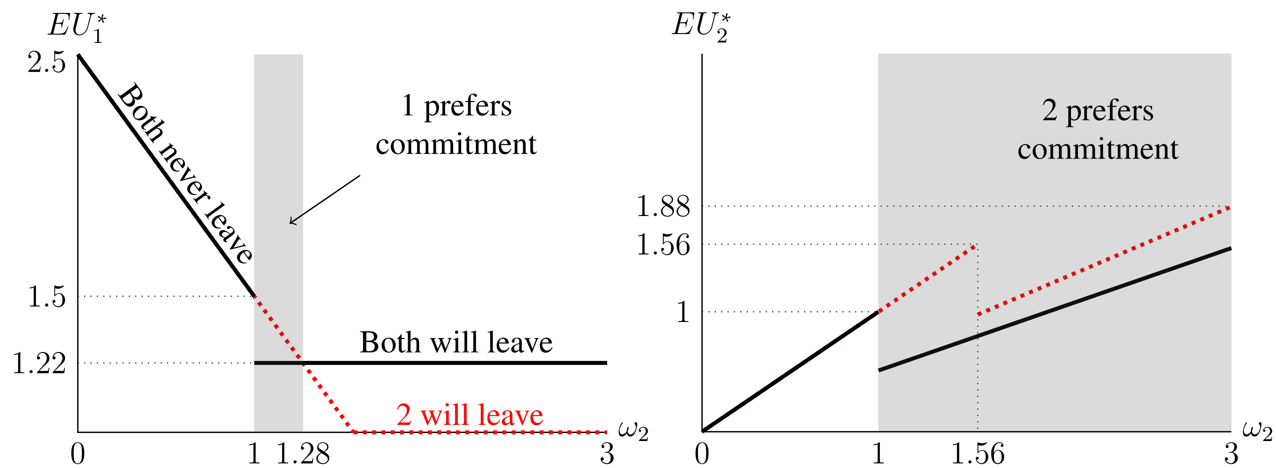
Third, the relationship between the proposer's compromise and the duration of government may be negative. Below I show that Party 1's optimal offer in the buyout equilibrium ($x^{\ddagger}$), if exists, is always larger than her offer in the equilibrium where both parties never leave ($x^{\dagger}$).

Proposition 3 *Let x^* be Party 1's optimal offer in equilibrium as a function of exogenous outside option ω_1. Conditional on a sufficiently low outside option of Party 2, $\omega_2 < (1-p)/(1-\delta(1-p))$, there always exists some $\widehat{\omega}_1$ such that*

$$\lim_{\omega_1 \to \widehat{\omega}_1^-} x^*(\omega_1) < \lim_{\omega_1 \to \widehat{\omega}_1^+} x^*(\omega_1).$$

Proposition 3 states that if ω_2 is sufficiently low (or when p is moderate), there always exists a discontinuous jump where Party 1 compromises more with higher ω_1, i.e., $x^{\ddagger} > x^{\dagger}$. Further, by definition, we know that the duration of cooperation must be shorter when Party 1 unilaterally leaves (buyout equilibrium) than when both parties never leave. This implies that in this region, more compromise leads to a shorter duration of government.

Now consider Party 1 and Party 2's welfare in comparison with the results from the baseline model. I find that parties may agree on which game to play. Both parties may prefer that Party 1 commits to the partnership and be unable to leave; conversely, they may want Party 1 to have the option to leave. The red dotted lines in Figure 6 and 7 represent the baseline model with commitment, while the black lines represent the results without commitment.



(a) Party 1

(b) Party 2

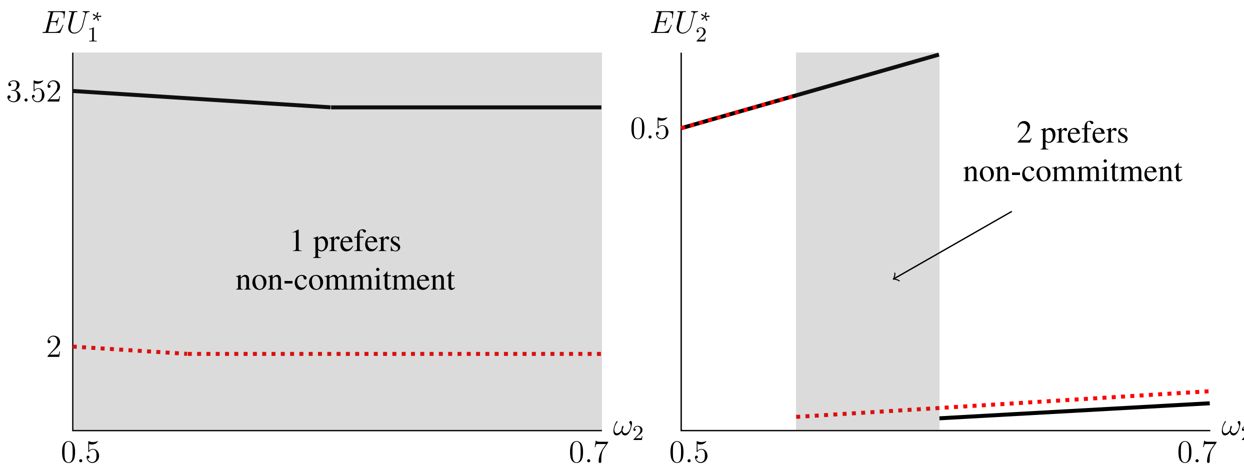
Figure 6: Comparison of Equilibrium Expected Payoffs
$\delta = 0.6, p = 0.4, \omega_1 = 1.5$

Figure 6 illustrates the case where both parties favor Party 1's inability to leave. From Figure 6a, we see that Party 1 in general is better off without commitment. It would seem clear that increasing Party 1's flexibility in her choice to leave can only increase Party 1's expected payoff. Similarly, one might think that Party 2 can not be helped by Party 1's increase in flexibility. However, this possibility, if foreseen by Party 2, introduces a credibility problem that becomes more costly for Party 1. Party 1 may thus prefer to concede her ability to leave the partnership in return for a longer duration of the coalition. This happens when the outside options of parties are moderate (see the shaded region in Figure 6a).

Notice that the general dynamics of the baseline and the extension models are similar. When ω_2 is sufficiently low, Party 1 is willing to offer $x^\dagger$ to maintain the relationship. When ω_2 is high, it takes more compromise to induce Party 2 to stay in the relationship, so Party 1 chooses to give nothing ($x^* = 0$) and the agreement lasts only until either of the parties draws a high outside option. However, the threshold of this discontinuity is higher in the baseline model. Unlike in the extension model, Party 1 is not tempted by the outside option in the baseline model because she has already committed to not leaving in the maintenance stage. Party 1 is thus willing to compromise for a value of ω_2 that in the extension model would result in both parties leaving.

In addition, not being able to leave provides Party 1 with credibility that would not have been available without commitment, which induces Party 2 to stay in the partnership. When Party 2 has a moderate outside option, he is better off receiving the continued stream of payoff in the partnership rather than taking a not-too-high outside option and leaving, but with the possibility of Party 1's "betrayal" in the extension model he is incentivized to leave. With Party 1's credible commitment, Party 2 is now willing to never leave. Party 1 in the baseline model thus concedes more to Party 2 in return for a stable relationship, and she also prefers this over leaving because her outside option is not too high. As can be seen from Figure 6b, Party 2 in this region is also weakly better off with Party 1's commitment.

Figure 7 represents an opposite case. Party 1's outside option ω_1 is very high that given these parameters, for any value of ω_2 Party 1 ultimately leaves the agreement after she draws ω_1. One might think that Party 2 would prefer that Party 1 commits to the relationship and never leaves, since otherwise he knows that Party 1 will leave with certainty in the future. Surprisingly, there is a region where Party 2 is better off when Party 1 is able to leave the agreement. This is closely related to the mechanism behind the buyout equilibrium (see Figure 5) where Party 1 concedes by offering Party 2 a larger share of resources in exchange for a secure exit strategy in the future. This shapes Party 2's preference for institutions, as he may prefer Party 1's ability to withdraw



(a) Party 1

(b) Party 2

Figure 7: Comparison of Equilibrium Expected Payoffs
$\delta = 0.6, p = 0.1, \omega_1 = 9.5$

from the agreement since this ironically increases her willingness to compromise. The following proposition summarizes the above implications.

Proposition 4 *Consider both parties' preferences in the baseline and the extension models.*[11]

1. *If either ω_1 or ω_2 is sufficiently low, parties are indifferent between the two models.*

2. *If both ω_1 and ω_2 are sufficiently high, parties' preferences diverge.*

3. *If both ω_1 and ω_2 are moderate, both parties are weakly better off in the baseline model.*

4. *If ω_1 is sufficiently high and ω_2 is sufficiently low, both parties are weakly better off in the extension model.*

Figure 8 is a graphical illustration of Proposition 4. Put together, there exist regions where parties agree on the institutional choice. When ω_1 and ω_2 are "not too low, not too high," both parties may prefer to have Party 1 commit to the partnership. Party 1 proposes more in the baseline

[11] The supporting proof and mathematical expressions for the conditions are in Appendix A.

