Personal Power Dynamics in Bargaining*

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Abstract

We study bargaining between a fixed agenda-setter and responder over successive issues. If the responder rejects the setter's proposal, the setter can attempt to *assert her will* to implement her ideal and will succeed with a probability that depends on her "personal power". Players learn about the setter's power as gridlock persists. Gridlock occurs when the setter's perceived power is either too high or too low, and the players reach compromise when the setter has moderate personal power. The presence of "difficult" issues can induce more compromise as the players have incentives to avoid testing the setter's power.

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"Macht bedeutet jede Chance, innerhalb einer sozialen Beziehung den eigenen Willen auch gegen Widerstreben durchzusetzen[. . .]" (Power means every chance within a social relationship to assert one's will even against opposition[. . .]) - Weber (1922)

1 Introduction

What does it mean for a decision maker to have power? To answer this question, the theoretical literature has long focused on the ability of agenda-setting, at least since the seminal works by Black (1958), Farquharson (1969), and Romer and Rosenthal (1978). In this literature, the power of the agenda-setter is derived from his institutional position — for example, in both the US House of Representatives and the UK House of Commons, the agenda is controlled by the party in power, and a bill that is not supported by a majority of that party is virtually never put on the agenda (Cox, 2001). However, there is another source of power which, like agenda-setting power, is derived from the decision maker's institutional position, but has not been investigated in the literature. It is the ability to cajole, lobby, persuade, or "go above the responder's head" to get a proposal passed. Unlike agenda-setting power, it is derived mostly from the decision maker's personal attributes and abilities. The management literature has defined it as *personal power* to contrast it from the power derived from the position, or *position power* (Yukl, 1989). In this paper, we provide a theoretical framework of personal power and investigate its effect on decision-making processes.

Lincoln's effort to get the 13th amendment passed in the House of Representatives is an example of the interplay between position power and personal power. As Burlingame (2013) reports, in mid-January 1865, Lincoln told a pair of house members that additional votes "needed to be obtained by hook and crook" to obtain the required two-thirds majority. Opponents understood Lincoln's power of forcing representatives to vote in favor of the amendment: "The wish or order of the President is very potent. He can punish and reward." In terms of the opening quote from Max Weber, Lincoln was very effective at using power in the sense of asserting his will even against opposition. While one part of Lincoln's power was clearly based on his position as president, a president's personal ability to exercise power also matters. In contrast, his predecessor James Buchanan had the same position power, but was not as skilled in using the power of the office. Using the above terminology, his personal power was low and he is therefore consistently ranked among the least effective presidents in U.S. history.[1]

A crucial characteristic of personal power is that there exists *uncertainty* about its effectiveness, so agents must form perceptions about it. For example, US presidents are elected based on expectations about performance, but actual accomplishments depend on factors such as the appointed cabinet, or coalitions formed. Such skills are uncertain to both the elected president and voters, and revealed over time. The managerial literature on leadership points out that solving problems successfully increases the perceived power of the leader, while failure reduces it (Hollander, 1978). This implies an inherently dynamic component to the perception of an agenda-setter's personal power that depends on failures and successes. In the presidential context, this dynamic perception is reflected in approval ratings, which often decrease over time, and increase with positive events such as legislative or military successes. Given this dynamic process, when choosing whether or not to assert his will, an agenda-setter may take into account the likelihood of success or failure on the dynamics of perceived power, which in turn affects future outcomes. In this setting, we ask the following questions: (i) How does perceived agenda-setter personal power affect the political decision-making process and policy outcomes? (ii) To what extent does the contentiousness of an issue affect the dynamics of perceived agenda-setter power?

To answer these questions, we present a stylized model of dynamic bargaining with a hierarchical difference between players. An agenda-setter (*setter* hereafter) and a responder bargain over successive issues over an infinite horizon. In the political context, an issue may be part of the President's agenda, such as immigration reform, addressing climate change or foreign policy. Outside the political context, an example is the chair of an academic department making proposals to faculty. At each meeting, a curriculum change, hire, promotion, or other issue may arise and must be bargained over. Time is continuous and a new issue arises with some probability in an interval of time. For simplicity, each issue has at most three possible outcomes: The setter's ideal, the status quo (the responder's most preferred outcome), and a compromise outcome (second most preferred outcome for both players). There are two types of policy issues that differ in the degree of contentiousness: An issue is "easy" if all three outcomes are possible; an issue is "difficult" if the compromise outcome does not exist.

[1]Siena College Research Institute, Siena's 6th Presidential Expert Poll 1982-2018, Retrieved from https://scri.siena.edu/2019/02/13/sienas-6th-Presidential-expert-poll-1982-2018

Once an issue arrives, the setter puts a proposal on the table. The responder can accept at any point in time, or simply wait. A key assumption in the model is that if the responder does not accept the proposal, the setter has an opportunity to *assert her will* and have her ideal implemented. Whether or not she is successful at asserting her will depends on her unknown personal power. A setter's personal power can only be known in the context of a particular institution, and the position power that this institution provides to the setter. For example, prior to Lincoln becoming President, it was unknown whether or not he would be able to use the power of the office effectively. Consistent with this observation, we assume both the setter and responder are symmetrically unaware of the setter's power at the start of the game. Whenever the setter asserts her will successfully, symmetric learning about the setter's power occurs. A powerful setter will succeed in asserting her will with some probability, while a powerless setter will never be successful.

The time interval over which the responder rejects and the setter fails to force acceptance is referred to as a period of *gridlock*. At any point in time, the setter can replace the existing proposal with another one during this period of gridlock. Time runs out when a new issue arrives, which occurs with some probability. If a new issue arrives with no agreement on the old issue, then the status quo prevails for the old issue.

Learning about the setter's power to successfully assert her will is modeled in the spirit of the exponential bandit literature (Keller *et al.*, 2005). There is a common prior belief that the setter is powerful. While the setter is attempting to assert her will, the belief decreases as long as she is unsuccessful. If the setter succeeds in asserting her will (by implementing her ideal), then the setter and responder know that she is powerful for certain and the belief jumps to one. We refer to the belief that the setter is powerful as the setter's level of (personal) power. The setter's power evolves over time as players learn during the period of gridlock.

We first analyze a game in which all issues are easy (i.e., there are three possible bargaining outcomes). We show that there is a unique Markov perfect equilibrium in which players choose to compromise on issues for an intermediate range of beliefs. That is, compromise is possible if the setter is neither too powerful nor too weak. As is standard in the bandit literature, the upper bound on the belief is driven by the setter's "exploitation" versus "exploration" tradeoff. In equilibrium, the responder accepts the compromise offer when the level of power is high, in which case the compromise endogenously becomes a "safe" alternative for the setter. The safe alternative may be exploited, or the risky alternative (proposing her ideal) may be explored. The lower bound on the belief is driven by the responder's incentives. When the setter is sufficiently powerless, the responder knows it is unlikely that the setter can implement her ideal. Therefore, the responder never accepts a compromise proposal, effectively eliminating the "safe" alternative of the setter. Given this, the setter seeks to assert her will on every issue, because she has nothing to lose – there is a small probability that she is successful, and discovers that she is powerful.

We then consider a model in which difficult issues arise with some probability. Recall that an issue is difficult if the compromise outcome does not exist, and thus the players must agree on either the status quo or the setter's ideal. In this case, we show that two types of equilibria exist. In both types of equilibria, behavior under the easy issues does not change: the players agree on the compromise outcome when the setter's power is in the intermediate range. Under difficult issues, however, the equilibrium behavior differs qualitatively between the two equilibria, which we call *gridlock equilibrium* and *avoiding-the-issue equilibrium*.

In the gridlock equilibrium, the setter always proposes her ideal so there is always gridlock (and learning) when a difficult issue arrives. Therefore, even if beliefs are in the interval where compromise is implemented for easy issues, the players eventually move out of the compromise region. From this point onward gridlock ensues even for easy issues and learning continues, unless the setter is successful at asserting her will. This helps to explain why gridlock may arise for issues that may allow compromise: As the setter's weakness becomes more evident during the difficult issue, the players no longer wish to compromise. As an example, President Truman was regarded as weak by the end of his presidency, and was unable to pass civil rights legislation.[2] In spite of Truman's failures, his successor, President Eisenhower, passed the Civil Rights Acts of 1957 and 1960 with bi-partisan support.

In contrast, in the avoiding-the-issue equilibrium, the setter stops demanding her ideal at the lower bound of the compromise interval. Since the setter knows that further gridlock will push the belief out of the compromise interval—leading to gridlock even for easy issues—she decides to "avoid the current issue" and propose the responder's ideal. As a result, long-run compromise ensues once the belief hits the compromise boundary. As an example, George W.

[2] See Mueller (1970), and *Who Had the Lowest Gallup Presidential Job Approval Rating?*, by Jeffrey M. Jones, Retrieved from https://news.gallup.com/poll/272765/lowest-gallup-presidential-job-approval-rating.aspx

Bush attempted to pass immigration reform—a divisive issue. After no success, and declining approval ratings, he eventually gave up and moved on to balancing the budget near the end of his presidency.

One may expect that the presence of difficult issues makes compromise harder, but this is not always the case. We show that when either difficult or easy issues can occur with positive probability, gridlock may become less frequent. To see this, observe that the absence of gridlock on difficult issues results in the responder's most preferred outcome—the status quo. Thus, even if the belief about the setter's personal power is low, the responder may be willing to compromise on easy issues, because by not doing so he would lose out on the benefit of the status quo when difficult issues arise. Further, the possibility of easy issues helps to avoid gridlock for difficult issues. If all issues were difficult, permanent gridlock would arise as the players have no reason to compromise. However, the prospect of future easy issues provides the setter an incentive to compromise on difficult issues in order to remain in the compromise interval, and avoid permanent gridlock.

Literature Review

There is an extensive literature on dynamic legislative bargaining, now summarized in Eraslan *et al.* (2022). As in Diermeier and Fong (2011) (and Romer and Rosenthal (1979) in a static setting), we assume that there is a designated agenda setter. This assumption allows us to focus on learning about the type of only one of the players. In contrast, Baron and Ferejohn (1989, 1987) consider the case of a decentralized committee in which each member can be selected to be the agenda setter. These models have been extended to multidimensional policy spaces by Banks and Duggan (2000, 2006), and to dynamic bargaining (c.f., Baron (1996), Kalandrakis (2004), Duggan and Kalandrakis (2012), Bowen and Zahran (2012)). To link policies over time, these models assume that once a policy is enacted it determines the status quo for the next period. In our model, the status quo payoff is exogenous and fixed, but the belief about the setter's type links issues through time. This allows us to clearly identify the effects of learning in the bargaining process.

The choice between a risky proposal (the setter's ideal) and a safe alternative (the compromise outcome) is modeled as a bandit problem in the spirit of Keller *et al.* (2005). In this sense, this project is related to the growing literature on collective experimentation and voting rules, including Strulovici (2010), Gieczewski and Kosterina (2020) and Anesi and Bowen (2021).

Like ours, these papers study the interaction between collective choice and experimentation, however, what is uncertain in our paper is the bargaining ability of the setter. In equilibrium, the setter's ideal action can be considered the risky alternative, while the compromise outcome is the safe alternative. Interestingly, the setter and responder have opposing incentives to experiment. This generates the possibility for an intermediate interval of beliefs such that the safe alternative is implemented. In this interval experimentation is too risky for the setter, while not conveying enough information for the responder to trigger it. Other papers considering policy experimentation and collective choice include Majumdar and Mukand (2004), Volden *et al.* (2008), Cai and Treisman (2009), Callander (2011), Callander and Hummel (2014), Millner *et al.* (2014), Hirsch (2016) and Freer *et al.* (2020). Callander and Hummel (2014) consider a case in which a political party preemptively experiments on policy to affect future decisions of the opposition party. Our paper differs because in our model agents do not learn the type of the policy, but the strength of the setter which endogenously determines the future outcome.

The existing literature on bargaining with incomplete information (Fudenberg *et al.*, 1985; Abreu and Gul, 2000; Deneckere and Liang, 2006; Lee and Liu, 2013) typically focuses on the effect of private information of bargainer(s). In these models, a rejection by the informed bargainer signals that the bargainer has a higher reservation value. In contrast, in our paper players are symmetrically uninformed about the setter's ability and their conflicts over policy induces social learning. Uncertainty about the bargaining strength of agents has been previously proposed as a rationale for delay in bargaining. This has been explored in the seminal works of Admati and Perry (1987), Cramton (1992) and more recently by Friedenberg (2019). We do not seek to explain delay in this paper, but rather we seek to explain when we expect compromise to arise, or when we expect a challenge to ensue. Our model features delay in the sense that gridlock exogenously implies some delay relative to agreeing to a policy proposal immediately.

Theoretically our paper is also related to a rich literature in continuous time bargaining models, including Ortner (2019); Perry and Reny (1993). Ortner (2019) is closely related as, similar to us, the effect of evolving setter power on bargaining outcomes is considered. Ortner (2019) considers a single issue, whereas we consider multiple. In addition, unlike Ortner (2019), our model features endogenous evolution of proposal power as gridlock is chosen. The setter and responder must therefore consider the trade-off between fighting for their preferred issue (which will imply learning about setter strength) and settling for a less preferred outcome. In earlier work, Powell (2004) also takes up the question of endogenous evolution of setter power, but in a discrete time setting with effectively a single issue being considered.

The remainder of the paper is organized as follows. Section 2 presents the baseline dynamic bargaining model and Section 3 calculates dynamic payoffs for setter and responder for two benchmark outcomes. Section 4 characterizes the equilibrium of the dynamic model and establishes existence of the compromise interval of beliefs. Section 5 extends the baseline model to include the possibility of difficult issues and shows that these can introduce learning that forces players into permanent gridlock or permanent compromise. Section 6 concludes. All proofs are relegated to the Appendix.