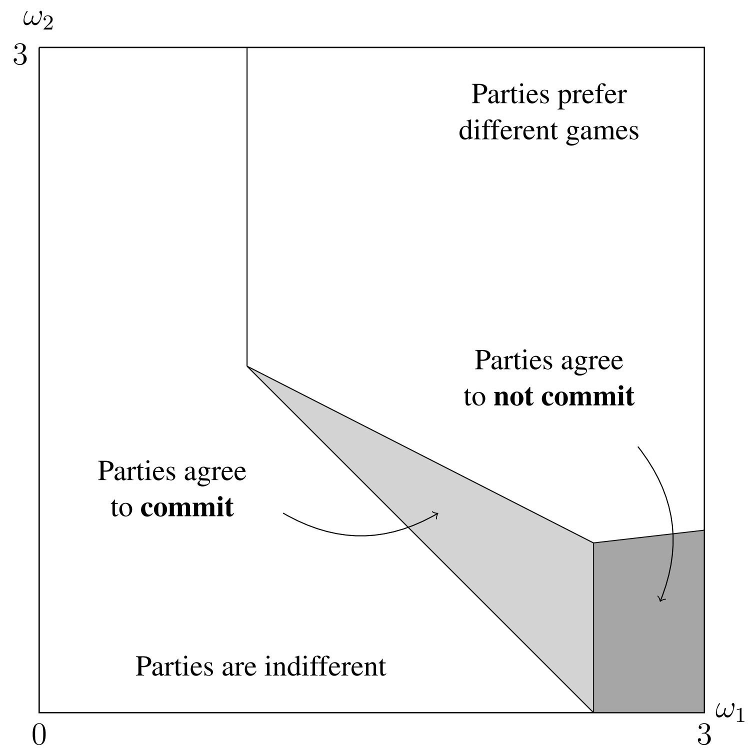


Figure 8: Parties' Preferences Over Games
$\delta = 0.6, p = 0.4$

model but prefers to do so, as this induces Party 2 to stay in the partnership longer. When ω_1 is sufficiently high but ω_2 is sufficiently low, both parties may conversely prefer that Party 1 has the ability to leave the partnership as implied by Figure 7. Additionally, when either ω_1 or ω_2 is sufficiently low, parties are indifferent between the two games because the equilibrium outcome is perfectly identical for both models. Otherwise, parties disagree on their preferred game choice.

6 Additional Extensions

In this section, I briefly introduce three extensions of the model that incorporate some additional features of coalition bargaining with the aim of providing a more nuanced analysis. I show that while there are minor shifts in equilibrium outcomes, the qualitative results from the models analyzed above continue to hold in these settings.

Renegotiation. The main models focus on how parties are forward-looking when negotiating the initial coalition terms with their partners. However, parties may be able to change their terms of agreement throughout their partnership. Coalition agreements may turn out to be suboptimal later, giving parties incentives to revisit the original deal via cabinet reshuffles (Kam and Indriason, 2005; Indridason and Kam, 2008), changes in portfolio design (Sieberer et al., 2021; Meyer, Sieberer and Schmuck, 2024), or policy compromises (Becher and Christiansen, 2015; Diermeier and Stevenson, 2000; Kayser and Rehmert, 2021). Allowing for shifts in the allocation of initial resources would, in this regard, speak to the theoretical ideas of coalition renegotiation as a response to outside options. To incorporate the possibility of renegotiation, I endow Party 1 with a chance to make a second offer to Party 2 with some probability when he announces that he will (unilaterally) leave. Now reshuffles may be strategically used by both parties. Party 1 can use it to protect herself from Party 2's unilateral defection; Party 2 utilizes it to extract more concessions from Party 1.

The equilibrium regions are qualitatively the same as in the baseline model, although Party 1 offers $x^* = 0$ more often with renegotiation now that she can change her offer later down the road. Successful renegotiation occurs when Party 2's outside option is moderate (see Appendix F for formal results). As expected, the renegotiated offer is always larger than the initial offer. There are largely two different patterns of successful renegotiation. First, we see Party 1's desire to avoid coalition termination when her outside option is low. Party 1 offers more to Party 2 during renegotiation and persuades him to stay in the partnership. Alternatively—and similar to the logic of the buyout equilibrium—Party 1 in equilibrium may offer more to Party 2 during renegotiation and convince him to stay, but after renegotiation, Party 1 leaves in equilibrium. This is when Party 1 has a high outside option. The effect of an increase in Party 2's outside option on the amount of renegotiation offer can thus be positive or negative depending on the size of Party 1's outside option.

Audience costs. In the baseline model, parties do not face any negative repercussions from defecting. Extensive works on coalition breakdown, however, find that terminations can be electorally costly for the parties (Mershon, 2002; Narud and Valen, 2008; Plescia and Kritzinger, 2022; So, 2023), and voters especially punish parties that choose to leave the government (Warwick, 2012). In this extension, I add a parameter $c \in (0, \omega)$ that captures the audience cost that the defector incurs from abandoning the partnership. The results show that the presence of audience costs leads to an increase in the equilibrium region where Party 1 offers Party 2 nothing and Party 2 unilaterally defects from the coalition. This is because the presence of audience costs already deters Party 2 from defecting, and thus Party 1 is less incentivized to offer him a compromise. The dynamic is otherwise consistent with the baseline model.

Correlated outside options. Additionally, I consider an extension where the parties' outside options are correlated. If we interpret the outside options as prospects of a new election or coalition, it is natural to assume that various exogenous factors could result in their utilities from leaving to be either positively or negatively correlated. For instance, when a certain issue is more salient than others or when certain groups of voters are more active in a given period, one party having received a high draw could mean that the other party is also more or less likely to receive a high draw of outside options.

Intuitively, a positive correlation between the parties seems like a good deal for both parties. Both parties being likely to receive the higher outside option in the same period could mean that when parties leave, they are more likely to leave together, and when they stay, they are also more likely to do so together. Therefore, we might expect unilateral leaving to occur less often and the duration of the partnership to be longer. However, I find that this is only true under some conditions; for moderate values of outside options, a higher level of positive correlation can lead to less stable partnerships. In this region, a positive correlation could lead to government termination when a negative or no correlation between the outside options under the same parameters would have resulted in the parties staying in the coalition. Formal results and further discussion are in Appendix C.

7 Discussion and Empirical Implications

Lastly, I review several key contributions of my model and discuss their empirical implications.

Buyout equilibrium. One of the main contributions of the model is the finding that an increase in proposer compromise should not be taken as evidence of a lack of proposer advantage. The buyout equilibrium finds that the proposer may be willing to concede precisely because she is highly incentivized to leave. She wants to call an opportunistic election when her prospect is favorable, but in order to sustain the coalition until the best timing for a new election, she keeps him in the relationship by offering more share of the pie. In this sense, the real benefit of being a formateur does not come from the share she appropriates in the initial bargaining process but rather from the ability to time her defection. This also implies that the partner under this equilibrium will be "overcompensated" in terms of the share he is offered by the proposer, but unlike previous works that find such weak-party bias to occur when the proposer has preferences for a stable coalition (Indridason, 2015), the partner is offered more when the proposer ironically has no incentives for stability.

From an inferential standpoint, this raises several issues. First, if the above equilibrium dynamic exists in data but is not controlled for, then the observed portfolio allocation will not be a reliable measure of the proposer advantage in question. Second, and relatedly, formal models that fail to take the buyout equilibrium into account would overstate the degree of proposer advantage in portfolio allocation and understate the weak party bias. This result builds on other formal works that uncover possible mechanisms for why we observe a lack of formateur advantage (Carroll and Cox, 2007; Bassi, 2013; Battaglini, 2021) and weak party bias (Morelli, 1999), and further helps bridge the gap between the empirical evidence and standard models of legislative bargaining. Lastly, note that we observe the buyout equilibrium when the relative *difference* in outside options between the parties is large in favor of the proposer party. This implies that empirical studies need to consider the dyadic aspect of outside options when examining the relationship between the proposer's outside option and her optimal level of compromise. Conditional on the partner's outside option being sufficiently high, an increase in the proposer's outside option leads to a decrease in her optimal level of compromise. However, when the partner's outside option is low, the association is positive; an increase in the proposer's outside option may *increase* the amount of compromise.[12]

[12] An increase in the partner's outside option always leads to more compromise unless his outside option is too high.

Outside option, compromise, and duration. The theoretical framework also tells us that the relationship between the proposer's optimal compromise and government duration may not be straightforward. More compromise may ironically lead to *a shorter duration of government*. This happens under the buyout equilibrium when the proposer bargains in expectation of future government termination. This equilibrium, in particular, allows us to identify conditions under which we will observe a strategic dissolution by the proposer party. We expect to see higher frequencies of defection by the proposer when her outside option is sufficiently higher than that of the other party or when the probability of drawing a favorable outside option is moderate (i.e., higher variance of the distribution). This is largely related to the literature on opportunistic election (e.g., Grofman and Van Roozendaal, 1994; Schleiter and Tavits, 2016; Walther and Hellström, 2019), and it resonates with Kayser (2005)'s model of election timing, which examines the government's ability to time elections ("surf") and manipulate their economies ("manipulate") for political advantage and finds that, among others, the frequency of opportunistic elections is positively associated with the variance of economic performance.

Such a dynamic also implies an ambiguous relationship between the proposer's outside options and the duration of government. My model predicts that an increase in the partner's outside option always leads to a decrease in government duration, while an increase in the proposer's outside option may have a non-monotonic effect. This is consistent with Martin (2000), which fails to find a significant relationship between the electoral prospects of the prime minister and government termination and only finds an effect for other coalition members. Overall, a comprehensive analysis of the dynamic requires an empirical model that can take account of both the effect of outside options on proposer compromise as well as the effect of compromise on coalition duration.

Commitment. Lastly, the model shows that the proposer may optimally prefer to tie her own hands and commit to the partnership. When both parties have outside options that are moderate, the proposer concedes more to her partner with commitment than without but, in exchange, enjoys a longer duration of the partnership. This result provides some insight into when and why parties agree to commitment devices such as pre-electoral coalitions that often constrain the proposer from leaving the coalition. The model expects to see higher frequencies of them when the outside options of parties are in an intermediate range and less of them when the outside options diverge in favor of the proposer. More specifically, a decrease in the partner's outside options will increase the likelihood of a pre-electoral coalition only when the proposer's outside option is sufficiently low; a decrease in the proposer's outside option will always increase the likelihood of a pre-electoral coalition.

While the structure of the model is different, this result is consistent with Carroll and Cox (2007), who find cabinet offices to be more strongly allocated in proportional terms, i.e., there is less proposer advantage, if a pre-electoral pact between the negotiation partners existed.[13] It also supports an empirical finding in the literature which suggests that coalitions that commit to cabinets before elections are significantly less likely to end through dissolution and early elections (Chiru, 2015).

[13] See Kaminski (2001); Bandyopadhyay, Chatterjee and Sjostrom (2009); Debus (2009) for other formal models on pre-electoral coalitions.

8 Conclusion

I have presented a simple model of bargaining with proposer advantage with the aim of considering the impact of dynamic outside options on both the contracting and maintaining phase in coalition bargaining. This paper provides a game-theoretic explanation of how cooperation might or might not last among actors who in the short term are inclined to take more for themselves or defect from the agreement. In particular, I return to the example introduced at the beginning of the paper and review the key contributions of the model.

The coalition between Netanyahu's Likud and Gantz's Blue and White in 2020 is an example of the buyout equilibrium in several aspects. Netanyahu's true advantage over Gantz didn't come from securing more resources from the coalition but rather from the ability to offer more to Gantz and ultimately time the election. Despite the numerical asymmetry between the two parties, Netanyahu made significant concessions to Gantz during the initial coalition bargaining, which kept Gantz in the coalition. Instead, Netanyahu expected his future outside option to be high and waited for the right time to end the partnership. He refused to pass the two-year budget and retained the ability to dissolve the coalition, yet when his outside option wasn't high in August with the second wave of COVID-19, he agreed to continue the coalition and postpone the election (Jamal, 2021); he ultimately called a new election exploiting the same budget crisis in December 2020.

As in this case, the theory presented in this paper also indicates why more compromise does not necessarily lead to a longer duration of government. A simple present-future trade-off fails to explain Netanyahu's strategic calculation in conceding more to Gantz. He was willing to give up some of the present benefits not to enjoy coalition stability but to disincentivize Blue and White from defecting first. We observe this dynamic: while the Gantz camp constantly pushed through a coalition-compliant budget that would keep the coalition going through 2021 and expressed its willingness to maintain the coalition, Netanyahu unilaterally chose to dissolve the coalition (Zielińska, 2020). This further highlights the model's insight on when we might observe a weak party bias. Gantz's Blue and White was offered a sizable concession despite the fact that Netanyahu was expecting his potential future prospects to be favorable and thus had no interest in maintaining the coalition. This resonates with the model's finding that a party with a low outside option may be overcompensated even when the proposer has no preferences for stability.

Overall, the model yields several conclusions. First, the buyout equilibrium tells us that the true proposer advantage may not be in taking more share of the portfolios but rather in the proposer's choice of coalition longevity. When the relative difference in outside options between the parties is large in favor of the proposer, she willingly concedes a share of the allocation and buys the partner's long-term support to sustain the coalition only to defect when the best timing for a new election arrives. This dynamic further provides a novel account of why the proposer may optimally overcompensate a partner with a sufficiently low outside option and why we would expect to observe weak party bias even when the proposer has no preferences for stability. Additionally, more compromise by the proposer may lead to a shorter duration of government, as she sometimes offers more in anticipation of her own defection in the future. Lastly, the model identifies conditions under which parties may agree on the use of commitment devices. In a model with static outside options, the proposer never prefers to commit to the partnership. By allowing the draw of outside options to be dynamic, the model finds that the proposer may willingly tie her hands when the outside options of both parties are moderate.

The concept behind this paper can be applied to other instances of transactional partnerships with unequal bargaining powers, including organizational hiring or personal relationships. While I have analyzed one particular setting where two parties engage in a one-time bargaining over government resources, future research could take this insight in various other settings to examine how multiple agents may bargain in light of their outside options. Alternatively, we could endogenize the selection of the proposer in the model and study agents' preferences over having one agent as the proposer to another.

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Appendix for

Bargaining for Longevity

Contents

A Proofs

Proposition 1 *In equilibrium,*

- *Party 1 offers* $x^{\dagger} \equiv \omega_2(1-\delta)$*; Party 2 never leaves if*

$$\omega_2 < \widetilde{\omega}_2 \equiv \frac{p}{(1-\delta)(1-\delta(1-p))}.$$

- *Party 1 offers* 0*; Party 2 will leave if*

$$\omega_2 > \widetilde{\omega}_2.$$

Proof: The game consists of a contracting stage and a maintenance stage. The maintenance stage is Party 2's dynamic discrete choice problem. I first solve for Party 2's optimal stationary strategy with respect to realized outside option ω_2^t, which depends on x. Then, Party 1 will choose an optimal offer x^* in the contracting stage in anticipation of Party 2's best response in the maintenance stage.

Let W denote Party 2's continuation value. Party 2 prefers to leave when

$$\omega_2^t > x + \delta W.$$

It immediately follows that not leaving is a dominant strategy when $\omega_2^t = 0$. Therefore, Party 2 essentially has two different strategies: 1) never leave for all ω_2^t, and 2) leave when $\omega_2^t = \omega_2$.

1. Consider the strategy profile where Party 2 never leaves for all ω_2^t. Then, the stationary MPE

requires that continuation value W satisfies the following Bellman equation:

$$W = \underbrace{x}_{\text{per-period payoff}} + \underbrace{\delta W}_{\text{discounted future}}.$$

The solution for this equation is

$$W = \frac{x}{1-\delta}.$$

Party 2 has incentive to employ this strategy if Party 1's offer is sufficiently large:

$$x > (1-\delta)\omega_2.$$

2. Consider the strategy profile where Party 2 leaves when $\omega_2^t = \omega_2$. Then, the stationary MPE requires that continuation value W satisfies the following Bellman equation:

$$W = \underbrace{(1-p)(x+\delta W)}_{\text{draws 0 and stays}} + \underbrace{p \cdot \omega_2}_{\text{draws } \omega_2 \text{ and leaves}}.$$

The solution for this equation is

$$W = \frac{x + p\omega_2}{1-\delta(1-p)}.$$

Party 2 has incentive to employ this strategy if the offer is sufficiently small:

$$x < (1-\delta)\omega_2.$$

Let EU_1 be Party 1's total expected utility as a function of choice $x \in [0,1]$. Then,

$$EU_1(x) = \begin{cases} \frac{(1-p)(1-x)}{1-\delta(1-p)} & \text{if } x < (1-\delta)\omega_2 \\ \frac{1-x}{1-\delta} & \text{if } x > (1-\delta)\omega_2. \end{cases}$$

Depending on exogenous parameters δ, p and ω_2, Party 1's optimal choice of offer and the subsequent equilibrium outcome is as follows:

1. Party 1 offers $x^\dagger$ and *Party 2 never leaves* in equilibrium if $\omega_2 < \widetilde{\omega}_2$.

2. Party 1 offers 0 and *Party 2 will leave* in equilibrium if $\omega_2 > \widetilde{\omega}_2$. ∎

Corollary 1 *Party 1's optimal offer x^* in equilibrium is larger than half when Party 2's outside option ω_2 is sufficiently low, but not too low:*

$$\frac{1}{2(1-\delta)} < \omega_2 < \frac{p}{(1-\delta)(1-\delta(1-p))}.$$

Proof: From Proposition 1, it directly follows that Party 2's outside option should be sufficiently low ($\omega_2 < \widetilde{\omega}_2$) for the optimal offer to be positive ($x^\dagger > 0$). Next, $x^\dagger$ is greater than half when

$$\omega_2 > \frac{1}{2(1-\delta)}.$$

In other words, ω_2 needs to be sufficiently low but not too low for Party 1 to optimally offer more than half in equilibrium. ∎

Proposition 2 *Let EU_2^* be Party 2's expected utility in equilibrium as a function of exogenous* *outside option ω_2. Then, the following is always true:*

$$\lim_{\omega_2 \to \widetilde{\omega}_2^-} EU_2^*(\omega_2) > \lim_{\omega_2 \to \widetilde{\omega}_2^+} EU_2^*(\omega_2).$$

Proof: From Proposition 1, we know that the optimal offer and equilibrium outcome depends on ω_2. Let EU_2^* be Party 2's expected utility in equilibrium as a function of ω_2. Then,

$$EU_2^*(\omega_2) = \begin{cases} \omega_2 & \text{if } \omega_2 < \widetilde{\omega}_2 \\ \frac{p\omega_2}{1-\delta(1-p)} & \text{if } \omega_2 > \widetilde{\omega}_2. \end{cases}$$

Utility EU_2^* is discontinuous at $\omega_2 = \widetilde{\omega}_2$. This is where both the optimal offer and the equilibrium outcome change. The right-hand limit of $EU_2^*(\omega_2)$ at $\widetilde{\omega}_2$ is

$$\lim_{\omega_2 \to \widetilde{\omega}_2^+} EU_2^*(\omega_2) = \frac{p\widetilde{\omega}_2}{1-\delta(1-p)} = \frac{p^2}{(1-\delta)(1-\delta(1-p))^2}.$$

The left-hand limit of $EU_2^*(\omega_2)$ at $\widetilde{\omega}_2$ is

$$\lim_{\omega_2 \to \widetilde{\omega}_2^-} EU_2^*(\omega_2) = \widetilde{\omega}_2 = \frac{p}{(1-\delta)(1-\delta(1-p))}.$$

Note that the left-hand limit is greater than the right-hand limit for all δ and p. In other words, as ω_2 increases, there always exists a discontinuous drop of EU_2^* at $\widetilde{\omega}_2$. ∎