2 Model

We present a stylized model of bargaining over an infinite sequence of issues between an agenda-setter S (e.g., President or department chair) and a responder R (e.g., Congress or faculty). We assume that time is continuous $t \in [0, \infty)$ and new issues arise at random times. In particular, in any interval of time $[t, t + dt)$, a new issue arrives with probability $1 - e^{-\xi dt} \approx \xi dt$. Since ξ governs the speed at which new issues arrive, we interpret this as the *velocity* of the institution. At most one issue is bargained over at any time. Therefore, if a new issue arrives while the present issue is not resolved, then the status quo is implemented for the present issue, which is then abandoned.

The game proceeds as follows. At each instant, the setter makes a proposal $x \in X \subseteq \{x_0, x_c, x_s\}$ for the issue at hand. We denote x_0 as the exogenous status quo position, x_c as the compromise outcome, and x_s as the setter's preferred option. After a proposal is made, the responder chooses to accept or reject the proposal. If the proposal is accepted, it is implemented immediately and the players receive payoffs. If the proposal is rejected, then the setter can choose to *assert her will* or allow the status quo to be implemented immediately.[3] If the setter chooses to assert her will then a stochastic outcome is realized—which we describe in detail in the next paragraph—and then a new issue stochastically arrives. Figure 1 depicts a heuristic timeline within an interval $[t, t + dt)$.

[3]The terminology of "asserting one's will" is from Weber (1922), quoted in the beginning of the introduction of this paper.

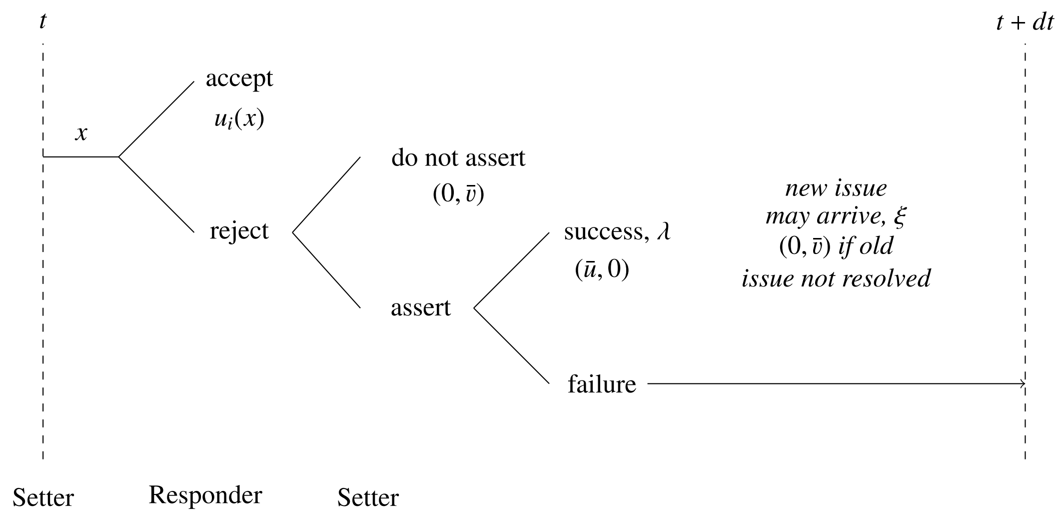

Figure 1: Heuristic timeline within an interval $[t, t + dt)$

We model the outcome of the setter's attempt to assert her will as an exponential bandit in the spirit of Keller *et al.* (2005). If the setter chooses to assert her will, then her success at implementing her ideal x_s depends on her type $\theta \in \{0, 1\}$. We say that if the setter is *powerful* or $\theta = 1$, then she is successful at asserting her will with probability $1 - e^{-\lambda dt} \approx \lambda dt$ over time interval $[t, t + dt)$. If the setter is *powerless* then she is never successful at asserting her will. Note that λ governs the setter's probability of success conditional on being powerful. We thus think of λ as related to institutional features (such as access to powerful committees), and thus captures position power.[4] The common prior probability that the setter is powerful is p_0. We refer to the posterior p_t as the setter's level of *perceived personal power* (or simply *power*) at time t.[5]

Players receive payoffs $u_S(x)$ and $u_R(x)$ when position x is implemented for each issue. We assume that R strictly prefers x_0 to x_s, and, similarly, S strictly prefers x_s to x_0. We assume that $u_S(x_0) = u_R(x_s) = 0$.[6] Also, let $u_S(x_s) = \bar{u}$, $u_S(x_c) = u_c$, $u_R(x_0) = \bar{v}$ and $u_R(x_c) = v_c$, where

[4] In the case of House Speaker, Cooper and Brady (1981) describe how leadership style moved from hierarchical to bargaining, suggesting that λ may have decreased over time.

[5] The way we model "asserting her will" parallels Lee and Liu (2013). They also assume the setter has two types and a powerful setter has higher probability of successfully extracting higher outside payment in the event of no disagreement. Lee and Liu (2013) focus on one-sided learning, whereas we focus on two-sided learning in a simpler setting.

[6] The results of this paper are robust to the case in which $u_S(x_0)$ and $u_R(x_s)$ are not too high. If either is sufficiently high, then the players may agree on their worst outcome to reduce the bargaining delay.

$0 < u_c < \bar{u}$ and $0 < v_c < \bar{v}$.[7,8] Note that x_c is considered a compromise proposal because it is the second-ranked outcome for both players. Finally, utility is discounted at a rate $r > 0$ and players maximize discounted sums of payoffs from all issues bargained over.

Learning If the responder accepts the setter's offer, or if the setter decides not to assert her will, then there is no learning about the setter's type and beliefs are unchanged. If the responder rejects the offer and the setter attempts to assert her will, the belief changes depending on the outcome of the attempt. If the setter succeeds in asserting her will, then her perceived power jumps to one and there is no learning thereafter. In other words, "good" news is conclusive. As the setter attempts to assert her will without success, then players become more pessimistic about the setter's power. Formally, while the setter is asserting her will (and there is gridlock), the belief that the setter is powerful changes on the time interval $[t, t + dt)$ via Bayes' rule:

$$p_{t+dt} = \frac{p_t(1 - \lambda dt)}{p_t(1 - \lambda dt) + (1 - p_t)}. \tag{1}$$

Simplifying (1) implies that the power dynamics during gridlock follows $dp = -\lambda p(1 - p)dt$.

Markov Strategies We restrict attention to pure Markovian strategies where the state of the game at period t is given by the setter's power p_t. Denote an offer strategy for the setter as $\chi : [0, 1] \to X$ which maps a power level p_t into a proposal in X. An acceptance strategy for the responder is a correspondence $A : [0, 1] \rightrightarrows X$ that gives the set of proposals which the responder will accept given the state p_t. Finally the setter's strategies of whether or not to "assert his will" is given by $\beta : [0, 1] \times X \to \{0, 1\}$, where 1 indicates that the decision to assert her will.

To ensure that strategies are well-defined in the continuous-time setting, we assume *admissability* in the sense of Klein and Rady (2011).[9] We consider Markov perfect equilibria which are subgame perfect equilibria in which players use Markov strategies. Also, we restrict attention

[7] We assume the status quo as the responder's most preferred outcome. The 13th Amendment example in the Introduction fits this assumption, as Lincoln attempted to assert his will to change the status quo. Without this assumption, the equilibrium outcome is straightforward. For example, if the status quo is x_s or an outcome worse for the responder than the x_s, then the setter always offers x_s, and the responder always accepts it immediately. If the status quo is the compromise then this case is equivalent to "difficult issues" analyze in Section 5. In the absence of "easy issues" there is permanent gridlock.

[8] Note that commonly used utility functions satisfy these minimal assumptions. For example $u_i(x) = -(x - x_i)^2$ with $x \in \mathbb{R}$, $x_0 < x_s$, $x_R = x_0$, $x_c \in (x_0, x_s)$.

[9] A strategy profile $\{\chi, A, \beta\}$ is *admissable* if there exists at least one well-defined solution to the corresponding

to equilibria in which the responder accepts proposals when indifferent.[10] We refer to a Markov perfect equilibrium with the above restrictions as simply an *equilibrium*.

3 Benchmark outcomes

Before proceeding to the equilibrium analysis we consider two benchmark outcomes and corresponding dynamic payoffs. It is yet to be determined that these outcomes occur in equilibrium. For now we construct the payoffs and later in Section 4 show that these are equilibrium payoffs for some values of p.

3.1 Long-run gridlock

First consider the case in which there is long-run gridlock. In this outcome, the setter proposes her ideal x_s at each instant, this is rejected by the responder, and the setter then chooses to assert her will. Gridlock induces learning in this outcome. If the setter is successful, then both players know the setter is powerful and learning ceases, and the setter continues to assert her will. We denote by $V_{i,g}(p)$ the value function under the long-run gridlock for player $i \in \{R, S\}$.

Suppose first that the setter is known to be powerful, i.e., $p = 1$. Fix a time interval $[t, t + dt)$ with a small $dt > 0$. If gridlock occurs in the time interval $[t, t + dt)$, the setter succeeds in asserting her will with probability λdt, in which case the setter and the responder obtain payoffs $\bar{u}$ and 0, respectively, and the players wait for the next issue. When players are simply waiting for a new issue we say that the previous issue is resolved. If the setter is not successful, then with probability ξdt the issue is replaced with a new one, in which case S and R obtain payoffs

law of motion for posterior beliefs. This is the case if and only if for each initial belief p_0, there is a function $t \mapsto p_t$ on $[0, \infty)$ that satisfies

$$p_t = \frac{p_0 e^{-\lambda \int_0^t I_{\chi(p_\tau) \notin A(p_\tau)} I_{\beta(p_\tau, \chi(p_\tau))=1} d\tau}}{p_0 e^{-\lambda \int_0^t I_{\chi(p_\tau) \notin A(p_\tau)} I_{\beta(p_\tau, \chi(p_\tau))=1} d\tau} + 1 - p_0}. \tag{2}$$

In this model, admissability of a profile requires that all belief intervals in which the responder accepts the setter's proposal must be right-closed.

[10]The is a common restriction in the dynamic bargaining literature, for example, Baron and Ferejohn (1989) or Bowen *et al.* (2014).

of 0 and $\bar{v}$, respectively. Therefore,

$$V_{S,g}(1) = \lambda dt(\bar{u} + \hat{V}_{S,g}(1)) + (1 - \lambda dt)e^{-rdt}V_{S,g}(1),$$
$$V_{R,g}(1) = \lambda dt\hat{V}_{R,g}(1) + (1 - \lambda dt)(\xi dt\bar{v} + e^{-rdt}V_{R,g}(1)),$$

where $\hat{V}_{i,g}(1)$ is player i's value function when the previous issue has been resolved and the players wait for a new issue. To derive the value of $\hat{V}_{i,g}(p)$ for any $p \in [0, 1]$, note that a new issue arrives with probability ξdt in the time interval $[t, t + dt)$. Therefore, for $i = S, R$,

$$\hat{V}_{i,g}(p) = e^{-rdt}(\xi dt V_{i,g}(p) + (1 - \xi dt)\hat{V}_{i,g}(p)).$$

Using $1 - rdt \approx e^{-rdt}$, dropping the higher orders of dt and simplifying yields $\hat{V}_{i,g}(p) = \xi V_{i,g}(p)/(r + \xi)$. Using this, we derive the value of $V_{i,g}(1)$, which are given by

$$V_{S,g}(1) = \frac{\lambda(r + \xi)}{r(r + \lambda + \xi)}\bar{u}, \qquad V_{R,g}(1) = \frac{\xi(r + \xi)}{r(r + \lambda + \xi)}\bar{v}.$$

When the setter is powerless (i.e., $p = 0$), she never succeeds in asserting her will (that is, $\lambda = 0$ in the above equations). Therefore, the value functions are given by

$$V_{S,g}(0) = 0, \qquad V_{R,g}(0) = \frac{\xi}{r}\bar{v}.$$

Now consider any intermediate level of power $p \in (0, 1)$. Observe that player i's value function $V_{i,g}(p)$ is a convex combination of $V_{i,g}(1)$ and $V_{i,g}(0)$. To understand this, note that the players' never change their actions in the future, regardless of the outcome—S always proposes x_s which R rejects. Therefore,

$$V_{S,g}(p) = pV_{S,g}(1) + (1 - p)V_{S,g}(0) = p\bar{u}\frac{\lambda(r + \xi)}{r(r + \lambda + \xi)}, \tag{3}$$
$$V_{R,g}(p) = pV_{R,g}(1) + (1 - p)V_{R,g}(0) = \frac{\xi\bar{v}}{r}\left(1 - \frac{p\lambda}{r + \lambda + \xi}\right). \tag{4}$$

Note that both value functions are affine linear in power p. The setter's function is increasing in p, while the responder's is decreasing in p.

3.2 Long-run compromise

The second important benchmark is where players compromise for all future issues. In this case, the setter offers the compromise x_c, and the responder immediately accepts the offer.

No learning occurs, and hence the payoffs do not depend on power p. Let $V_{i,c}$ be player i's continuation utility under the long-run compromise. Then the value functions can be written as

$$V_{S,c} = u_c + e^{-rdt}(\xi dt V_{S,c} + (1-\xi dt)\hat{V}_{S,c}),$$
$$V_{R,c} = v_c + e^{-rdt}(\xi dt V_{R,c} + (1-\xi dt)\hat{V}_{R,c}),$$

where $\hat{V}_{i,c}$ is player i's value function when the players wait for a new issue. The same argument used to derive $\hat{V}_{i,g}$ shows that $\hat{V}_{i,c} = \xi V_{i,c}/(r+\xi)$. Therefore, the above equations simplify to

$$V_{S,c} = \frac{r+\xi}{r} u_c, \qquad V_{R,c} = \frac{r+\xi}{r} v_c. \tag{5}$$

4 Bargaining with Easy Issues

In this section, we analyze equilibria for the model in which all policy issues have three possible outcomes, i.e., $X = \{x_0, x_c, x_s\}$. We refer to these as *easy* issues as players can compromise on the outcome x_c. Later, we introduce *difficult* issues in which only the two extreme outcomes are feasible.