Proposition 3 *Let x^* be Party 1's optimal offer in equilibrium as a function of exogenous outside option ω_1. Conditional on sufficiently low outside option of Party 2, $\omega_2 < (1-p)/(1-\delta(1-p))$,* *there always exists some* $\widehat{\omega}_1$ *such that*

$$\lim_{\omega_1 \to \widehat{\omega}_1^-} x^*(\omega_1) < \lim_{\omega_1 \to \widehat{\omega}_1^+} x^*(\omega_1).$$

Proof: I first conduct a complete equilibrium analysis of the extension model. In this version of the game, Party 1 also draws an outside option every period and may choose to leave the partnership. As in the baseline model, not leaving is a weakly dominant strategy when $\omega_i^t = 0$. Therefore, there are four possible strategy profiles: 1) both parties never leave, 2) Party 1 will leave when $\omega_1^t = \omega_1$ and Party 2 never leaves, 3) Party 1 never leaves and Party 2 will leave when $\omega_2^t = \omega_2$, and 4) both parties will leave when $\omega_i^t = \omega_i$.[1]

1. Consider the strategy profile where *both parties never leave* for all ω_i^t. Let V and W respectively denote Party 1 and Party 2's continuation values. Then, they satisfy the following Bellman equations:

$$V = 1 - x + \delta V \quad \text{and} \quad W = x + \delta W.$$

   The solutions are

$$V = \frac{1-x}{1-\delta} \quad \text{and} \quad W = \frac{x}{1-\delta}.$$

[1] It is always a Nash equilibrium for both parties to simultaneously choose to leave for all parameters and realizations of ω_i^t. However, as dynamic considerations do not come into play in this equilibrium, I do not consider it in the analysis.

Conditions for such a strategy profile are as follows:

$$\omega_1 < 1 - x + \delta V \quad \text{and} \quad \omega_2 < x + \delta W.$$

It follows that offer x must be moderate to remove any incentive to unilaterally deviate from this strategy profile. In other words,

$$(1 - \delta)\omega_2 < x < 1 - (1 - \delta)\omega_1.$$

2. Consider the strategy profile where *Party 1 will leave* when $\omega_1^t = \omega_1$ and *Party 2 never leaves* for all ω_2^t. Then, they satisfy the following Bellman equations:

$$V = (1 - p)(1 - x + \delta V) + p\omega_1 \quad \text{and} \quad W = (1 - p)(x + \delta W).$$

The solutions are

$$V = \frac{(1 - p)(1 - x) + p\omega_1}{1 - \delta(1 - p)} \quad \text{and} \quad W = \frac{(1 - p)x}{1 - \delta(1 - p)}.$$

Conditions for such a strategy profile are as follows:

$$\omega_1 > 1 - x + \delta V \quad \text{and} \quad \omega_2 < (1 - p)(x + \delta W).$$

It follows that offer x must be sufficiently large. In other words,

$$x > \max\left\{1 - (1-\delta)\omega_1, \frac{(1-\delta(1-p))\omega_2}{1-p}\right\}.$$

3. Consider the strategy profile where *Party 1 never leaves* for all ω_1^t and *Party 2 will leave* when $\omega_2^t = \omega_2$. Then, they satisfy the following Bellman equations:

$$V = (1-p)(1-x+\delta V) \quad \text{and} \quad W = (1-p)(x+\delta W) + p\omega_2.$$

The solutions are

$$V = \frac{(1-p)(1-x)}{1-\delta(1-p)} \quad \text{and} \quad W = \frac{(1-p)x + p\omega_2}{1-\delta(1-p)}.$$

Conditions for such a strategy profile are as follows:

$$\omega_1 < (1-p)(1-x+\delta V) \quad \text{and} \quad \omega_2 > x + \delta W.$$

It follows that offer x must be sufficiently small. In other words,

$$x < \min\left\{1 - \frac{(1-\delta(1-p))\omega_1}{1-p}, (1-\delta)\omega_2\right\}.$$

4. Consider the strategy profile where *both parties will leave* when $\omega_i^t = \omega_i$. Then, they satisfy

the following Bellman equations:

$$V = (1-p)^2(1-x+\delta V) + p\omega_1 \quad \text{and} \quad W = (1-p)^2(x+\delta W) + p\omega_2.$$

The solutions are

$$V = \frac{(1-p)^2(1-x) + p\omega_1}{1-\delta(1-p)^2} \quad \text{and} \quad W = \frac{(1-p)^2 x + p\omega_2}{1-\delta(1-p)^2}.$$

Conditions for such a strategy profile are as follows:

$$\omega_1 > (1-p)(1-x+\delta V) \quad \text{and} \quad \omega_2 > (1-p)(x+\delta W).$$

It follows that offer x must be moderate. In other words,

$$1 - \frac{(1-\delta(1-p))\omega_1}{1-p} < x < \frac{(1-\delta(1-p))\omega_2}{1-p}.$$

These four cases together are exhaustive but not mutually exclusive. More specifically, the first (*both never leave*) and the fourth (*both will leave*) cases may overlap - the same offer x can lead to multiple equilibria. I assume that *both parties never leave* in such a case.

Since Party 1's continuation value V is decreasing in offer x for all outcomes, Party 1's optimal choice of x conditional on a fixed outcome is to choose a minimum x such that results in the same outcome. Since x is between 0 and 1, such x may or may not be feasible depending on parameters $\omega_1, \omega_2, \delta$, and p. After identifying the feasible minimum offer for each outcome, I compare the corresponding utilities to derive the optimal offer and the subsequent equilibrium outcome. I summarize the four different cases below. In the interest of conciseness, I introduce the following auxiliary notations:

$$A = \frac{1-p}{1-\delta(1-p)} \quad \text{and} \quad B = \frac{1}{1-\delta}.$$

A and B do not depend on ω_1, ω_2.[2]

1. Party 1 offers $x^\dagger$ and *both parties never leave* in equilibrium. This is when

$$\omega_2 < B - A \quad \text{and} \quad \omega_1 + \omega_2 < B.$$

   In other words, both ω_1 and ω_2 must be sufficiently low.

2. Party 1 offers $x^\ddagger \equiv \frac{(1-\delta(1-p))\omega_2}{1-p}$ and *Party 1 will leave* in equilibrium. This is when

$$\omega_2 < \min\left\{\frac{Ap + A\delta p^2 \omega_1}{(1-\delta(1-p)^2)}, A\right\} \quad \text{and} \quad \omega_1 + \omega_2 > B.$$

   In other words, ω_1 must be sufficiently high, and ω_2 must be sufficiently low.

3. Party 1 offers 0 and *Party 2 will leave* in equilibrium. This is when

$$\omega_1 < A \quad \text{and} \quad \omega_2 > B - A.$$

   In other words, ω_1 must be sufficiently low, and ω_2 must be sufficiently high.

[2] Note that $\widetilde{\omega}_2$ from the baseline condition can be rewritten as $B - A$ using this notation.

4. Party 1 offers 0 and *both parties will leave* in equilibrium. This is when

$$\omega_1 > A \quad \text{and} \quad \omega_2 > \min\left\{\frac{Ap + A\delta p^2\omega_1}{(1-\delta(1-p)^2)}, A\right\} \quad \text{and} \quad \omega_1 + \omega_2 > B.$$

In other words, both ω_1 and ω_2 must be sufficiently high.

Note that (1) neither $x^\dagger$ nor $x^\ddagger$ depends on ω_1 and (2) $x^\ddagger$ is always greater than $x^\dagger$. Therefore, the optimal offer as a function of ω_1 is a piecewise constant function of which the value discontinuously switches as the equilibrium outcome changes. In particular, consider the second equilibrium. I rewrite the conditions as follows:

$$\omega_1 > \max\left\{B - \omega_2, C \equiv \frac{(1-\delta(1-p)^2)\omega_2 - Ap}{A\delta p^2}\right\} \quad \text{and} \quad \omega_2 < A.$$

For the optimal offer to be $x^\ddagger$, ω_1 must be sufficiently high conditional on ω_2 being sufficiently low. Furthermore, the threshold for ω_1 is always greater than 0 for all values of ω_2, p, and δ. Below the threshold, the optimal offer is either 0 or $x^\dagger$, which are smaller than $x^\ddagger$. Above the threshold, the optimal offer is $x^\ddagger$. Therefore, the left-hand limit of x^* at the threshold is always smaller than the right-hand limit of x^* conditional on $\omega_2 < A$. ∎

Proposition 4 *Consider both parties' preferences in the baseline and the extension models.*

1. *If either ω_1 or ω_2 is sufficiently low, parties are indifferent between the two models.*

2. *If both ω_1 and ω_2 are sufficiently high, parties' preferences diverge.*

3. *If both ω_1 and ω_2 are moderate, both parties are weakly better off in the baseline model.*

4. *If ω_1 is sufficiently high and ω_2 is sufficiently low, both parties are weakly better off in the extension model.*

Proof: From Proposition 1 and 3, we know what the realized equilibrium outcomes and their respective conditions are for both the baseline and the extension models. Here, I merge the conditions of both models to compare parties' utilities and establish results on Pareto optimality. There are mainly six different cases.

1. *Party 2 will leave* in both the baseline and the extension models when

$$\omega_1 < A \quad \text{and} \quad \omega_2 > B - A.$$

   Parties are indifferent between the two models. The condition requires a sufficiently low ω_1 and a sufficiently high ω_2.

2. *Both parties never leave* in the baseline and the extension models when

$$\omega_2 < B - A \quad \text{and} \quad \omega_1 + \omega_2 < B.$$

   Parties are indifferent between the two models. The condition requires sufficiently low ω_1 and ω_2.