When all policy issues are easy, compromise can occur in equilibrium if the following condition on parameters is satisfied:

$$\frac{v_c}{\bar{v}} \geq \max\left\{\frac{\xi}{r+\xi}\left(1-\frac{u_c}{\bar{u}}\right), \frac{\xi}{r+\lambda+\xi}\right\}. \tag{6}$$

We state this formally in Proposition 1.

Proposition 1 *Fix parameters $u_c, \bar{u}, v_c, \bar{v}, r, \lambda, \xi$ that satisfy (6), then there exists a $\underline{p}$ and a $\overline{p}$ ($0 \leq \underline{p} \leq \overline{p} \leq 1$) such that compromise occurs for $p \in [\underline{p}, \overline{p}]$ in equilibrium. Specifically,*

$$\chi(p) = \begin{cases} x_c & \text{if } p \in [\underline{p}, \overline{p}] \\ x_s & \text{otherwise,} \end{cases} \qquad A(p) = \begin{cases} \{x_0, x_c\} & \text{if } p \geq \underline{p} \\ \{x_0\} & \text{if } p < \underline{p}. \end{cases}$$

If parameters do not satisfy (6), then there exists an equilibrium in which no compromise occurs: There exists a $\underline{p} \geq 0$ such that

$$\chi(p) = x_s \quad \text{for any } p \in [0,1], \qquad A(p) = \begin{cases} \{x_0, x_c\} & \text{if } p \geq \underline{p} \\ \{x_0\} & \text{if } p < \underline{p}. \end{cases}$$

For any set of parameters, the setter always asserts her will after a rejection in equilibrium, i.e., $\beta(p,x) = 1$ for all $p \in [0,1]$ and $x \in X$.

Proposition 1 states that if compromise occurs in equilibrium, then it occurs when perceived power is in some interval $[\underline{p}, \overline{p}]$. The values of the bounds depend on parameter values, and are given in the proof of Proposition 1 in the Appendix. In other words, compromise occurs when the *agenda-setter's personal power is moderate*. If the setter is perceived to be too powerful, then the setter prefers to take the risk and induce gridlock, believing that he would succeed in asserting her will. On the other hand, when the setter is too weak, the responder refuses to compromise, as he finds gridlock more beneficial.

Gridlock induces learning about the setter's power, leading to various equilibrium dynamics depending on the setter's initial power. If the setter is initially very powerful ($p_0 > \overline{p}$), then gridlock occurs in the beginning of the game. If the setter succeeds in asserting her will, then the setter is known to be powerful with probability one and the setter continues to induce gridlock. If the setter cannot assert her will, however, then power gradually drifts down, and when p reaches $\underline{p}$ the setter offers x_c to make a compromise. If the setter's power is moderate ($p_0 \in [\underline{p}, \overline{p}]$), then the players compromise for all future issues and no learning occurs. For an initially weak setter ($p_0 < \underline{p}$), the power either jumps to one or gradually drifts down, resulting in permanent gridlock.

The complete proof of Proposition 1 is provided in the Appendix. Here we provide a heuristic argument to derive the lower and upper bound of the compromise interval when $\underline{p}, \overline{p} \in (0, 1)$. First, the value of $\underline{p}$ is derived from the responder's incentives. Rejecting x_c at $p = \underline{p}$ would lead to permanent gridlock in the future, whereas accepting results in continued compromise. Therefore, it must be that $V_{R,c} = V_{R,g}(\underline{p})$. From (4) and (5), it follows that the responder is indifferent when

$$\underline{p} = \frac{r + \lambda + \xi}{\lambda} \left(1 - \frac{r + \xi}{\xi} \frac{v_c}{\bar{v}}\right). \tag{7}$$

For compromise to occur at $p = \underline{p}$, the setter must also prefer to compromise (by offering x_c) than inducing long-run gridlock (by offering x_s) at $p = \underline{p}$. This condition is given by

$$V_{S,c} \geq V_{S,g}(\underline{p}) \quad \Longleftrightarrow \quad \frac{v_c}{\bar{v}} \geq \frac{\xi}{r + \xi} \left(1 - \frac{u_c}{\bar{u}}\right),$$

which is satisfied by (6).

The setter's incentive determines the upper bound $\overline{p}$ of the compromise region. Specifically, when $p = \overline{p}$ the setter must be willing to switch from offering his ideal (gridlock), to offering the compromise (with compromise ensuing therafter). This implies that the setter is indifferent between gridlock and compromise at $p = \overline{p}$. Therefore, the value matching condition (Dixit (2002)) gives

$$\frac{r+\xi}{r}u_c = \lambda\overline{p}dt(\bar{u} + \hat{V}_{S,g}(1)) + (1-\lambda\overline{p}dt)e^{-rdt}\frac{r+\xi}{r}u_c,$$

which can be simplified to

$$\overline{p} = \frac{r+\lambda+\xi}{\lambda}\frac{ru_c}{(r+\lambda)\bar{u}-(r+\lambda+\xi)u_c}. \tag{8}$$

Figure 2 illustrates the parameters such that the equilibrium in Proposition 1 admits compromise. The green region represents the set of parameters such that (6) holds, and thus the equilibrium in this region features compromise at some $p \in [0, 1]$.

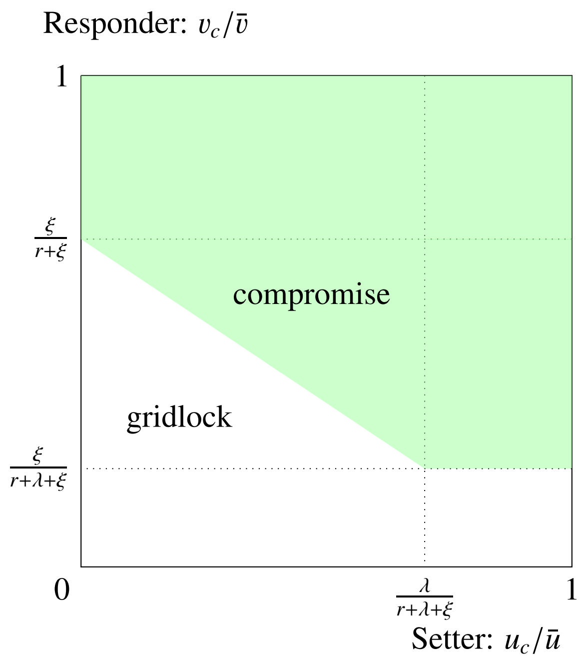

Figure 2: Parameters such that compromise occurs in equilibrium for some $p \in [0, 1]$.

Uniqueness We next show that, fixing parameter values, the equilibrium described in Proposition 1 for those parameters is the unique Markov perfect equilibrium with two mild refinements.

Let $\mathcal{A} = \{p \in [0,1] \mid \chi(p) \in A(p)\}$ be the set of beliefs in which agreement is reached in equilibrium. We call $\mathcal{A}$ the *agreement set* of a Markovian profile. Observe that for the equilibrium in Proposition 1, the agreement set is either empty or $[\underline{p}, \overline{p}]$ depending on the parameter values.

Condition 1 *$\mathcal{A}$ is closed.*

To understand Condition 1, consider the case where $\mathcal{A}$ is a finite union of pairwise disjoint intervals. Note that by admissibility, each of these intervals must be right-closed (see footnote 9). Now consider the condition that each interval is left-closed. Intuitively, at some point, experimentation should move the belief out of the compromise set (as long as the lower bound of the compromise set is strictly greater than 0), which should make the responder more cautious in rejecting a setter's proposal. If an interval is left-open, then this intuition is absent. To see this, suppose that an interval is open on the left, i.e., of the form $(p', p'']$. Then for beliefs in this set the responder can reject a compromise proposal, generating a tiny amount of learning, and still remain in the agreement set (provided the setter is not revealed to be strong). In other words, there is no definite point at which further experimentation moves the belief out of the compromise set. The cost of experimentation is solely that the setter may be revealed to be powerful and that there is some delay. Technically, we can ensure that this does not happen if p' is in the compromise set, and hence if each of the intervals is also closed on the left, i.e., if $\mathcal{A}$ a closed set.

Condition 2 *For any $p \notin \mathcal{A}$, the setter proposes her most preferred position in $X \backslash A(p)$.*

Condition 2 requires the setter to play an undominated strategy. The following proposition presents the equilibrium uniqueness result:

Proposition 2 *All equilibria that satisfies Condition 1 are payoff equivalent. Furthermore, there exists a unique equilibrium that satisfies Conditions 1 and 2.*

Comparative Statics We next explore how the compromise interval changes with parameter values. Given the simple expressions for the bounds on power for compromise to occur, we can do straightforward comparative statics.

Proposition 3 *Suppose parameters are such that $\underline{p} < \bar{p} < 1$.*

1. *$\bar{p}$ increases in r; $\underline{p}$ decreases in r;*
2. *both $\bar{p}$ and $\underline{p}$ decrease in λ; $\bar{p} - \underline{p}$ decreases in λ;*
3. *both $\bar{p}$ and $\underline{p}$ increase in ξ.*

4. *$\bar{p}$ increases in $u_c/\bar{u}$; $\underline{p}$ decreases in $v_c/\bar{v}$.*

First, Item 1 of Proposition 3 states that raising r admits more beliefs at which compromise can occur. Intuitively, increasing the discount rate r increases the costs of delay, making both players more willing to compromise.

Second, increasing λ means that the setter's position power is increased. Hence, the setter is less willing to compromise, i.e., $\bar{p}$ decreases. At the same time, the responder is more willing to compromise, which means that $\underline{p}$ also decreases. Overall, however, compromise can occur for a smaller set of beliefs, as measured by $\bar{p} - \underline{p}$ when λ is increased.

Third, recall that ξ is that the rate at which a new issue arises, or the *velocity* of the institution. If the current issue has not been resolved, then the status quo is retained. Thus, raising ξ benefits the responder versus the setter. As a consequence, the responder is less willing to compromise, thereby raising $\underline{p}$, while the setter is more willing to compromise, which raises $\bar{p}$. The size of the agreement set $\bar{p} - \underline{p}$ itself is in general not monotone in ξ.

Last, the belief range for compromise increases in either $u_c/\bar{u}$ or $v_c/\bar{v}$. Note that $u_c/\bar{u}$ and $v_c/\bar{v}$ can be used as proxies for the (inverse of) the degree of political polarization: An increase in polarization would lead to lower levels of players' payoff when they reach a compromise outcome. Therefore, Item 4 implies that gridlock would be more likely to occur under more polarized environments. The relationship between gridlock and polarization is also reflected in the set of parameters that lead to compromise (Equation (6)). Equilibria with compromise are associated with high levels of $u_c/\bar{u}$ or $v_c/\bar{v}$, i.e., low polarization. We summarized these in the following corollary.

Corollary 1 *Greater polarization, as measured by a decrease in $u_c/\bar{u}$ or $v_c/\bar{v}$, is associated with more gridlock.*

5 Difficult issues

The previous analysis showed how power dynamics can result in long-run compromise outcomes, but it is sometimes the case that there are issues for which a compromise exists, yet agreement seems elusive. Moreover, compromise may be possible at a different point in time or under a different setter. For example, passing civil rights legislation was very high on the agenda for President Truman. In a speech to civil rights activist on November 15, 1949 he indicated that "in that great cause, there is no retreat and no retirement."[11] However, he repeatedly failed. In contrast, his successor President Eisenhower, signed two civil rights bills in 1957 and 1960 that passed with overwhelming majorities. In this section we show how such situations may arise due to personal power dynamics.

In the organizational or political bargaining process, an issue without a compromise option often arises. In 1947 Congress overrode a veto by President Truman, and enacted the "Taft-Hartley Act" (or "Labor Management Relations Act"), which significantly reduced the power of labor unions. Truman promised to repeal Taft-Hartley in his "Fair Deal" but never succeeded. Repealing an existing law is an example of an "all-or-nothing" policy issue, since the choice is binary and there is no compromise. We ask the following question: Does the presence of all-or-nothing issues affect the outcomes for normal issues? We answer the question in the affirmative.

To model such an environment, we modify our main model and assume that the players may have a *difficult* policy issue with no compromise alternative. Assume that a difficult issue arises with probability $\alpha > 0$. With the complementary probability, the *easy* policy issue (with three possible outcomes) arises. Formally, let $\tau \in \{e, d\}$ be the type of a policy issue. Let $X^e = \{x_0, x_c, x_s\}$ and $X^d = \{x_0, x_s\}$ be the set of possible outcomes under easy issues and difficult issues, respectively. Let χ^τ be the offer strategy for the setter if the current issue is of type τ. Similarly, let A^τ and β^τ be the acceptance strategy for the responder and the setter's strategy to assert her will, respectively.

In this section, we focus on the parameter range where

$$\frac{\xi}{r+\lambda+\xi} < \frac{v_c}{\bar{v}} < \frac{\xi}{r+\xi}, \quad \text{and} \quad \frac{u_c}{\bar{u}} < \frac{\lambda}{r+\lambda+\xi}. \tag{9}$$

The condition on $v_c/\bar{v}$ guarantees that the value of $\underline{p}$ is in the interior of $[0, 1]$, and the condition on $u_c/\bar{u}$ ensures that gridlock occurs at $p = 1$ regardless of the issue type. In the equilibria constructed in this section, the players' behavior under the easy policy issue remains qualitatively the same.

We construct two types of equilibria exhibiting qualitatively different behavior under the difficult issues. First, there exists an equilibrium in which players never concede under difficult

[11] "Truman promises civil rights fight," New York Times, November 16, 1949.

issues. We call this a *gridlock equilibrium*. Second, there exists an equilibrium in which the setter concedes by offering x_0 to avoid a long-run gridlock. We call this an *avoiding-the-issue* equilibrium.

The next proposition formally states the gridlock equilibrium and the parametric conditions for its existence. The proofs for the next two propositions are in the Online Appendix.

Proposition 4 (gridlock equilibrium) *Suppose that (9) holds, and*

$$\frac{\xi}{r+\xi}\left(1-\frac{u_c}{\bar{u}}\right) \leq \frac{v_c}{\bar{v}} \leq \frac{\xi}{r+\xi}\left(1-\frac{\xi(1-\alpha)}{r+\xi}\frac{u_c}{\bar{u}}\right). \tag{10}$$

Then for some $\overline{p}_\alpha \in [\underline{p}, 1]$, there exists an equilibrium in which

$$\chi^e(p) = \begin{cases} x_c & \text{if } p \in [\underline{p}, \overline{p}_\alpha], \\ x_s & \text{otherwise,} \end{cases} \qquad A^e(p) = \begin{cases} \{x_0, x_c\} & \text{if } p \geq \underline{p}, \\ \{x_0\} & \text{if } p < \underline{p}, \end{cases}$$

$$\chi^d(p) = x_s \quad \text{for all } p, \qquad A^d(p) = \{x_0\} \quad \text{for all } p.$$

Moreover, the setter always asserts her will after a rejection, i.e., $\beta^\tau(p, x) = 1$ for all $\tau = e, d$, $p \in [0, 1]$ and $x \in X$.

In the *gridlock equilibrium*, the equilibrium behavior eventually features permanent gridlock. Even when the prior belief sits in the intermediate range so that compromise is initially maintained on easy issues, difficult issues arise and gridlock over those issues leads to learning. Learning makes the belief either jump to one or drift below $\underline{p}$, and thus the belief moves out of the compromise region. There is permanent gridlock thereafter in equilibrium.

This helps explain why gridlock can arise on seemingly easy, non-contentious issues, for which compromise is possible. Learning over gridlock with difficult issues leads to a more extreme level of perceived personal power, which in turn provides the responder greater incentives to reject compromise proposals. Returning to the example of President Truman, by the end of his presidency he was widely regarded as weak, having sustained many legislative failures. His approval rating was the worst in Presidential history at 22% in 1952.[12] Consistent with our model, he was unable to pass civil rights legislation, a centerpiece of his Fair Deal, in spite of having a Democratic Congress. In contrast, the Civil Rights Acts of 1957 and 1960 were passed

[12] See "Who Had the Lowest Gallup Presidential Job Approval Rating?", Jeffrey M. Jones, `https://news.gallup.com/poll/272765/lowest-gallup-Presidential-job-approval-rating.aspx`.

by President Eisenhower with bi-partisan support and an overwhelming majority in a divided government.

The next proposition describes another type of equilibrium in which the setter concedes to avoid future gridlock.

Proposition 5 (avoiding-the-issue equilibrium) *Suppose that* (9) *holds, and*

$$\frac{v_c}{\bar{v}} \geq \frac{\xi(1-\alpha)}{r+\xi(1-\alpha)}\left(1-\frac{\xi}{r+\xi}\frac{u_c}{\bar{u}}\right). \tag{11}$$

Then there exists $\underline{p}_0$ *and* $\hat{p}$ *with* $\underline{p}_0 \leq \hat{p} \leq \underline{p}$*, such that for any* $\underline{p}_\alpha \in [\underline{p}_0, \hat{p}]$*, there is an equilibrium in which*

$$\chi^e(p) = \begin{cases} x_c & \text{if } p \in [\underline{p}_\alpha, \overline{p}_\alpha], \\ x_s & \text{otherwise,} \end{cases} \qquad A^e(p) = \begin{cases} \{x_0, x_c\} & \text{if } p \geq \underline{p}_\alpha, \\ \{x_0\} & \text{if } p < \underline{p}_\alpha, \end{cases}$$

$$\chi^d(p) = \begin{cases} x_0 & \text{if } p = \underline{p}_\alpha, \\ x_s & \text{otherwise,} \end{cases} \qquad A^d(p) = \{x_0\} \quad \text{for all } p.$$

Moreover, the setter always asserts her will after a rejection, i.e., $\beta^\tau(p, x) = 1$ *for all* $\tau = e, d$*,* $p \in [0, 1]$ *and* $x \in X$*.*[13]

In the *avoiding-the-issue equilibrium*, gridlock ensues on difficult issues until the belief reaches the lower bound of the compromise region for the easy issues ($p = \underline{p}_\alpha$). At the lower bound, the setter concedes to the responder by proposing the status quo. After that, the players immediately reach agreement for every issue, with outcomes of x_c and x_0 for the easy and difficult type, respectively, and the belief stays at $\underline{p}_\alpha$. The setter has an incentive to concede because doing so would avoid further learning, which leads to a gridlock even for easy issues.

An example that reflects this avoiding-the-issue dynamic is George W. Bush's attempts to pass immigration reform—a very divisive issue in the United States. At the end of his second term, he eventually gave up, leaving the status quo in place. As noted in a Reuters article "A crestfallen Bush conceded defeat and said he was moving on to other issues such as balancing the federal budget when it became clear the immigration legislation would not be revived

[13]There exists at least one other equilibrium that yields the same equilibrium outcome described in Proposition 5. In this equilibrium, the setter offers her most preferred outcome under a difficult issue when the belief hits the lower bound of the agreement set ($\chi^d(\underline{p}_\alpha) = x_s$) but chooses not to assert her will after a rejection ($\beta^d(\underline{p}_\alpha, x_s) = 0$).

during the final 18 months of his two-term presidency."[14] One might consider that Presidential approval ratings are correlated with personal power. This accords well with our model—the legislative defeats described by George W. Bush and Harry Truman were accompanied by very low approval ratings. By contrast, President Eisenhower enjoyed consistently high approval.

In general, the gridlock equilibrium exists for lower values of $v_c/\bar{v}$ compared to the avoiding-the-issue equilibrium. Intuitively, higher values of the compromise payoff gives the setter a stronger incentive to concede for the current difficult issue to avoid a long-run gridlock. Note that for $v_c/\bar{v} \geq \xi/(r+\xi)$ there exists a trivial equilibrium in which for easy issues there is gridlock for $p \geq \overline{p}$ and compromise otherwise. In this equilibrium, there is always gridlock for difficult issues. Combining with Propositions 4 and 5, the condition to sustain an equilibrium with the possibility of compromise when there are difficult issues is

$$v_c/\bar{v} \geq \max\left\{\min\left\{\frac{\xi}{r+\xi}\left(1-\frac{u_c}{\bar{u}}\right), \frac{\xi(1-\alpha)}{r+\xi(1-\alpha)}\left(1-\frac{\xi}{r+\xi}\frac{u_c}{\bar{u}}\right)\right\}, \frac{\xi}{r+\lambda+\xi}\right\}. \tag{12}$$

Comparing condition (12) to condition (6) in Proposition 1, it is straightforward to see that the set of parameters that admits a possibility of compromise with difficult issues, includes those parameters that admit compromise when there are no difficult issues. We thus conclude that when either difficult or easy issues can occur with positive probability (i.e., $\alpha > 0$), compromise on easy issues becomes possible for more parameter values, than when only easy issues arise (i.e., $\alpha = 0$). Moreover, whereas difficult issues alone (i.e., $\alpha = 1$) would result in perpetual gridlock, agreement on the status quo is possible when difficult issues are combined with easy issues. This results from the unwillingness of the setter to yield power that can be valuable when easy issues arise.

6 Concluding Remarks

In this paper, we provide a model that predicts the dynamics of personal power in bargaining. We show that agents will compromise when the setter is neither too powerful nor too powerless. A powerful setter is never willing to offer a compromise, while the responder is never willing to compromise when the setter is too powerless. The incentive constraints of both the setter and responder determine an intermediate range of beliefs such that compromise occurs. In this

[14] See "Senate kills Bush immigration reform bill", Reuters (2007) https://www.reuters.com/article/us-usa-immigration/senate-kills-bush-immigration-reform-bill-idUSN2742643820070629.

interval, the setter believes she is too powerless to assert her will successfully, and the responder prefers to compromise rather than learn about the setter's type.

We seek to understand how the evolution of power may explain puzzling bargaining outcomes. That is, observing gridlock on issues that may have previously been relatively easy to settle. We show that when difficult issues arise that force the agents into gridlock, these issues also force learning about the setter's strength. If the setter learns either that she is powerful with certainty, or becomes too powerless, then gridlock ensues on every issue. On the other hand, we also show the existence of an equilibrium where the setter accommodates the responder on difficult issues when the belief about her type is too low. This avoids learning and allows compromise to be sustained for easy issues. We think this helps explain instances where the setter "avoids the issue".

We believe that our model is a first step in analyzing the effect of personal power in political decision-making processes, and that there are several interesting future research directions. First, one can consider a model with endogenous sequence and timing of easy and difficult issues. If either the setter or the responder is allowed to choose the issue sequence, their choice would be certainly affected by its effect on learning.[15] Second, it is possible that the policy issues have various degrees of importance, and it may affect the players' incentive to create gridlock and learn about personal power. Thus, it would be fruitful to analyze a case in which issues have heterogeneous payoffs. Third, while a perfect good news model is a natural representation of the evolution of personal power, one can consider a model with generalized information structures, in which gridlock may generate either a good or bad news. Finally, the model lends itself naturally to empirical or experimental tests. One can test if compromise occurs more often with higher position power than lower position power, or if compromise occurs more often when difficult issues can occur.

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[15] Some of these questions are explored in a companion paper (Hwang and Krasa, 2022).

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7 Appendix

7.1 Proof of Proposition 1

In this proof, we construct and verify the equilibrium described in Proposition 1. Define $\underline{p}$ and $\overline{p}$ as

$$\underline{p} = \begin{cases} \dfrac{r+\lambda+\xi}{\lambda}\left(1-\dfrac{r+\xi}{\xi}\dfrac{v_c}{\bar{v}}\right) & \text{if } \frac{v_c}{\bar{v}} < \frac{\xi}{r+\xi} \text{ and } \frac{u_c}{\bar{u}} < \frac{\lambda}{r+\lambda+\xi}, \\ \dfrac{r+\lambda}{\lambda}\dfrac{\bar{v}-\frac{r+\xi}{\xi}v_c}{\bar{v}-v_c} & \text{if } \frac{v_c}{\bar{v}} < \frac{\xi}{r+\xi} \text{ and } \frac{u_c}{\bar{u}} \geq \frac{\lambda}{r+\lambda+\xi}, \\ 0 & \text{if } \frac{v_c}{\bar{v}} \geq \frac{\xi}{r+\xi}, \end{cases} \tag{13}$$

and $\overline{p} = \max\{\hat{p}, \underline{p}\}$, where

$$\hat{p} = \begin{cases} \dfrac{r+\lambda+\xi}{\lambda}\dfrac{ru_c}{(r+\lambda)\bar{u}-(r+\lambda+\xi)u_c} & \text{if } \frac{u_c}{\bar{u}} < \frac{\lambda}{r+\lambda+\xi}, \\ 1 & \text{if } \frac{u_c}{\bar{u}} \geq \frac{\lambda}{r+\lambda+\xi}. \end{cases} \tag{14}$$

Note that these are precisely the values calculated in (7) and (8) when $\frac{v_c}{\bar{v}} \in (\xi/(r+\lambda+\xi), \xi/(r+\xi))$ and $u_c/\bar{u} < \lambda/(r+\lambda+\xi)$. Recall that $\mathcal{A} = \{p \in [0,1] : \chi(p) \in A(p)\}$ is the agreement set of a Markovian profile. Then under the strategy profile described in Proposition 1 we have $\mathcal{A}$ for the following cases:

- ***Case A****: condition* (6) *holds and* $\frac{u_c}{\bar{u}} < \frac{\lambda}{r+\lambda+\xi}$. In this case, $\mathcal{A} = [\underline{p}, \overline{p}]$ where $\overline{p} < 1$.
- ***Case B****: condition* (6) *holds and* $\frac{u_c}{\bar{u}} \geq \frac{\lambda}{r+\lambda+\xi}$. In this case, $\mathcal{A} = [\underline{p}, 1]$.
- ***Case C****: condition* (6) *does not hold*. In this case, $\mathcal{A} = \emptyset$.

In what follows, we first derive the players' value functions under the conjectured strategy profile in each case. Then, we complete the proof by verifying each player's incentive conditions.

Value Functions ***Case A***: First consider the profile in Case A, with $\mathcal{A} = [\underline{p}, \overline{p}]$ where $\overline{p} < 1$. Observe that the belief dynamics imply that whenever $p < \underline{p}$, the players will never reach a compromise in the future and long-run gridlock occurs. Thus, the players' value functions are $V_i(p) = V_{i,g}(p)$ for any $p < \underline{p}$. Moreover, for any $p \in [\underline{p}, \overline{p}]$, the players always compromise at the moment a new issue arrives, and thus $V_i(p) = V_{i,c}(p)$, where $V_{i,c}(p)$ is the player i's payoff under no gridlock. Therefore, it remains to derive the value functions for $p > \overline{p}$.

First, consider the setter's value function $V_S(p)$ for $p > \overline{p}$. In the interval $[t, t+dt)$, the probability that the setter successfully asserts is given by λdt. In this case, the issue is resolved and the setter receives utility $\bar{u}$. In addition, the setter's type is now known to be high, i.e., the belief jumps up to 1. With the complementary probability, the issue is not resolved in $[t, t+dt)$, and the belief drifts down to $p + dp$ following Bayes' rule given by (1). Therefore, $V_S(p)$ is determined recursively by the equation

$$V_S(p) = p\lambda dt \left(\bar{u} + e^{-rdt}(\xi dt V_S(1) + (1-\xi dt)\hat{V}_S(1))\right) + (1 - p\lambda dt)e^{-rdt} V_S(p + dp).$$

As in Section 3, $\hat{V}_i(p)$ is the dynamic payoff for player i after an issue has been resolved and players await a new issue. By the same arguments, it follows that

$$\hat{V}_i(p) = \frac{\xi}{r + \xi} V_i(p),$$

for any $p \in [0, 1]$.