3. *Both parties never leave* in the baseline and *Party 1 will leave* in the extension model when

$$\omega_2 < \min\left\{\frac{Ap + A\delta p^2\omega_1}{(1 - \delta(1 - p)^2)}, A, B - A\right\} \quad \text{and} \quad \omega_1 + \omega_2 > B.$$

   Party 2 is indifferent between the two versions; Pareto optimality is established by Party 1's preference. If $\omega_1 < B$, Party 1 prefers the baseline model, and Party 1 prefers the extension model otherwise.

4. *Both parties never leave* in the baseline and *both parties will leave* in the extension model when

$$\omega_1 > A \quad \text{and} \quad \min\left\{\frac{Ap + A\delta p^2\omega_1}{(1-\delta(1-p)^2)}, A\right\} < \omega_2 < B - A \quad \text{and} \quad \omega_1 + \omega_2 > B.$$

   Party 2 always prefers the baseline model. If Party 1 also prefers the baseline model, then Pareto optimality is established. This is when

$$(1-\delta)(1-\delta(1-p)^2)\omega_2 < p(2-p-(1-\delta)\omega_1).$$

   The conditions require moderate ω_1 and ω_2. Party 1 prefers the extension model otherwise; parties' preferences over the institutions diverge in this case. The conditions require moderate (but relatively higher) ω_1 and ω_2.

5. *Party 2 will leave* in the baseline and *Party 1 will leave* in the extension model when

$$B - A < \omega_2 < \min\left\{\frac{Ap + A\delta p^2\omega_1}{(1-\delta(1-p)^2)}, A\right\} \quad \text{and} \quad \omega_1 + \omega_2 > B.$$

   Both parties always prefer the extension model; Pareto optimality is established. The conditions require a sufficiently high ω_1 and a moderate ω_2.

6. *Both parties never leave* in the baseline and *both parties will leave* in the extension model

when

$$\omega_1 > A \quad \text{and} \quad \omega_2 > \max\left\{B - A, \min\left\{\frac{Ap + A\delta p^2\omega_1}{(1-\delta(1-p)^2)}, A\right\}\right\} \quad \text{and} \quad \omega_1 + \omega_2 > B.$$

Party 1 always prefers the extension model, while Party 2 always prefers the baseline model; parties' preferences for institutions diverge. The conditions require sufficiently high ω_1 and ω_2.

Rearranging these conditions derives the implications stated in Proposition 4. ∎

B Additional Extension 1: Extracting from Party 2

In this section, I relax the assumption on Party 1's choice of x. More specifically, I allow Party 1 to choose any $x \in \mathbb{R}$ instead of from an interval $[0,1]$. In particular, the negative value of x represents an *extraction* by Party 1. If Party 1 could set a negative x, i.e., demand $|x|$ amount from Party 2 in each period, will things play out differently? Party 1 does have a unilateral proposer power in the model, but technically Party 2 has a veto power in the sense that it can leave from the very first period in the maintenance stage. If he leaves in the first period, Party 2 will receive his draw in that period and the partnership will end, meaning that Party 1's "unfair" allocation of resources won't affect his payoff in any way. It follows from this reasoning that with negative x, Party 2 might leave right away, especially given that the minimum outside option payoff he can get is 0. However, the analysis shows that this may not be the case. To keep the model parsimonious, I assume a homogeneous outside option, i.e., $\omega = \omega_1 = \omega_2$. Below I summarize equilibrium outcomes and their conditions.

1. Party 1 offers $\omega(1-\delta)$ and *both parties never leave* in equilibrium. This is when

$$\omega < \min\left\{\frac{1}{2(1-\delta)}, \frac{p}{(1-d)(1-d(1-p)^2)}\right\}.$$

2. Party 1 offers $-\delta p\omega$ and *Party 2 will leave* in equilibrium. This is when

$$\frac{p}{(1-d)(1-d(1-p)^2)} < \omega < \frac{1-p}{1-\delta(1-p^2)}.$$

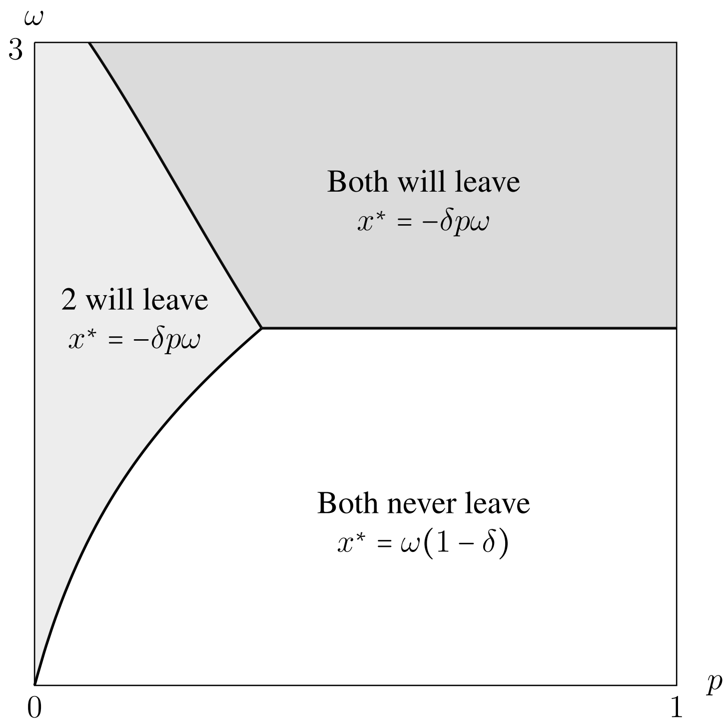


Figure B.1: Equilibrium Outcomes with Extraction
$\delta = 0.7$

3. Party 1 offers $-\delta p\omega$ and *both parties will leave* in equilibrium. This is when

$$\omega > \max\left\{\frac{1}{2(1-\delta)}, \frac{1-p}{1-\delta(1-p^2)}\right\}.$$

Figure B.1 illustrates the results. Somewhat surprisingly, we observe an equilibrium where Party 1 offers $x^* = -\delta p\omega < 0$ when ω is sufficiently high and Party 2 does not leave conditional on $\omega_2^t = 0$. In other words, even when Party 1 demands $|x|$ from Party 2, the partnership still lasts for a positive amount of period; this is because Party 2 is willing to pay the cost to wait for a potential high draw of outside option ω.

Results further show that parties are indeed more likely to leave the coalition in this version of the model, but only to a very small margin. As we see in Figure B.2, Party 2's behavior changes

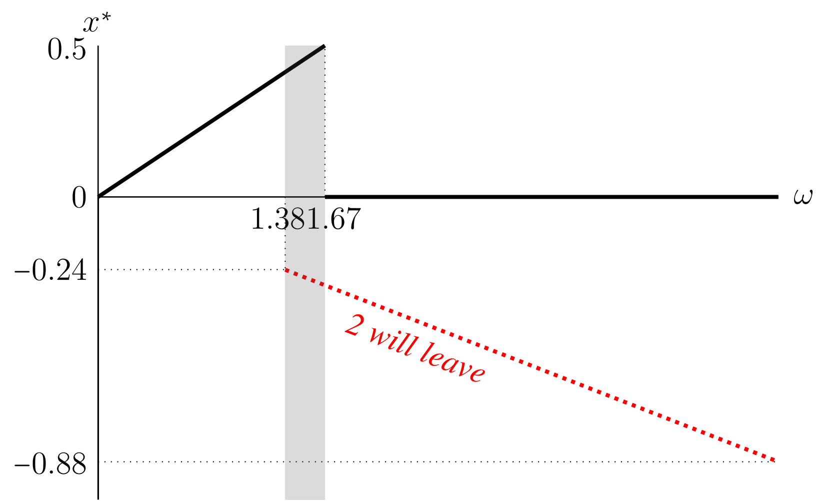


Figure B.2: Optimal Political Compromise
$\delta = 0.7$, $p = 0.25$

only in the gray region. Under these conditions, Party 2 never leaves in the baseline model but leaves after drawing a high outside option in this extension. However, Party 2's payoff is strictly worse off than in the baseline model because Party 1 can propose a negative x instead of 0.

C Additional Extension 2: Correlated Outside Options

In this extension, I relax the assumption on the *distribution* of outside option ω_i^t. Let r be the conditional probability of outside option draws $Pr(\omega_i^t = \omega | \omega_j^t = \omega)$, as can be seen in Table C.1. Positive correlation ($r > p$) means that if Party 1 draws ω_1 in a period, Party 2 is also more likely to receive that value and vice versa; if negatively correlated ($r < p$), a higher draw of outside option for Party 1 means that Party 2 is less likely to get one and vice versa. If $r = p$ the two are independent. I assume a homogeneous outside option.

	$\omega_2^t = 0$	$\omega_2^t = \omega$
$\omega_1^t = 0$	$1 - 2p + pr$	$p(1-r)$
$\omega_1^t = \omega$	$p(1-r)$	pr

Table C.1: Joint Distribution of Outside Option Draws

I summarize the equilibrium conditions below.