Note that $V_S(p + dp) = V_S(p) + V_S'(p)dp$, $e^{-rdt} \simeq 1 - rdt$, and the belief dynamics in (1) simplifies to $dp = -\lambda p(1 - p)dt$. Therefore,

$$\begin{aligned}(1 - (1 - p\lambda dt)(1 - rdt))V_S(p) = p\lambda dt &\left(\bar{u} + (1 - rdt)(\xi dt V_S(1) + (1 - \xi dt)\hat{V}_S(1))\right) \\ &- (1 - p\lambda dt)(1 - rdt)V_S'(p)\lambda p(1 - p)dt.\end{aligned}$$

Note that we use $1 - rdt \simeq e^{-rdt}$. Dropping terms with order of dt^2 or higher, and substituting the value of $\hat{V}_S(1)$ yields the differential equation

$$(r + p\lambda)V_S(p) = p\lambda\bar{u}\left(1 + \frac{\xi\lambda}{r(r + \lambda + \xi)}\right) - \lambda p(1 - p)V_S'(p).$$

Solving the differential equation we get

$$V_S(p) = \frac{(1 - p)^{1+\frac{r}{\lambda}}}{p^{\frac{r}{\lambda}}} K_S + V_{S,g}(p), \tag{15}$$

where K_S is the constant of integration. The boundary condition is given by $V_S(\overline{p}) = V_{S,c}$, which is the value matching condition at $p = \overline{p}$.

We now determine the responder's value function $V_R(p)$ for $p > \overline{p}$. Using a similar argument as for the setter, the responder's value function is defined recursively as follows:

$$V_R(p) = p\lambda dt e^{-rdt}(\xi dt V_R(1) + (1 - \xi dt)\hat{V}_R(1)) + (1 - p\lambda dt)\left(\xi dt\bar{v} + e^{-rdt}V_R(p + dp)\right).$$

Simplifying the above equation yields the following differential equation

$$(r + p\lambda)V_R(p) = \frac{p\lambda\xi^2\bar{v}}{r(r + \lambda + \xi)} + \xi\bar{v} - \lambda p(1 - p)V_R'(p).$$

Solving the differential equation yields

$$V_R(p) = \frac{(1 - p)^{1+\frac{r}{\lambda}}}{p^{\frac{r}{\lambda}}} K_R + V_{R,g}(p), \tag{16}$$

where K_R is the constant of integration. Similar to the setter's case, the boundary condition that determines K_R is given by the value-matching condition at $p = \overline{p}$, which is $V_R(\bar{p}) = V_{R,c}$.

Case B: Next, consider the strategy profile in Case B, in which $\mathcal{A} = [\underline{p}, 1]$. For $p \geq \underline{p}$, it is straightforward that $V_i(p) = V_{i,c}$ for $i = S, R$. For $p < \underline{p}$, the setter's value function is recursively written as

$$V_S(p) = p\lambda dt\left(\bar{u} + e^{-rdt}(\xi dt V_{S,c} + (1-\xi dt)\hat{V}_{S,c})\right) + (1 - p\lambda dt)e^{-rdt}V_S(p + dp).$$

Note that if the setter successfully asserts her will, then the belief jumps to one and the players compromise for all future issues. Simplifying the above equation yields

$$(r + p\lambda)V_S(p) = p\lambda(\bar{u} + \hat{V}_{S,c}) - \lambda p(1-p)V_S'(p).$$

Solving the differential equation yields

$$V_S(p) = \frac{(1-p)^{1+\frac{r}{\lambda}}}{p^{\frac{r}{\lambda}}}K_S + \frac{\lambda}{r+\lambda}(\bar{u} + \hat{V}_{S,c})p,$$

where K_S is an integration constant. Since the boundary condition is $V_S(0) = V_{S,g} < \infty$, it must be that $K_S = 0$, and thus the

$$V_S(p) = \frac{\lambda}{r+\lambda}(\bar{u} + \hat{V}_{S,c})p. \tag{17}$$

Similar to the setter's case, the responder's value function is recursively written as

$$V_R(p) = p\lambda dt e^{-rdt}(\xi dt V_R(1) + (1-\xi dt)\hat{V}_R(1)) + (1 - p\lambda dt)\left(\xi dt\bar{v} + e^{-rdt}V_R(p + dp)\right),$$

which simplifies to

$$(r + p\lambda)V_R(p) = p\lambda\hat{V}_{R,c} + \xi\bar{v} - \lambda p(1-p)V_R'(p).$$

Solving the differential equation and applying the boundary condition $V_R(0) = V_{R,g} < \infty$ yield

$$V_R(p) = \frac{\xi}{r}\bar{v} - \frac{\lambda}{r+\lambda}\left(\frac{\xi}{r}\bar{v} - \hat{V}_{R,c}\right)p. \tag{18}$$

Case C: The players' value functions in Case C—part 2 of Proposition 1—are straightforward. Since the players never reach a compromise in the future,

$$V_i(p) = V_{i,g}(p) \quad \text{for any } p \in [0, 1],$$

where $V_{i,g}(p)$ is player i's expected payoff under the long-run gridlock given in (3) and (4).

Equilibrium verification We are ready to verify the optimality of the candidate equilibrium profile in each case.

Case A: Consider the candidate equilibrium profile in Case A. We proceed our analysis in each of four belief regions: (i) $p < \underline{p}$; (ii) $p = \underline{p}$; (iii) $p \in (\underline{p}, \overline{p}]$; and (iv) $p > \overline{p}$.

Case A1: $p < \underline{p}$. In this case, the responder rejects any offer from the setter, and the setter offers x_s. Given the responder's behavior, the setter's incentive condition is trivially satisfied. Therefore, it suffices to check if the responder rejects a compromise offer x_c if the setter deviates and makes such proposal. This requires that

$$V_{R,g}(p) \geq v_c + \hat{V}_{R,g}(p).$$

This inequality simplifies to

$$V_{R,g}(p) \geq V_{R,c} \quad \text{for any } p < \underline{p}. \tag{19}$$

Since $V_{R,g}(p)$ is decreasing in p, the above inequality is satisfied if and only if

$$V_{R,g}(\underline{p}) \geq V_{R,c}. \tag{20}$$

From (7) if $\frac{v_c}{\bar{v}} \in (\frac{\xi}{r+\lambda+\xi}, \frac{\xi}{r+\xi})$, then $\underline{p}$ is such that $V_{R,g}(\underline{p}) = V_{R,c}$, so this is satisfied. If $\frac{v_c}{\bar{v}} \leq \frac{\xi}{r+\lambda+\xi}$, then $\underline{p} \geq 1$. At $\underline{p} = 1$ using (4) and (5) we have (20) simplified to $\frac{\xi(r+\xi)}{r(r+\lambda+\xi)}\bar{v} \geq \frac{r+\xi}{r}v_c$ or $\frac{v_c}{\bar{v}} \leq \frac{\xi}{r+\lambda+\xi}$ so this is satisfied. If $\frac{v_c}{\bar{v}} \geq \frac{\xi}{r+\xi}$, then $\underline{p} = 0$ and the case of $p < \underline{p}$ does not exist.

Case A2: $p = \underline{p}$. We check two incentive conditions for the responder: (a) incentive to accept x_c; and (b) incentive to reject x_s.

If the responder accepts the setter's offer x_c, then the belief stays the same and there will be an agreement at x_c for all future periods. If the responder rejects the offer, then learning occurs. With probability $p\lambda dt$ the setter is successful and the issue is resolved with position x_s. With the complementary probability, however, the setter is not successful, in which case the current issue continues and the belief declines. Therefore, the responder is better off accepting the offer x_c if

$$V_R(p) \geq p\lambda dt e^{-rdt}(\xi dt V_R(1) + (1-\xi dt)\hat{V}_R(1)) + (1-p\lambda dt)\left(\xi dt\bar{v} + e^{-rdt}V_R(p+dp)\right). \tag{21}$$

Since $p = \underline{p}$, if the responder rejects x_s and the setter fails to overturn, then the belief goes out of the compromise region, after which the players engage in the permanent gridlock. Therefore, the incentive condition (21) becomes

$$V_{R,c} \geq p\lambda dt e^{-rdt}(\xi dt V_R(1) + (1-\xi dt)\hat{V}_R(1)) + (1-p\lambda dt)\left(\xi dt\bar{v} + e^{-rdt}V_{R,g}(\underline{p}+dp)\right).$$

Dropping the terms with orders of dt and higher, we have

$$V_{R,c} \geq V_{R,g}(\underline{p}). \tag{22}$$

As before if $\frac{v_c}{\bar{v}} \in (\frac{\xi}{r+\lambda+\xi}, \frac{\xi}{r+\xi})$, then $\underline{p}$ is such that $V_{R,g}(\underline{p}) = V_{R,c}$, so this is satisfied. If $\frac{v_c}{\bar{v}} \geq \frac{\xi}{r+\lambda+\xi}$, then $\underline{p} \geq 1$, so this does not apply for Case A. If $\frac{v_c}{\bar{v}} \geq \frac{\xi}{r+\xi}$, then $\underline{p} = 0$ and (22) simplifies to $\frac{r+\xi}{r} v_c \geq \xi \bar{v}/r$ or $\frac{v_c}{\bar{v}} \geq \frac{\xi}{r+\xi}$.

We also need to check that the responder prefers to reject x_s when it is offered by the setter, i.e., $x_s \notin A(p)$. The responder's payoff from accepting x_s is given by $\hat{V}_R(p)$, and her payoff from rejecting x_s is identical to the right-hand side of (21). Therefore, $V_R(p)$ must satisfy

$$\hat{V}_R(p) \leq p\lambda dt e^{-rdt}(\xi dt V_R(1) + (1-\xi dt)\hat{V}_R(1)) + (1-p\lambda dt)\left(\xi dt \bar{v} + e^{-rdt} V_R(p+dp)\right).$$

Dropping the terms with order of dt and higher from the above inequality, we have

$$\hat{V}_R(p) \leq V_R(p),$$

which is trivially satisfied.

Next, consider the setter's incentive at $p = \underline{p}$. Given that the responder accepts x_c, the setter prefers to offer x_c rather than to offer x_s if

$$V_{S,c} \geq p\lambda dt(\bar{u} + e^{-rdt}\hat{V}_{S,g}(1)) + (1-p\lambda dt)e^{-rdt} V_{S,g}(\underline{p}+dp).$$

Dropping the terms with orders of dt and higher yields $V_{S,c} \geq V_{S,g}(\underline{p})$, or

$$\frac{v_c}{\bar{v}} \geq \frac{\xi}{r+\xi}\left(1 - \frac{u_c}{\bar{u}}\right). \tag{23}$$

This is satisfied since condition (6) holds.

Also, note that the argument in Case A2 shows the necessity of condition (6): If (6) does not hold, then either (22) or (23) would be violated, and thus the candidate profile in part 1 of Proposition 1 cannot be an equilibrium.

Case A3: $p \in (\underline{p}, \overline{p}]$. Next, we analyze the players' incentive condition in the "compromise interval" $(\underline{p}, \overline{p}]$. Note that this interval exists only if $\underline{p} < \overline{p}$.

First observe that the responder's incentive condition to accept x_c for $p \in (\underline{p}, \overline{p}]$ is identical to (21). However, in contrast to Case A2, the belief after the setter's failure for a small period of time is still in the compromise region. Therefore, (21) becomes

$$V_{R,c} \geq p\lambda dt e^{-rdt}(\xi dt V_{R,g}(1) + (1-\xi dt)\hat{V}_{R,g}(1)) + (1-p\lambda dt)\left(\xi dt \bar{v} + e^{-rdt} V_{R,c}\right).$$

Dropping terms with orders of $(dt)^2$ and higher, we get

$$p\lambda\left(V_{R,c} - \hat{V}_{R,g}(1)\right) + rV_{R,c} \geq \xi \bar{v}. \tag{24}$$

A simple calculation shows that (24) is satisfied as long as $\frac{v_c}{\bar{v}} > \frac{\xi}{r+\lambda+\xi}$, which is satisfied under (6). Therefore, the responder's incentive condition to accept x_c is satisfied. Furthermore, the responder's incentive condition to reject x_s is identical to the one in Case A2, and thus is trivially satisfied.

Next, consider the setter's incentive constraints for $p \in (\underline{p}, \overline{p}]$, in which the setter must prefer offering x_c (which is immediately accepted) to offering x_s (which is rejected). Since the belief after the setter's failure remains in the agreement set, then we require

$$V_{S,c} \geq p\lambda dt \left(\bar{u} + e^{-rdt}(\xi dt V_{S,g}(1) + (1 - \xi dt)\hat{V}_{S,g}(1) \right) + (1 - p\lambda dt)e^{-rdt} V_{S,c}.$$

Eliminating terms with orders of dt^2 and higher and reorganizing yield

$$p\lambda \left((r + \lambda) - (r + \lambda + \xi)\frac{u_c}{\bar{u}} \right) \leq r(r + \lambda + \xi)\frac{u_c}{\bar{u}}. \tag{25}$$

It is easy to check that (25) holds if and only if $p \leq \hat{p}$, where $\hat{p}$ is defined in (14). Since Case 3 assumes the case where $\hat{p} = \bar{p}$, it follows that the setter's incentive is satisfied for any $p \in (\underline{p}, \bar{p}]$.

Equations (13) and (14) imply that given that (6) holds (so that $\underline{p} < 1$), $\underline{p} < \hat{p}$ if and only if

$$\frac{v_c}{\bar{v}} > \frac{\xi}{r + \xi} \frac{(r + \lambda) - (2r + \lambda + \xi)\frac{u_c}{\bar{u}}}{(r + \lambda) - (r + \lambda + \xi)\frac{u_c}{\bar{u}}}. \tag{26}$$

Therefore, the compromise region is a nondegenerate interval (i.e., $\underline{p} < \overline{p}$) if and only if (26) holds.

Case A4: $p > \overline{p}$. First, observe that the integration constraints K_S and K_R in equations (15) and (16) must be nonnegative. To see this, note that it is straightforward to show $K_R \geq 0$ from (16): At $p = \overline{p}$, the boundary condition is given by $V_R(\overline{p}) = V_{R,c}$; but $V_{R,c}$ is no less than than $V_{R,g}(\overline{p})$ since $\underline{p} \leq \overline{p}$. Similarly, one can easily check that $V_{S,c} \geq V_{S,g}(\overline{p})$, which implies that K_S is nonnegative.

For $p > \overline{p}$, the responder accepts x_c when it is offered. Therefore, her incentive condition is $v_c + \hat{V}_R(p) \geq V_R(p)$, or

$$V_{R,c} \geq V_R(p) \quad \text{for all } p > \overline{p}. \tag{27}$$

This condition is immediately satisfied since K_R is nonnegative, which implies (from (16)) that $V_R(p)$ is decreasing and strictly convex for $p > \overline{p}$. Given the responder's strategy, the setter prefers to offer x_s rather than to offer x_c. This incentive condition is $u_c + \hat{V}_S(p) \leq V_S(p)$, which is equivalent to

$$V_{S,c} \leq V_S(p) \quad \text{for all } p > \overline{p}. \tag{28}$$

Again, the fact that K_S is nonnegative implies that the incentive condition is satisfied.

Case B: Next, we consider the case in which (6) holds and $u_c/\bar{u} \geq \lambda/(r + \lambda + \xi)$, and check the optimality of the candidate profile that $\mathcal{A} = [\underline{p}, 1]$. Much of our analysis here will be based on the results in Case A. First, consider the responder's incentive. The analysis in Cases 1A and 1B imply that the responder's incentives at $p < \underline{p}$ and $p = \underline{p}$ are satisfied if and only if $V_R(\underline{p}) = V_{R,c}$. From (18), we have

$$\underline{p} = \frac{r+\lambda}{\lambda} \frac{\bar{v} - \frac{r+\xi}{\xi} v_c}{\bar{v} - v_c},$$

which is identical to (13). For the setter's incentive, it suffices to check if the setter prefers to offer x_c than to offer x_s when $p = 1$. This condition is given by

$$V_{S,c} \geq \lambda dt \Big(\bar{u} + e^{-rdt} \Big(\xi dt V_{S,c} + (1 - \xi dt) \hat{V}_{S,c} \Big) \Big) + (1 - \lambda dt) e^{-rdt} V_{S,c}.$$

Cancelling out terms with orders of dt or higher and simplifying yields $u_c/\bar{u} \geq \lambda/(r + \lambda + \xi)$, and thus the setter's incentive is satisfied.

Case C: It remains to verify that if (6) is violated, the candidate profile in Case C is optimal for each player. Note that the argument in Case A1 implies that the responder accepts x_c if and only if $p \geq \underline{p}$. For the setter, her incentive condition for $p < \underline{p}$ is trivial (and identical to that of Case A). Therefore, it remains to verify the setter's incentive condition for $p \geq \underline{p}$.

For $p \geq \underline{p}$, the setter prefers to offer x_s than to offer x_c if

$$u_c + \hat{V}_{S,g}(p) \leq V_{S,g}(p) \quad \Longleftrightarrow \quad V_{S,g}(p) \geq V_{S,c}.$$

Since $V_{S,g}(p)$ increases in p, it suffices to check the condition at $p = \underline{p}$. Plugging in $p = \underline{p}$ yields the condition (23) with the reversed inequality. Therefore, the setter's incentive condition holds if (6) is violated.

7.2 Proof of Proposition 2

Recall that an agreement set of a Markovian strategy profile is defined as $\mathcal{A} \equiv \{p \in [0,1] | \chi(p) \in A(p)\}$. We first prove the following lemma.

Lemma 1 *In any Markov perfect equilibrium, the following is satisfied:*

1. *For any $p \in [0,1]$, $x_0 \in A(p)$ and $x_s \notin A(p)$;*

2. *For any $p \in \mathcal{A}$, $\chi(p) = x_c$ and $A(p) = \{x_0, x_c\}$;*

3. *For any $p \notin \mathcal{A}$, $A(p) = \{x_0, x_c\}$ if $V_R(p) \leq V_{R,c}$ and $A(p) = \{x_0\}$ otherwise; $\chi(p) = x_s$ if Condition 2 holds.*

Proof of Lemma 1. ***Item 1:*** First we show that $x_0 \in A(p)$ for any $p \in [0,1]$. For any $p \in \mathcal{A}$, accepting x_0 is obviously the responder's optimal choice. For $p \notin \mathcal{A}$, the responder prefers to accept x_0 if $\bar{v} + \hat{V}_R(p) \geq V_R(p)$, or $V_R(p) \leq (r+\xi)\bar{v}/r$. This inequality is always satisfied, since the responder's best possible payoff is $(r+\xi)\bar{v}/r$ (when x_0 is implemented without any delay).

To show that $x_s \notin A(p)$ for any p, suppose to the contrary that there exists a Markov perfect equilibrium in which $x_s \in A(p)$ for some p. Then it must be optimal for the setter to offer x_s, since doing so would yield the best possible payoff for him. Therefore $V_R(p) = 0$, and thus rejecting the offer is a profitable deviation for the responder.

Item 2: Given the behavior of the responder in Item 1, the setter would never offer x_0 for any p, since doing so would yield a payoff of zero to him. Then it follows trivially that whenever $p \in \mathcal{A}$ (i.e., $\chi(p) \in A(p)$), it must be that $(\chi(p), A(p)) = (x_c, \{x_0, x_c\})$.

Item 3: Consider any $p \notin \mathcal{A}$. For the setter, it is straightforward that $\chi(p) = x_s$ if $A(p) = \{x_0, x_c\}$. If $A(p) = \{x_0\}$, then the setter is indifferent between proposing x_c and x_s; if Condition 2 holds, then he proposes x_s.

For the responder, he prefers to accept x_c for any $p \notin \mathcal{A}$ if and only if

$$v_c + \hat{V}_R(p) \geq V_R(p),$$

which is equivalent to $V_R(p) \leq V_{R,c}$. ■

Given the result in Lemma 1, we focus on finding the equilibrium agreement set $\mathcal{A}$, which enables us to characterize the equilibrium profile. The next lemma is the first step in characterizing the equilibrium $\mathcal{A}$.

Lemma 2 *If a Markov perfect equilibrium has non-empty agreement set $\mathcal{A}$, it must be that* $\inf \mathcal{A} = \underline{p}$*, where $\underline{p}$ is given in* (13).

Proof of Lemma 2. Let $p^* = \inf \mathcal{A}$. Since $\mathcal{A}$ is closed, it follows that $p^* \in \mathcal{A}$. Then by Lemma 1, $\chi(p^*) = x_c$ and $\chi(p) = x_s$ for all $p < p^*$. Then the responder's incentive conditions at $p < p^*$ and $p = p^*$ are given by (20) and (22), respectively, with $\underline{p}$ replaced with p^*. Therefore, it must be that $V_{R,c} = V_{R,g}(p^*)$, which implies that $p^* = \underline{p}$. ■

Lemma 2 implies that the agreement set of any Markov perfect equilibrium must be one of the following three types: (1) $\mathcal{A} = \emptyset$; (2) $\mathcal{A} = \{\underline{p}\}$; and (3) $\mathcal{A} \supsetneq \{\underline{p}\}$ and $\inf \mathcal{A} = \underline{p}$. Below, we show that there exists a unique candidate equilibrium profile for each type, and derive the parametric conditions for existence of each type of equilibrium.

Case 1: $\mathcal{A} = \emptyset$. In this case, Lemma 1 implies that $x(p) = x_s$ for any p. Since the equilibrium features permanent gridlock, the players' value functions are $V_i(p) = V_{i,g}(p)$. Then by the definition of $\underline{p}$ (equation 13), $V_R(p) \geq V_{R,c}$ if and only if $p \geq \underline{p}$. Therefore, by Lemma 1, $A(p) = \{x_0, x_c\}$ for $p \geq \underline{p}$ and $A(p) = \{x_0\}$ for $p < \underline{p}$, providing the unique candidate equilibrium profile. Note that this profile is the one analyzed in the proof of Proposition 1, which shows that this profile exists if and only if (6) does not hold.

Case 2: $\mathcal{A} = \{\underline{p}\}$. By Lemma 1, $x(p) = x_c$ if $p = \underline{p}$ and $x(p) = x_s$ otherwise. Then the responder's value function under this profile is given by $V_R(p) = V_{R,g}(p)$. Then by the same logic as Case 1, $A(p) = \{x_0, x_c\}$ for $p \geq \underline{p}$ and $A(p) = \{x_0\}$ for $p < \underline{p}$, which provides the unique candidate equilibrium profile. Again, the existence condition for this equilibrium profile is analyzed in the proof of Proposition 1: The unique candidate profile in Case 2 exists if and only if (6) holds and (26) is violated.

Case 3: $\mathcal{A} \supsetneq \{\underline{p}\}$ *and* $\inf \mathcal{A} = \underline{p}$. We claim that in Case 3, there exists a unique equilibrium agreement set, which is an interval $[\underline{p}, \hat{p}]$ where $\hat{p}$ is given in (14).

Let $p^{**} = \sup \mathcal{A} > \underline{p}$. Then $p^{**} \in \mathcal{A}$, because $\mathcal{A}$ is closed by Condition 1. We first show that $p^{**} = \hat{p}$.

Players never reach an agreement for any $p > p^{**}$. Hence, the responder's value function for $p > p^{**}$ is given by (16), with the boundary condition $V_R(p^{**}) = V_{R,c}$. Because $p^{**} \geq \underline{p}$ and $V_{R,g}$ is strictly decreasing, it follows that $V_{R,g}(p^{**}) \leq V_{R,c}$. Equation (16) implies $K_R \geq 0$, and hence V_R is strictly decreasing. Thus, $V_R(p) < V_{R,c}$ for all $p > p^{**}$. Then Lemma 1 implies that $A(p) = \{x_0, x_c\}$ for $p \geq p^{**}$. Because the responder's behavior is constant for $p \in [p^{**}, 1]$, the setter's value function $V_S(p)$ must satisfy both value-matching and smooth-pasting conditions at $p = p^{**}$. The setter's value function for $p > p^{**}$ is given by (15), the value-matching and smooth-pasting conditions are given by

$$V_{S,c} = \frac{(1-p^{**})^{1+\frac{r}{\lambda}}}{(p^{**})^{\frac{r}{\lambda}}} K_S + V_{S,g}(p^{**}), \tag{29}$$

$$0 = -\frac{(1-p^{**})^{\frac{r}{\lambda}}}{(p^{**})^{1+\frac{r}{\lambda}}} \left(p^{**} + \frac{r}{\lambda}\right) K_S + V'_{S,g}(p^{**}), \tag{30}$$

respectively. Solving above system shows that

$$p^{**} = \frac{r+\lambda+\xi}{\lambda} \frac{r u_c}{(r+\lambda)\bar{u} - (r+\lambda+\xi)u_c},, \tag{31}$$

which coincides with $\hat{p}$ given in (14). If the above formula is above one, then the boundary conditions do not hold at any $p \in [0,1]$ and it must be that $p^{**} = 1$.

It remains to prove that $\mathcal{A} = [\underline{p}, \hat{p}]$. Intuitively, this follows because at any $p' \in \mathcal{A}$ with $p \notin \mathcal{A}$ for all p that are marginally above p', the smooth pasting and the value matching must hold at p'. These conditions, however, imply that $p' = \hat{p}$.

More formally, suppose by way of contradiction that $\mathcal{A}$ is a strict subset of $[\underline{p}, \hat{p}]$. Then the closedness of $\mathcal{A}$ implies that there exists $p' \in \mathcal{A}$ and $\varepsilon > 0$ such that $(p', p'+\varepsilon) \subset [0,1] \setminus \mathcal{A}$. Note that $p' \geq \underline{p}$. The same argument used in the first part of the proof of Case 3 to show that $p^{**} = \hat{p}$ implies that the responder should accept x_c for $p \in (p', p'+\varepsilon)$, which in turn implies that the setter's value function must satisfy both the value-matching and smooth-pasting conditions (29) and (30), replacing p^{**} by $\hat{p}$. This implies that equation (31) holds for p', i.e., $p' = \hat{p}$, leading to a contradiction.

Lemma 2 implies that if Condition 2 holds, the above argument provides the unique candidate equilibrium profile in Case 3:

$$\chi(p) = \begin{cases} x_c & \text{if } p \in [\underline{p}, \hat{p}] \\ x_s & \text{otherwise,} \end{cases} \qquad A(p) = \begin{cases} \{x_0, x_c\} & \text{if } p \geq \underline{p} \\ \{x_0\} & \text{if } p < \underline{p}. \end{cases}$$

Again, this profile is analyzed in proof of Proposition 1; this profile exists if and only if both (6) and (26) hold.

7.3 Proof of Proposition 3

First, it is straightforward from (13) and (14) that $\underline{p}$ and $\bar{p}$ is continuous in all parameters. Define

$$\underline{p}_a = \frac{r+\lambda+\xi}{\lambda}\left(1 - \frac{r+\xi}{\xi}\frac{v_c}{\bar{v}}\right), \quad \underline{p}_b = \frac{r+\lambda}{\lambda}\frac{\bar{v} - \frac{r+\xi}{\xi}v_c}{\bar{v} - v_c},$$

and

$$\hat{p}_a = \frac{r+\lambda+\xi}{\lambda}\frac{ru_c}{(r+\lambda)\bar{u} - (r+\lambda+\xi)u_c},$$

Then we show the desired results by analyzing the comparative statics of $\underline{p}_a$, $\underline{p}_b$, and $\hat{p}_a$.