1. Party 1 offers $(1-\delta)\omega$ and *both parties never leave* in equilibrium. This is when

$$\omega \quad < \min\left\{\frac{1}{2(1-\delta)}, \frac{p}{(1-\delta)(1-\delta(1-p))}, \max\left\{\frac{1-r}{1-\delta(1-p)}, \frac{p(2-r)}{(1-\delta)(1-\delta+p+\delta p(2-r))}\right\}\right\}.$$

2. Party 1 offers $(1-\delta(1-p))\omega/(1-r)$ and *Party 1 will leave* in equilibrium. This is when

$$\frac{1}{2(1-\delta)} < \omega < \frac{1-r}{1-\delta(1-p)} \quad \text{and} \quad r \quad < 2 - \frac{1-\delta(1-p)^2}{p}.$$

3. Party 1 offers 0 and *Party 2 will leave* in equilibrium. This is when

$$\min\left\{\begin{array}{c}\frac{1}{2(1-\delta)},\\ \\ \frac{p}{(1-\delta)(1-\delta(1-p))}\end{array}\right\} < \omega < \max\left\{\begin{array}{c}\frac{1-r}{1-\delta(1-p)},\\ \\ \min\left\{\frac{1}{2(1-\delta)}, \frac{p(2-r)}{(1-\delta)(1-\delta+p+\delta p(2-r))}\right\}\end{array}\right\} \text{ and } r > 2 - \frac{1-\delta(1-p)^2}{p}.$$

4. Party 1 offers 0 and *both parties will leave* in equilibrium. This is when

$$\omega \quad > \max\left\{\frac{1-r}{1-\delta(1-p)}, \min\left\{\frac{1}{2(1-\delta)}, \frac{p(2-r)}{(1-\delta)(1-\delta+p+\delta p(2-r))}\right\}\right\}.$$

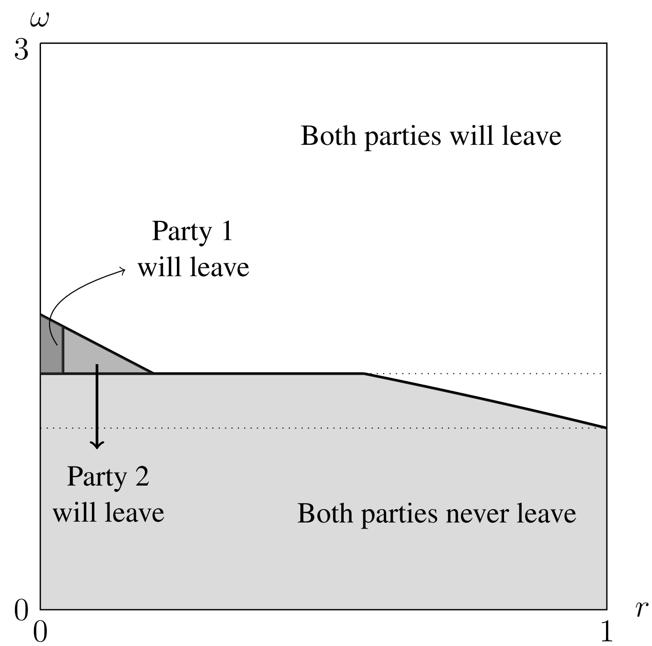


Figure C.3: Equilibrum Outcomes with Correlated Outside Options
$\delta = 0.6$, $p = 0.4$

Figure C.3 depicts the equilibrium outcomes in this version of the model. Note that the region between the two dotted lines in Figure C.3 denotes the area where the equilibrium changes from *both never leave* to *both will leave* as r increases. In other words, a more positive correlation between parties' outside options may lead to a *shorter* duration of agreement. This happens when:

$$\frac{p}{(1-\delta)(1+p-\delta(1-p))} < \omega < \min\left\{\frac{1}{2(1-\delta)}, \frac{p}{(1-\delta)(1-\delta(1-p))}\right\}.$$

Additionally, we see that there exists a region where parties are in agreement over r. Both parties are willing to increase r and let their outside options be more positively correlated when:

$$\omega \quad > \max\left\{\frac{1-r}{1-\delta(1-p)}, \min\left\{\frac{1}{2(1-\delta)}, \frac{p(2-r)}{(1-\delta)(1-\delta+p+\delta p(2-r))}\right\}\right\}.$$

One possible way is to interpret correlation parameter r as ideological diversity between parties, where high r means that parties have low ideological diversity and vice versa. In this regard, this result speaks to the studies on cabinet stability that examine the influence of a government's ideological diversity on its durability. While most works find a strong positive association between ideological polarization and the risk of cabinet termination (King et al., 1990; Laver and Schofield, 1998), some evidence conversely indicates a risk-increasing effect of minimal connected winning coalitions (Grofman, 1989; Saalfeld, 2008; Hellström and Bergman, 2011; Hu, 2014; Bergman, Ersson and Hellström, 2015; Krauss, 2018). This model implies that these mixed empirical results are expected when parties' outside option ω is sufficiently moderate; a coalition of "strange bedfellows" made up of ideologically divergent parties can in fact decrease the risk of breakdown.

D Additional Extension 3: Lower Breakdown Costs

I have assumed throughout the paper that a party's defection is always costly to the other party who had decided to stay. However, despite having faced a new election involuntarily due to the other party's defection, a party may still have a favorable prospect in the period or enjoy some positive externality (Allers, Rienks and de Natris, 2022; So, 2023). Taking this into account, I assume in this extension that a party can still draw his or her high outside option ω_i with probability p even when the other party has defected in the given period. The payoff matrix is as follows:

		Party 2	
		$a_2^t = 0$	$a_2^t = 1$
Party 1	$a_1^t = 0$	$(1-x, x)$	(ω_1^t, ω_2^t)
	$a_1^t = 1$	(ω_1^t, ω_2^t)	(ω_1^t, ω_2^t)

Table D.2: Payoff Structure in the Extension

I summarize the equilibrium conditions below.

1. Party 1 offers $x^\dagger$ and *both parties never leave* in equilibrium. This is when

$$\omega_2 < \frac{p(1-(1-\delta)p\omega_1)}{(1-\delta)(1-\delta(1-p))} \quad \text{and} \quad \omega_2 < \frac{1}{1-\delta} - \omega_1.$$

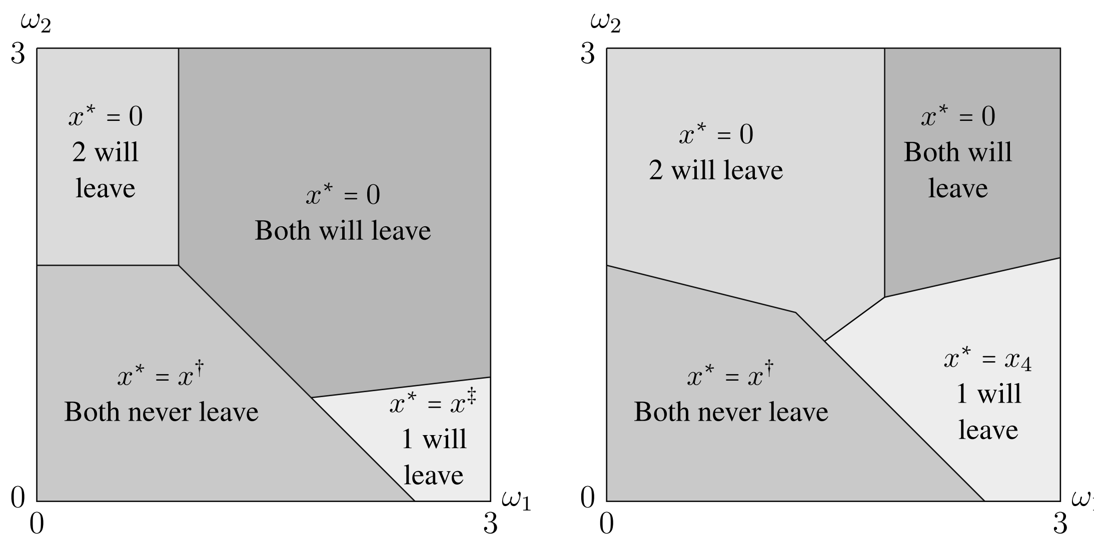
2. Party 1 offers 0 and *both parties will leave* in equilibrium. This is when

$$\omega_1 > \tfrac{1}{1-\delta(1-p+p^2)} \quad \text{and} \quad \omega_2 > \min\left\{\tfrac{1}{1-\delta(1-p+p^2)}, \tfrac{p(1+\delta p\omega_1)}{(1-\delta(1-p)^2)(1-\delta+\delta(1-p)p)}\right\}.$$

3. Party 1 offers $(1 - \delta(1 - p(1 - p)))\omega_2$ and *Party 1 will leave* in equilibrium. This is when

$$\frac{1}{1-\delta} - \omega_1 < \omega_2 < \min\left\{\frac{p(1-(1-\delta)p\omega_1)}{(1-\delta)(1-\delta(1-p))}, \frac{p(1+\delta p\omega_1)}{(1-\delta(1-p)^2)(1-\delta+\delta(1-p)p)}, \frac{p\omega_1}{1-\delta+\delta(1-p)p}\right\}.$$

4. Party 1 offers 0 and *Party 2 will leave* in equilibrium otherwise.



(a) Baseline Model

(b) Lower Breakdown Costs

Figure D.4: Comparison of Equilibrium Outcomes
$\delta = 0.6$, $p = 0.4$

Figure D.4 compares this extension with the baseline model where the defected party always receives 0. Intuitively, with the relaxed assumption, we observe that unilateral defection is more common than in the baseline model. This is coming from the fact that now parties are less induced to leave when the other party leaves since the party can still draw his or her high outside option with positive probability. Further note that $x^{\ddagger}$ is always greater than x_4. This is because it takes a larger offer to convince Party 2 to stay in the agreement, given his risk of receiving 0 after Party 1's defection.

E Additional Extension 4: Incorporating Audience Costs

In this extension, I add a parameter $c \in (0, \omega)$ that captures the audience cost that the defector incurs from abandoning the partnership. Below are the parties' payoffs in this version of the model; I assume homogeneous ω.

		Party 2: $a_2^t = 0$	Party 2: $a_2^t = 1$
Party 1	$a_1^t = 0$	$(1 - x, x)$	$(\omega^t, \omega^t - c)$
Party 1	$a_1^t = 1$	$(\omega^t - c, \omega^t)$	$(\omega^t - c, \omega^t - c)$

Table E.3: Payoff Structure with Audience Costs

Note that when we assume the payoff structure to be identical to the baseline model, adding c does not affect any of the equilibrium outcomes so long as c is not too high, as this simply increases the parties' disincentives to leave by c. In order to make the game non-trivially different from the baseline model, I adopt the payoff structure in Appendix D where parties have an incentive to wait and "free ride" on the opponent's decision to end the coalition even if a positive outside option is drawn. There are two types of subgame equilibrium multiplicity in this version:

1. Cases 1 and 2 may coexist. As in the baseline model, I assume that Case 1 prevails.

2. Cases 3 and 4 may coexist. The multiplicity range is symmetric around 1/2 with respect to x. Therefore, I assume that Case 3 prevails when $x > 1/2$ and Case 4 prevails when $x < 1/2$. In other words, a more dissatisfied party will leave in equilibrium.

I summarize the equilibrium conditions below.

1. Party 1 offers $(1-\delta)(\omega-c)$ and *both parties never leave* in equilibrium. This is when

$$\omega < \min\left\{\frac{c(-1+\delta)(1+\delta(-1+p))-p}{(-1+\delta)(-1+\delta(-1+p)+p^2)}, c+\frac{1}{2-2\delta}\right\}.$$

2. Party 1 offers 0 and *both parties will leave* in equilibrium. This is when

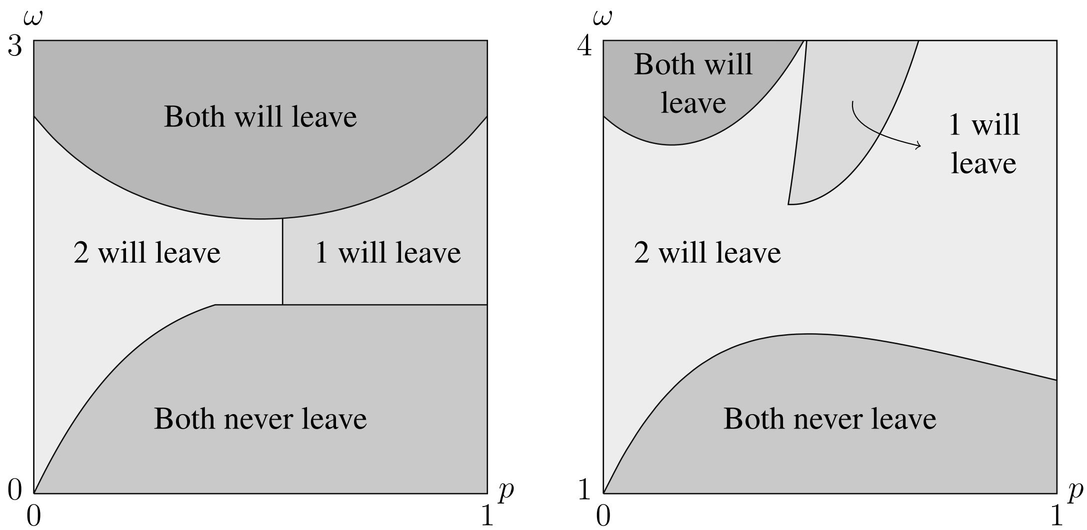
$$\omega > \frac{1+c+c\delta(-1+p)-p}{(-1+p)(-1+\delta+\delta(-1+p)p)}.$$

3. Party 1 offers $\left(\delta+\frac{1}{-1+p}\right)+(1-\delta(1-p(1-p)))\omega$ or $\frac{1}{2}$ and *Party 1 will leave* in equilibrium. This is when

$$\max\left\{-\frac{c}{-1+p}+\frac{1}{2p}, c+\frac{1}{2-2\delta}\right\} < \omega < \frac{1+c+c\delta(-1+p)-p}{(-1+p)(-1+\delta+\delta(-1+p)p)} \quad \text{and} \quad c > \frac{(-1+\delta+p+\delta(-1+p)p)\omega}{-1+\delta}.$$

4. Party 1 offers 0 and *Party 2 will leave* in equilibrium otherwise.

Figure E.5 illustrates the above result. First, Figure E.5a assumes zero cost of defecting $c = 0$. Note that the figure is different from the baseline model because of the 1) homogeneous ω assumption and 2) relaxed assumption on what parties receive given the other party's defection (payoff structure in Appendix D). Our equilibrium of interest—the buyout equilibrium—still exists in this version, more specifically when outside option ω is moderate and the probability of drawing such outside option p is high. Moderate ω, although convoluted because it represents the outside option of both parties, captures the intuition that the outside option is not too low that Party 1 wants to leave but is not too high that Party 1 can persuade Party 2 not to leave. Sufficiently high p further increases Party 1's incentive to leave.



(a) No cost ($c = 0$) (b) Audience cost ($c = 1$)

Figure E.5: Comparison of Equilibrium Outcomes
$\delta = 0.6$

In Figure E.5b where the cost of leaving c is 1, we observe that the results are qualitatively consistent with the baseline model, with changes to the equilibrium results in the expected direction. Notably, the region where Party 1 proposes $x = 0$ and Party 2 leaves increases. This is because Party 1 is generally less incentivized to offer a compromise to Party 2, as the presence of the audience cost deters Party 2 from defecting to a certain degree. Party 2, following an offer of 0, leaves after he draws a favorable outside option. The buyout equilibrium is also present in this version. Now, outside option ω has to be higher to sustain this equilibrium, as Party 1 also has to pay the cost $c = 1$ in order to leave; probability p needs to be moderate, as Party 1 is reluctant to offer Party 2 anything when p is low and she is unable to persuade Party 2 to stay if it is too high. Other results are in accordance with the baseline model.

F Additional Extension 5: Incorporating Renegotiation

In this section, I allow Party 1 to make a second offer x' to Party 2 when he unilaterally announces that he will leave. I assume homogeneous ω; I further fix $\delta = 0.6$ and $p = 0.4$ for tractability. If Party 2 accepts the offer, each party receives $(1 - x', x')$, and the game proceeds to the maintenance stage governed by a new allocation of x'. Renegotiation succeeds with probability σ; with probability $1 - \sigma$, the game immediately ends as in the baseline model. As σ tends to zero, this extension becomes equivalent to the baseline model without renegotiation. As σ increases, renegotiation is more likely to succeed.

I solve this extension by backward induction. I first examine what the optimal offer by Party 1 and the corresponding subgame equilibrium is given that Party 2 decides to leave. Then, I analyze what the initial offer of Party 1 will be given that Party 2 can ask for renegotiation later in the bargaining process. If Party 2 announces to leave after drawing ω, Party 2 accepts the new offer x' if $x' + \delta\widehat{W}(x') > \omega$ where $\widehat{W}$ is the continuation value of renegotiation outcome given x'. If Party 2 announces to leave after drawing 0, Party 2 accepts new offer x' since $x' + \delta\widehat{W}(x') > 0$. It is always better for Party 1 to achieve any renegotiation since $1 - x' + \delta\widehat{V}(x') > 0$; in addition, Party 1 aims to maximize the LHS conditional on acceptance.

It follows that Party 1 always has the incentive to renegotiate because it is always better to prolong the game for at least one more period than to end the game with a zero payoff. Therefore, the feasibility of renegotiation solely depends on the existence of new x' that can convince Party 2 with a positive outside option to stay. I summarize the equilibrium conditions below.

1. Party 1 offers $x^\dagger$ and *both parties never leave* in equilibrium. This is when

$$\omega_2 < \min\left\{\frac{5-2\omega_2}{2}, \max\left\{\frac{25(1-\sigma)}{2(8-5\sigma)}, \min\left\{\frac{15}{16}, \frac{60-15\omega_1}{49}\right\}\right\}\right\}.$$

2. Party 1 offers 0 and *Party 2 will leave* in equilibrium; after renegotiation, Party 1 offers $x^\dagger$ and *both parties never leave*. This is when

$$\max\left\{\frac{25(1-\sigma)}{2(8-5\sigma)}, \min\left\{\frac{15}{16}, \frac{60-15\omega_1}{49}\right\}\right\} < \omega_2 < \frac{5-2\omega_1}{2}.$$

3. Party 1 offers 0 and *Party 2 will leave* in equilibrium; after renegotiation, Party 1 offers $\widetilde{x} \equiv 68\omega_2/125$ and *both parties will leave*. This is when

$$\frac{5-2\omega_1}{2} < \omega_2 < \min\left\{\frac{125}{68}, \frac{735-384\omega_1+25\sigma(25+6\omega_1)}{340\sigma}\right\}.$$

4. Party 1 offers 0 and *Party 2 will leave* in equilibrium; there is no counteroffer. This is when

$$\omega_2 > \max\left\{\frac{125}{68}, \frac{5-2\omega_1}{2}\right\} \quad \text{and} \quad \omega_1 < \frac{15}{16}.$$

5. Party 1 offers $\widehat{x} \equiv 16(5+2\sigma)\omega_2/75$ and *Party 1 will leave* in equilibrium. This is when

$$\frac{5-2\omega_1}{2} < \omega_2 < \max\left\{\begin{array}{l} \min\left\{\frac{75(1-\sigma)(25+6\omega_1)}{3920-432\sigma}, \frac{675+162\omega_1}{2288}\right\}, \\ \min\left\{\frac{375(1-\sigma)(25+6\omega_1)}{4352(5-3\sigma)}, \frac{675+162\omega_1}{3920}\right\} \end{array}\right\}.$$

6. Party 1 offers $x^{\ddagger}$ and *Party 1 will leave* in equilibrium. This is when

$$\max\left\{\frac{5-2\omega_1}{2}, \frac{675+162\omega_1}{2288}\right\} < \omega_2 < \frac{15(49-40\sigma)(25+6\omega_1)}{38416-8160\sigma}.$$