Item 1: Consider the comparative statics with respect to r. First, $\hat{p}_a$ is strictly increasing in r, because

$$\frac{\partial \hat{p}_a}{\partial r} = \frac{u_c(((r+\lambda)^2 + \xi\lambda)\bar{u} - (r+\lambda+\xi)^2 u_c)}{((r+\lambda)\bar{u} - (r+\xi+\lambda)u_c)^2\lambda} > 0. \tag{32}$$

In particular, (32) is strictly positive because

$$\frac{u_c}{\bar{u}} < \frac{\lambda}{r+\lambda+\xi} \leq \frac{(r+\lambda)^2 + \xi\lambda}{(r+\lambda+\xi)^2}.$$

Taking derivatives of $\underline{p}_a$ and $\underline{p}_b$ with respect to r yields

$$\frac{\partial \underline{p}_a}{\partial r} = \frac{\bar{v} - \frac{2r+2\xi+\lambda}{\xi}v_c}{\lambda\bar{v}}, \qquad \frac{\partial \underline{p}_b}{\partial r} = \frac{\bar{v} - \frac{2r+\xi+\lambda}{\xi}v_c}{\lambda(\bar{v} - v_c)}.$$

Both derivatives are strictly negative since (6) implies that $v_c/\bar{v} > \xi/(r+\xi+\lambda)$.

Item 2: It is straightforward that $\underline{p}_a$ and $\underline{p}_b$ are strictly decreasing in λ. For $\hat{p}_a$,

$$\frac{\partial \hat{p}_a}{\partial \lambda} = \frac{ru_c((r+\lambda+\xi)^2 u_c - ((r+\lambda)^2 + (2\lambda + r)\xi\bar{u}))}{((r+\lambda)\bar{u} - (r+\xi+\lambda)u_c)^2\lambda^2} < 0, \tag{33}$$

because

$$\frac{u_c}{\bar{u}} < \frac{(r+\lambda)^2 + \xi\lambda}{(r+\lambda+\xi)^2} \leq \frac{(r+\lambda)^2 + (2\lambda+r)\xi}{(r+\lambda+\xi)^2}.$$

Item 3: Taking the derivatives with respect to ξ yields

$$\frac{\partial \underline{p}_a}{\partial \xi} = \frac{r(r+\lambda)v_c + \xi^2(\bar{v} - v_c)}{\bar{v}\xi^2\lambda} > 0,$$
$$\frac{\partial \underline{p}_b}{\partial \xi} = \frac{r(r+\lambda)}{\lambda\xi^2(\bar{v} - v_c)} > 0,$$
$$\frac{\partial \hat{p}_a}{\partial \xi} = \frac{u_c\bar{u}r(r+\lambda)}{((r+\lambda)\bar{u} - (r+\xi+\lambda)u_c)^2\lambda} > 0,$$

showing the desired results.

Item 4: Straightforward from equations (7) and (8).

Online Appendix: Proof of Propositions 4 and 5

We first derive the players' value functions in each type of equilibrium. Observe that the two types of equilibrium differ only in the behavior at $p = \underline{p}_\alpha$. Therefore, the differential equations underlying both value functions are identical, and they differ only in the boundary conditions at $p = \underline{p}_\alpha$. After obtaining the value functions, we verify each type of equilibrium by investigating the players' incentive conditions.

Value functions Let $V_i(p)$, $i = S, R$ be the value function under the easy issues, and let $W_i(p)$ be the value function under the difficult issues. Also, for notational simplicity, define $Z_i(p)$ to be the value function when the new issue arises, and define $\hat{Z}_i(p)$ as the value function when the current issue is resolved (but the new issue has not yet appeared). Then it is straightforward that

$$Z_i(p) = (1-\alpha)V_i(p) + \alpha W_i(p), \tag{34}$$

$$\hat{Z}_i(p) = \frac{\xi}{r+\xi}\Big((1-\alpha)V_i(p) + \alpha W_i(p)\Big). \tag{35}$$

Observe that for $p < \underline{p}_\alpha$, regardless of the issue type, permanent gridlock occurs in equilibrium. Therefore, $V_i(p) = W_i(p) = V_{i,g}(p)$.

Next, we derive the value functions for $p \in (\underline{p}_\alpha, \overline{p}_\alpha]$. Consider first the setter's value function. Under the easy issue, the setter offers x_c and the responder accepts the offer. Therefore, $V_S(p)$ satisfies

$$V_S(p) = u_c + e^{-rdt}\Big(\xi dt Z_S(p) + (1-\xi dt)\hat{Z}_S(p)\Big).$$

Cancelling the terms with order dt or higher, applying (34) and (35) and simplifying yield

$$V_S(p) = \frac{rV_{S,c} + \xi\alpha W_S(p)}{r+\xi\alpha}. \tag{36}$$

Under the difficult issue, the setter offers x_s and the responder rejects the offer. Therefore, $W_S(p)$ satisfies

$$\begin{aligned} W_S(p) =& p\lambda dt\Big(\bar{u} + e^{-rdt}(\xi dt V_{S,g}(1) + (1-\xi dt)\hat{V}_{S,g}(1))\Big) \\ &+ (1-p\lambda dt)e^{-rdt}\Big(\xi dt Z_S(p+dp) + (1-\xi dt)W_S(p+dp)\Big). \end{aligned} \tag{37}$$

Cancelling the terms with order dt^2 or higher, applying (34) and (35), and reorganizing yields

$$\lambda p(1-p)W_S'(p) = p\lambda(\bar{u} + \hat{V}_{S,g}(1)) + \xi(1-\alpha)V_S(p) - (p\lambda + r + \xi(1-\alpha))W_S(p).$$

Plugging in (36) and solving the differential equation yield

$$W_S(p) = f(p)K_S + \frac{a-b}{\mu+1}p + b, \tag{38}$$

where

$$f(p) = \frac{(1-p)^{\mu+1}}{p^{\mu}}, \quad \mu = \frac{r(r+\xi)}{\lambda(r+\xi\alpha)}, \quad a = \bar{u} + \hat{V}_{S,g}(1), \quad b = (1-\alpha)\hat{V}_{S,c} \tag{39}$$

and K_S is an integration constant.

Now consider the responder. Similar to (36), the responder's value function under the easy issues are given by

$$V_R(p) = \frac{rV_{R,c} + \xi\alpha W_R(p)}{r+\xi\alpha}. \tag{40}$$

Under the difficult issues, the setter offers x_s and the responder rejects the offer. Therefore, $W_R(p)$ satisfies

$$\begin{aligned} W_R(p) =& p\lambda dt e^{-rdt}(\xi dt V_{R,g}(1) + (1-\xi dt)\hat{V}_{R,g}(1)) \\ &+ (1-p\lambda dt)\Big(\xi dt\bar{v} + e^{-rdt}(\xi dt Z_R(p+dp) + (1-\xi dt)W_R(p+dp))\Big). \end{aligned}$$

Cancelling the terms with order dt^2 or higher, applying (34) and (35), and reorganizing yields

$$\lambda p(1-p)W_R'(p) = p\lambda\hat{V}_{R,g}(1) + \xi\bar{v} + \xi(1-\alpha)V_R(p) - (p\lambda + r + \xi(1-\alpha))W_R(p).$$

Solving this equation with (40) gives

$$W_R(p) = f(p)K_R + \frac{1}{\mu+1}\left[(\mu+1-p)\left(\frac{r+\xi\alpha}{r+\xi}V_{R,g}(0) + (1-\alpha)\hat{V}_{R,c}\right) + \hat{V}_{R,g}(1)p\right], \tag{41}$$

where K_R is an integration constant.

For $p > \overline{p}_{\alpha}$, gridlock arises in both the easy and the difficult policy issues. For the setter, $V_S(p)$ satisfies

$$\begin{aligned} V_S(p) =& p\lambda dt\Big(\bar{u} + e^{-rdt}(\xi dt V_{S,g}(1) + (1-\xi dt)\hat{V}_{S,g}(1))\Big) \\ &+ (1-p\lambda dt)e^{-rdt}\Big(\xi dt Z_S(p+dp) + (1-\xi dt)V_S(p+dp)\Big), \end{aligned}$$

and $W_S(p)$ satisfies (37). Simplifying, we have

$$\begin{aligned} \lambda p(1-p)V_S'(p) &= \lambda ap + \xi\alpha W_S(p) - (p\lambda + r + \xi\alpha)V_S(p). \\ \lambda p(1-p)W_S'(p) &= \lambda ap + \xi(1-\alpha)V_S(p) - (p\lambda + r + \xi(1-\alpha))W_S(p), \end{aligned} \tag{42}$$

where a is defined in (39). Similarly, $V_R(p)$ and $W_R(p)$ jointly solve

$$\begin{aligned} \lambda p(1-p)V_R'(p) &= \lambda\hat{V}_{R,g}(1)p + \xi\bar{v} + \xi\alpha W_R(p) - (p\lambda + r + \xi\alpha)V_R(p). \\ \lambda p(1-p)W_R'(p) &= \lambda\hat{V}_{R,g}(1)p + \xi\bar{v} + \xi(1-\alpha)V_R(p) - (p\lambda + r + \xi(1-\alpha))W_R(p). \end{aligned} \tag{43}$$

Solving the systems (42) and (43) yield the value functions

$$V_S(p) = K_{S1}h_1(p) + K_{S2}h_2(p) + \frac{\lambda}{r+\lambda}ap \tag{44}$$

$$W_S(p) = K_{S1}\frac{\alpha-1}{\alpha}h_1(p) + K_{S2}h_2(p) + \frac{\lambda}{r+\lambda}ap \tag{45}$$

$$V_R(p) = K_{R1}h_1(p) + K_{R2}h_2(p) + \frac{\lambda}{r+\lambda}\left(\hat{V}_{R,g}(1) - \frac{\xi}{r}\bar{v}\right)p + \frac{\xi}{r}\bar{v} \tag{46}$$

$$W_R(p) = K_{R1}\frac{\alpha-1}{\alpha}h_1(p) + K_{R2}h_2(p) + \frac{\lambda}{r+\lambda}\left(\hat{V}_{R,g}(1) - \frac{\xi}{r}\bar{v}\right)p + \frac{\xi}{r}\bar{v}, \tag{47}$$

where $K_{S1}, K_{S2}, K_{R1}, K_{R2}$ are integration constants and

$$h_1(p) = \frac{(1-p)^{\tau+1}}{p^{\tau}}, h_2(p) = \frac{(1-p)^{\nu+1}}{p^{\nu}}, \tau = \frac{r+\xi}{\lambda}, \nu = \frac{r}{\lambda}.$$

Equilibrium Verification: Gridlock Equilibrium In the first type of equilibrium—*gridlock equilibrium*—the setter induces gridlock for any p when the current policy issue is a difficult one. Therefore, if players currently face a difficult policy issue and $p = \underline{p}_\alpha$, there will be permanent gridlock. Thus, the boundary conditions for W_i are given by $W_i(\underline{p}_\alpha) = V_{i,g}(\underline{p}_\alpha)$. Then from (36) and (40), we have

$$V_S(\underline{p}_\alpha) = \frac{rV_{S,c} + \xi\alpha V_{S,g}(\underline{p}_\alpha)}{r+\xi\alpha}, \tag{48}$$

$$V_R(\underline{p}_\alpha) = \frac{rV_{R,c} + \xi\alpha V_{R,g}(\underline{p}_\alpha)}{r+\xi\alpha}. \tag{49}$$

Given this boundary condition, let us verify the incentive constraints of each player.

Case 1: $p < \underline{p}_\alpha$. In this case, we only need to verify the responder's incentive condition to reject x_c under easy issues. Same as the benchmark model, this condition is given by

$$V_{R,c} \le V_{R,g}(p) \qquad \text{for any } p < \underline{p}_\alpha.$$

Since $V_{R,g}(p)$ is decreasing in p, the above inequality holds if and only if

$$\underline{p}_\alpha \le \underline{p}, \tag{50}$$

where $\underline{p}$ is given in equation (13).

Case 2a: $p = \underline{p}_\alpha$ **under a easy policy issue**. First, consider the responder's incentives. Under easy issues, the responder must accept x_c at $p = \underline{p}_\alpha$. This condition is given by

$$V_R(\underline{p}_\alpha) \ge p\lambda dt e^{-rdt}(\xi dt V_{R,g}(1) + (1-\xi dt)\hat{V}_{R,g}(1)) + (1-p\lambda dt)\Big(\xi dt\bar{v} + e^{-rdt}V_{R,g}(\underline{p}_\alpha + dp)\Big).$$

Deleting terms with order dt or higher and reorganizing yield

$$v_c + \frac{\xi}{r+\xi}((1-\alpha)V_R(\underline{p}_\alpha) + \alpha W_R(\underline{p}_\alpha)) \geq V_{R,g}(\underline{p}_\alpha).$$

Plugging in $W_R(\underline{p}_\alpha) = V_{R,g}(\underline{p}_\alpha)$ and (49), and simplifying yield

$$V_{R,c} \geq V_{R,g}(\underline{p}_\alpha) \quad \Longleftrightarrow \quad \underline{p}_\alpha \geq \underline{p}. \tag{51}$$

Combining (50) and (51) implies that

$$\underline{p}_\alpha = \underline{p} = \frac{r+\lambda+\xi}{\lambda}\left(1 - \frac{r+\xi}{\xi}\frac{v_c}{\bar{v}}\right). \tag{52}$$

Since the setter prefers to offer x_c than to offer x_s at $p = \underline{p}$ under easy issues, the setter's incentive condition is given by $V_S(\underline{p}) \geq V_{S,g}(\underline{p})$. By (48), this condition simplifies to $V_{S,c} \geq V_{S,g}(\underline{p})$, or

$$\frac{v_c}{\bar{v}} \geq \frac{\xi}{r+\xi}\left(1 - \frac{u_c}{\bar{u}}\right). \tag{53}$$

Note that (53) is identical to (23), the corresponding condition in the benchmark case.