7. Party 1 offers $\bar{x} \equiv 2(227\sigma - 45)/375$ and *both parties will leave* in equilibrium; after renegotiation, Party 1 offers $x^{\ddagger}$ and *Party 1 will leave*. This is when

$$\max\left\{\frac{5-2\omega_1}{2}, \frac{375(1-\sigma)(25+6\omega_1)}{4352(5-3\sigma)}\right\} < \omega_2 < \frac{675+162\omega_1}{3920}.$$

8. Party 1 offers 0 and *both parties will leave* in equilibrium; after renegotiation, Party 1 offers $x^{\ddagger}$ and *Party 1 will leave* after renegotiation. This is when

$$\max\left\{\frac{5-2\omega_1}{2}, \frac{675+162\omega_1}{3920}, \frac{75(1-\sigma)(25+6\omega_1)}{3920-432\sigma}\right\} < \omega_2 < \frac{675+162\omega_1}{2288}.$$

9. Party 1 offers 0 and *both parties will leave* in equilibrium; after renegotiation, Party 1 offers $\widetilde{x}$ and *both parties will leave*. This is when

$$\max\left\{\begin{array}{c} \frac{5-2\omega_1}{2}, \frac{735-384\omega_1+25\sigma(25+6\omega_1)}{340\sigma}, \\ \frac{675+162\omega_1}{2288}, \frac{15(49-40\sigma)(25+6\omega_1)}{38416-8160\sigma} \end{array}\right\} < \omega_2 < \frac{125}{68}.$$

10. Party 1 offers 0 and *both parties will leave* in equilibrium given $x^* = 0$; there is no counteroffer. This is when

$$\omega_2 > \frac{125}{68} \quad \text{and} \quad \omega_1 > \frac{15}{16}.$$

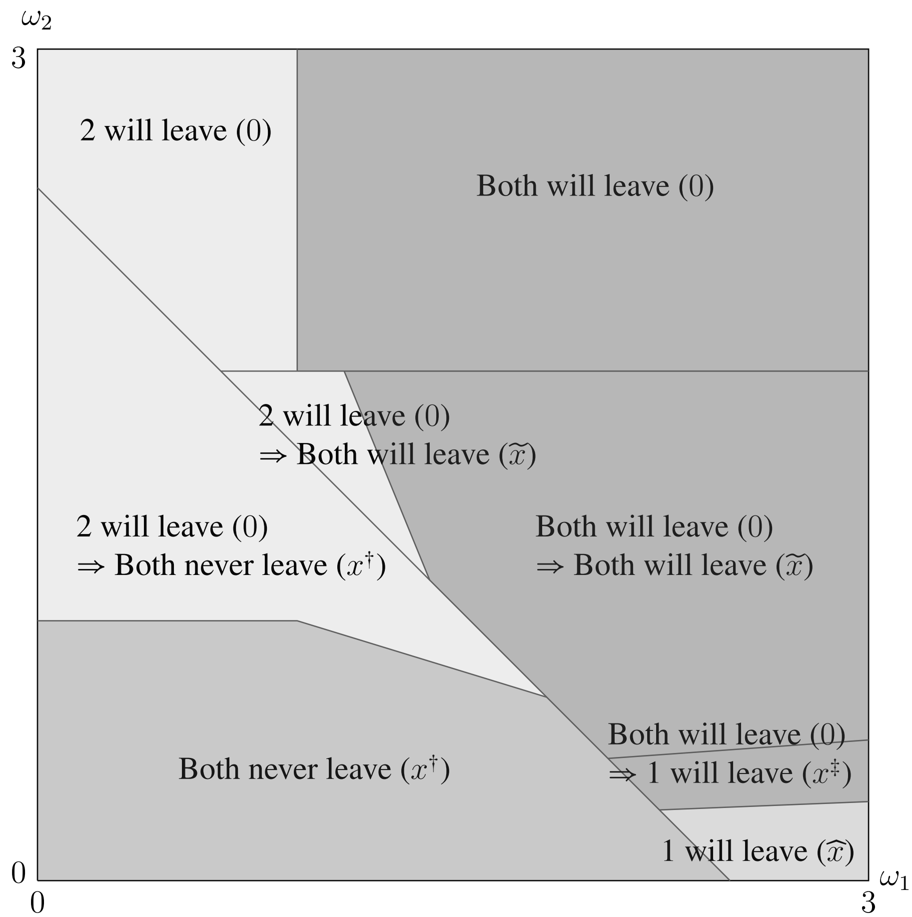


Figure F.6: Equilibrium Outcomes with Renegotiation
$\delta = 0.6, \sigma = 0.8$

Figure F.6 illustrates Party 1's optimal offer in both the initial bargaining stage and the renegotiation stage, as well as the corresponding equilibrium outcomes. Equilibria with the same initial bargaining outcomes are colored in the same shade. As expected, Party 1 offers 0 more often in this extension since she can simply offer more to Party 2 *after* Party 2 announces to leave. Successful renegotiation with $x' > 0$ after an initial offer of 0 occurs when Party 2's outside option ω_2 is moderate. Further notice that the logic of the buyout equilibrium is still present. When ω_1 is sufficiently high relative to ω_2, Party 1 in equilibrium concedes to Party 2 but leaves after drawing a high outside option. With renegotiation, however, there exists an additional equilibrium where Party 1 "buys" Party 2's cooperation only after renegotiation.

G Additional Extension 6: Continuous Outside Options

In this section, I re-solve the baseline model and the main extension (where Party 1 can also leave the agreement) using a continuous distribution and show that the results extend outside the Bernoulli distribution setting. I set ω_i to be distributed continuously according to a Normal(μ, σ) distribution. I choose Normal distribution as a conservative test to examine if the results still hold for an unbounded and continuous distribution. Unfortunately, we are unable to get closed-form solutions with the distribution; I instead run simulations and report numerical solutions to provide insight into how the parameters in my model affect the equilibrium behavior of parties. Specifically, I examine the effect of changes in mean μ, which best represents the changes in the size of outside options. We first know that

1. Party 1 leaves when $1 - x + \delta V < \omega_1^t$,
2. Party 2 leaves when $x + \delta W < \omega_2^t$.

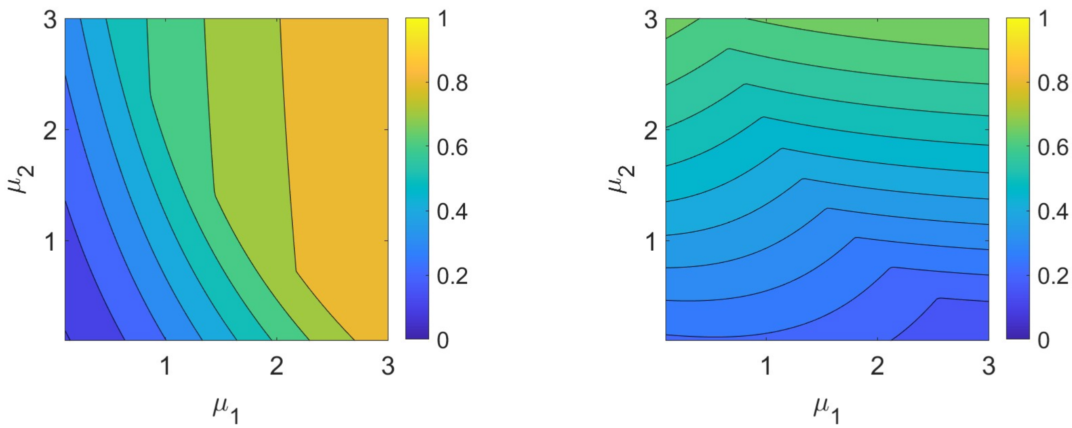
With the distributional assumption, the probability that each party leaves can be expressed as

$$P = 1 - \Phi(1 - x + \delta V; \mu_1, \sigma) \quad \text{and}$$
$$Q = 1 - \Phi(x + \delta W; \mu_2, \sigma),$$

where Φ is the cumulative density function (CDF) of Normal distribution given μ_i and σ. In equilibrium, continuation value V and W must satisfy the following Bellman equations:

$$V = (1 - P)(1 - x + \delta V) + P \cdot E[\omega_1 | \omega_1 > 1 - x + \delta V] \quad \text{and}$$
$$W = (1 - Q)(x + \delta W) + Q \cdot E[\omega_2 | \omega_2 > x + \delta W].$$

Below I provide numerical results for parameter values $\delta = 0.6$ and $\sigma = 1$.



(a) Probability that Party 1 Leaves

(b) Probability that Party 2 Leaves

Figure G.7: Probability that Parties Leave
$\delta = 0.6, \sigma = 1$

First, note that by assuming that outside options are normally distributed, draws of outside options can be infinitely large numbers. Equilibria where parties never leave are therefore impossible because there is always a positive probability that the outside option is better than what Party 1 can offer.[3] Otherwise, however, the main dynamics of the game do not largely change relative to the baseline model. From Figure G.7a and G.7b, we can see that when μ_1 and μ_2 are both low, the probability of leaving is low for both parties (which is the region where *both parties never leave* in the baseline model; see Figure 4). When μ_1 is high but μ_2 is low, the probability of leaving is high for Party 1 but low for Party 2 (*Party 1 will leave* in the baseline model). When μ_1 is low but μ_2 is high, the probability of leaving is low for Party 1 but high for Party 2 (*Party 2 will leave* in the baseline model). Lastly, when μ_1 and μ_2 are both high, the probability of leaving is high for both parties (*both will leave* in the baseline model).

[3] See Kayser (2005) for a model of strategic election timing that uses a dynamic optimal stopping problem with continuous shocks.