Given the result of (52), we denote $\underline{p}$ instead of $\underline{p}_\alpha$ in the remaining of the proof.

Case 2b: $p = \underline{p}$ **under a hard policy issue**. The responder must prefer to reject x_s than to accept the offer, and thus her incentive condition is given by

$$V_{R,g}(p) \geq \frac{r}{r+\xi}((1-\alpha)V_R(\underline{p}) + \alpha W_R(\underline{p})).$$

Since (52) implies that $V_R(\underline{p}) = W_R(\underline{p}) = V_{R,g}(\underline{p})$, the above condition simplifies to $V_{R,c} \geq \hat{V}_{R,c}$, which is trivially satisfied.

Consider the setter's incentive to offer x_s at $p = \underline{p}$. Because she must prefer offering x_s to offering x_0, her incentive condition is given by

$$V_{S,g}(\underline{p}) \geq e^{-rdt}(\xi dt Z_S(\underline{p}) + (1-\xi dt)\hat{Z}_S(\underline{p})).$$

Plugging in (48) and (52), and simplifying yield

$$\frac{v_c}{\bar{v}} \leq \frac{\xi}{r+\xi}\left(1 - \frac{\xi(1-\alpha)}{r+\xi}\frac{u_c}{\bar{u}}\right), \tag{54}$$

which is given by condition (10) in Proposition 4.

Case 3a: $p \in (\underline{p}, \overline{p}_\alpha]$ **under a easy policy issue**. In this case, the responder prefers to accept x_c than to reject. Therefore, her incentive condition is

$$V_R(p) \geq p\lambda dt e^{-rdt}\hat{V}_{R,g}(1) + (1-p\lambda dt)(\xi dt(\bar{v} + e^{-rdt}Z_R(p+dp)) + (1-\xi dt)e^{-rdt}V_R(p+dp)).$$

Simplifying yields

$$(r + p\lambda + \xi\alpha)V_R(p) \geq p\lambda\hat{V}_{R,g}(1) + \xi\overline{v} + \xi\alpha W_R(p) - \lambda p(1-p)V_R'(p)$$

Using (36), we reorganize the condition as

$$rV_{R,c} - p\lambda(\hat{V}_{R,g}(1) - V_{R,c}) - \xi\overline{v} \geq \xi\alpha\left(V_{R,g}(0) - V_{R,c} + \frac{p\lambda}{r}(\hat{V}_{R,g}(1) - W_R(p) - (1-p)W_R'(p))\right). \tag{55}$$

Note that if $\alpha = 0$, (55) becomes identical to (24), which is the corresponding incentive condition in the benchmark model. Then the corresponding argument in the proof of Proposition 1 (page 29) shows that (24) is satisfied for all $p > \underline{p}$. Moreover, a calculation shows that the right side of (55) is negative for all $p > \underline{p}$, implying that (55) is satisfied for all $p > \underline{p}$. Intuitively, the responder has a stronger incentive to accept x_c when $\alpha > 0$ compared to the case with $\alpha = 0$, because rejecting might lead to the replacement of a difficult policy issue.

Next, consider the setter's incentive condition. Since the setter prefers to offer x_c then to offer x_s, her incentive condition is given by

$$V_S(p) \geq p\lambda dt(\bar{u} + e^{-rdt}\hat{V}_{S,g}(1)) + (1 - p\lambda dt)e^{-rdt}(\xi dt Z_S(p + dp) + (1 - \xi dt)V_S(p + dp))$$

Simplifying and plugging in (36), we have

$$rV_{S,c} - p\lambda(a - V_{S,c}) \geq \xi\alpha\left(-V_{S,c} + \frac{p\lambda}{r}(a - W_S(p) - (1-p)W_S'(p))\right), \tag{56}$$

where a is defined in (39). From (38), $a - W_S(p) - (1-p)W_S'(p) = f(p)\frac{\mu}{p}K_S + \frac{\mu}{\mu+1}(a-b)$. Therefore, (56) becomes

$$rV_{S,c} - p\lambda(a - V_{S,c}) + \xi\alpha\left(V_{S,c} - \frac{r+\xi}{r+\xi\alpha}\left(f(p)K_S + \frac{a-b}{\mu+1}p\right)\right) \geq 0. \tag{57}$$

We show that the left side of (57) is concave. First, observe that $f(p)$ is convex. Second, note that K_S must be positive. If K_S is negative, then $V_S(p)$ must be concave by (36), but this leads to a negative value of information under a easy policy issue. This is a contradiction because there cannot be any loss of learning from the belief drifting down but there exists the upside gain when the belief jumps to one. Therefore, if (57) is satisfied at $p = \underline{p}$, then there exists $\overline{p}_\alpha \in (\underline{p}, 1]$ such that (57) is satisfied for $p \in (\underline{p}, \overline{p}_\alpha]$. If (57) is not satisfied at $p = \underline{p}$, then (since (53) holds) the players compromise only at $p = \underline{p}$.

Case 3b: $p \in (\underline{p}, \overline{p}_\alpha]$ **under a hard policy issue.**

In this case, the responder's incentive condition to reject x_s is identical to that in Case 2b. given by

$$W_R(p) \geq e^{-rdt}(\xi dt Z_R(p) + (1 - \xi dt)\hat{Z}_R(p)).$$

Cancelling out terms with orders of dt or higher, plugging in (36) and reorganizing yield

$$W_R(p) \geq (1-\alpha)\hat{V}_{R,c},$$

which is trivially satisfied. The setter's incentive condition to propose x_s is

$$W_S(p) \geq e^{-rdt}(\xi dt Z_S(p) + (1 - \xi dt)\hat{Z}_S(p)).$$

Plugging in value functions and simplifying yields

$$W_S(p) \quad \geq \quad (1-\alpha)\hat{V}_{S,c}.$$

The analysis in Case 2b shows that the above condition holds at $p = \underline{p}$ if and only if (54) is satisfied. Then since $W_S(p)$ is strictly decreasing in p, it follows that the above condition is satisfied for all $p \in (\underline{p}, \bar{p}_\alpha]$ if (54) holds.

Case 4: $p > \overline{p}_\alpha$. Let us consider the setter's incentive condition under the easy issue. He must prefer to offer x_s than x_c.

$$V_S(p) \geq u_c + e^{-rdt}(\xi dt Z_S(p) + (1 - \xi dt)\hat{Z}_S(p)).$$

Similar to above, cancelling out terms with order of dt or above and reorganizing yield

$$(r + \xi\alpha)V_S(p) - \xi\alpha W_S(p) \geq rV_{S,c}. \tag{58}$$

Plugging in (44) and (45) and reorganizing yield

$$K_{S1}h_1(p) + \frac{r}{r+\xi}\left(K_{S2}h_2(p) + \frac{\lambda}{\lambda+r}ap\right) \geq u_c. \tag{59}$$

We claim that (59) holds for all $p \geq \bar{p}_\alpha$ given that $\bar{p}_\alpha < 1$. Note that by (36) and the continuity of $V_S(p)$ and $W_S(p)$ at $p = \bar{p}_\alpha$, (58) holds with equality at $p = \bar{p}_\alpha$. Therefore, it suffices to show that the left-hand side of (59) is increasing in p.

Note that since $V_S(\bar{p}_\alpha) > W_S(\bar{p}_\alpha)$, it follows from (44) and (45) that $K_{S1} > 0$. Now suppose to the contrary that the left-hand side of (59) is strictly decreasing at $p = p' > \bar{p}_\alpha$. Since $K_{S1} > 0$, it must be that $K_{S2} < 0$. Then comparing the left-hand side of (59) and $V_S(p)$ in (44) implies that $V_S(p)$ must be strictly decreasing at $p = p'$. However, $V_S(p)$ must be strictly increasing for all $p > \bar{p}_\alpha$ since having a higher p does not incur any cost to the setter, leading to a contradiction.

Equilibrium Verification: Avoiding-the-issue Equilibrium In the avoiding-the-issue equilibrium, the setter offers x_0 to induce compromise at $p = \underline{p}_\alpha$ under difficult policy issues. Then the value of $V_S(\underline{p}_\alpha)$ and $W_S(\underline{p}_\alpha)$ satisfy the following system of equations:

$$V_S(\underline{p}_\alpha) = u_c + \frac{\xi}{r+\xi}\Big((1-\alpha)V_S(\underline{p}_\alpha) + \alpha W_S(\underline{p}_\alpha)\Big)$$
$$W_S(\underline{p}_\alpha) = \frac{\xi}{r+\xi}\Big((1-\alpha)V_S(\underline{p}_\alpha) + \alpha W_S(\underline{p}_\alpha)\Big)$$

Similarly, $V_R(\underline{p}_\alpha)$ and $W_R(\underline{p}_\alpha)$ jointly solve

$$V_R(\underline{p}_\alpha) = v_c + \frac{\xi}{r+\xi}\Big((1-\alpha)V_R(\underline{p}_\alpha) + \alpha W_R(\underline{p}_\alpha)\Big)$$
$$W_R(\underline{p}_\alpha) = \bar{v} + \frac{\xi}{r+\xi}\Big((1-\alpha)V_R(\underline{p}_\alpha) + \alpha W_R(\underline{p}_\alpha)\Big)$$

Solving the above systems yields the boundary conditions at $p = \underline{p}_\alpha$:

$$V_S(\underline{p}_\alpha) = u_c + \frac{\xi(1-\alpha)}{r}u_c, \qquad V_R(\underline{p}_\alpha) = v_c + \frac{\xi}{r}((1-\alpha)v_c + \alpha\bar{v}),$$
$$W_S(\underline{p}_\alpha) = \frac{\xi(1-\alpha)}{r}u_c, \qquad W_R(\underline{p}_\alpha) = \bar{v} + \frac{\xi}{r}((1-\alpha)v_c + \alpha\bar{v}).$$

Case 1: $p < \underline{p}_\alpha$. For $p < \underline{p}_\alpha$, the players' incentive conditions are identical to those in the gridlock equilibrium. Therefore, the profile must satisfy (50), or equivalently,

$$\underline{p}_\alpha \leq \underline{p}, \tag{60}$$

where $\underline{p}$ is defined in Proposition 1.

Case 2b: $p = \underline{p}_\alpha$ **under a easy policy issue**. First, the responder must prefer to accept x_c at $p = \underline{p}_\alpha$. Same as the gridlock equilibrium, this condition is given by

$$V_R(\underline{p}_\alpha) \geq p\lambda dt e^{-rdt}(\xi dt V_{R,g}(1) + (1-\xi dt)\hat{V}_{R,g}(1)) + (1-p\lambda dt)\Big(\xi dt\bar{v} + e^{-rdt}V_{R,g}(\underline{p}_\alpha + dp)\Big).$$

Deleting terms with order dt or higher, plugging in the value of $W_R(\underline{p}_\alpha)$ and $V_R(\underline{p}_\alpha)$ and simplifying yields

$$V_{R,c} + \frac{\xi\alpha}{r}(\bar{v} - v_c) \geq V_{R,g}(\underline{p}_\alpha). \tag{61}$$

Note that the above incentive condition is strictly weaker than the corresponding condition in the gridlock equilibrium (equation 51). Solving for $\underline{p}_\alpha$, we have

$$\underline{p}_\alpha \geq \underline{p}_0 \equiv \frac{r+\lambda+\xi}{\lambda}\left((1-\alpha) - \frac{r+\xi(1-\alpha)}{\xi}\frac{v_c}{\bar{v}}\right). \tag{62}$$

It is straightforward to check that $\underline{p}_0 < \underline{p}$ for any $\alpha > 0$.

For the setter, she must prefer to offer x_c than to offer x_s at $p = \underline{p}_\alpha$, and thus her incentive condition is

$$V_S(\underline{p}_\alpha) \geq V_{S,g}(\underline{p}_\alpha).$$

As we shall see, this condition is strictly weaker than the corresponding condition under the hard policy issue (equation 63).

Case 2b: $p = \underline{p}_\alpha$ **under a hard policy issue**. In this case, the responder prefers to accept x_0, and thus her incentive condition is given by $W_R(\underline{p}_\alpha) \geq V_{R,g}(\underline{p}_\alpha)$. It is straightforward to show that this condition is strictly weaker than (61).

Next, consider the setter's incentive to offer x_0 at $p = \underline{p}_\alpha$. Since she must prefer offering x_0 than offering x_s, her incentive condition is given by

$$rW_S(\underline{p}_\alpha) \geq V_{S,g}(\underline{p}_\alpha). \tag{63}$$

Reorganizing with respect to $\underline{p}_\alpha$ yields

$$\underline{p}_\alpha \leq \tilde{p} \equiv \frac{r+\lambda+\xi}{\lambda} \cdot \frac{\xi(1-\alpha)}{r+\xi} \frac{u_c}{\bar{u}} \tag{64}$$

Combining (60), (62), and (64) implies that $\underline{p}_\alpha \in [\underline{p}_0, \min\{\underline{p}, \tilde{p}\}]$. Such $\underline{p}_\alpha$ exists if and only if $\underline{p}_0 \leq \tilde{p}$, or

$$\frac{v_c}{\bar{v}} \geq \frac{\xi(1-\alpha)}{r+\xi(1-\alpha)} \left(1 - \frac{\xi}{r+\xi} \frac{u_c}{\bar{u}}\right),$$

which is the binding condition in Proposition 5.

Case 3 & 4: $p > \underline{p}_\alpha$. For each $\underline{p}_\alpha \in [\underline{p}_0, \min\{\underline{p}, \tilde{p}\}]$, an argument identical to that for the gridlock equilibrium shows that the incentive conditions for $p > \underline{p}_\alpha$ are satisfied.