Knowing When Not to Quit: State Reputation and War Duration*

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August 20, 2007

Word Count: 8,708

Prepared for presentation at the 2007 American Political Science Association Annual Meeting, Chicago.

*Author names are listed alphabetically. We are grateful to Branislav Slantchev and Mark Crescenzi for the use of their data. Stata 9.2 was used to generate the statistical results presented in this paper. Please direct correspondence to sblong@ksu.edu.
Abstract

Rationalist explanations of war often tout the importance of informational asymmetries. However, some wars last substantially longer than others. Warring states obtain vital information in the initial stages of conflict about one another’s capabilities, resolve, and reservation points. Yet, as Robert Powell (2006) argues, wars may continue to persist as a result of the conflicting parties’ inability to commit to peaceful forms of conflict resolution. In this paper, we seek to explain interstate war duration by focusing on the tenor of state reputations. We argue that commitment problems will be especially difficult to overcome when warring states have an historical reputation for hostility. Past conflicts are indications of past commitment problems. As such, we expect that reputations that are marked by hostile interactions will have the effect of prolonging the duration of interstate wars. We test this hypothesis in a model of war duration by using the Reputational Interdependence Score (Crescenzi, 2007) as measures of states’ extra–dyadic histories of conflict and cooperation. The results shed light on the ability of states to credibly commit to conflict resolution.
1 Introduction

Why do states engaged in interstate war sometimes seem not to know when to quit? The length of interstate war varies widely, and scholars have tended to do a better job predicting wars on the lower end of the duration scale. Long wars have posed a more puzzling question: why, once multiple battles have occurred, do states sometimes fail to gain enough information to locate a peaceful settlement acceptable to both parties? In this paper, we explain how Powell’s (2006) discussion of commitment problems can be used to understand why some wars drag on to the point of being seen as statistical outliers, then connect his ideas to recent innovations in the operationalization of extra-dyadic historical interactions to show that longer wars can be explained effectively.

2 Bargaining Theory, State Reputation, and War

2.1 Information Asymmetries

Bargaining theories of interstate war often rely upon information asymmetries to explain conflict between states (Fearon, 1995; Wagner, 2000; Werner, 1999). States in crisis lack information about their crisis partner. Since conflict is costly, states prefer to resolve their disputes by peacefully dividing the spoils between them. However, states are often incapable of knowing their crisis partner’s strength, resolve, and reservation points. Armed conflict may thus be the result of a lack of information on any or all of these issues.

First, war between states may occur as the result of each state’s inability to accurately assess its opponent’s battlefield capabilities relative to its own. For example, perceiving an opponent to be relatively weak militarily may cause a state in crisis to be less willing to make concessions at the negotiation table, believing that a resort to arms should produce a positive outcome. The result of such a miscalculation may yield costly battlefield losses, an
inefficient outcome relative to a division of the spoils at the negotiation table.

Second, a state may lack reliable information about the value that its opponent places on the issue under dispute. Should the issue be of great importance to its opponent, a state may mistakenly initiate a conflict in which its opponent is willing to endure great losses to achieve victory, thus increasing the costs to the initiator. Issues of territory, for example, appear to be especially prone to conflict (Vasquez, 1993). A state may miscalculate its opponent’s resolve for maintaining control of its territorial possessions, especially if that territory has cultural, resource, or geopolitical significance that is special or exclusive to its opponent. Accurately assessing its opponent’s resolve prior to conflict is thus critical to a state’s ability to offer settlement terms that are congruent with its opponent’s valuation of the status quo.

Lastly, an accurate assessment of an opponent’s reservation point is critical to avoiding the costs of war. With full information, a state could simply offer the minimum settlement terms that its opponent would be willing to accept before turning to violence. In a world of full information, assuming that conflict is a costly process and all issues are divisible, war would be obsolete as states could simply divide status quo benefits to accurately reflect the power distribution among them. However, lacking full information, states may perceive a disparity between the distribution of power between countries and the status quo distribution of benefits among them, thus creating an opportunity for conflict to erupt (Werner, 1999).

In a world of incomplete information, states may misjudge their crisis adversaries. Finding mutually agreeable settlement terms is further complicated by each state’s incentive to misrepresent its own private information in an effort to achieve a more valuable settlement. Boasting of a powerful military, feigning determination to fight fiercely over an issue if necessary, or exaggerating one’s minimally acceptable terms are ways in which states attempt to convince their opponents to yield to their demands. The result may be war.

The initial research in the bargaining literature thus saw the onset of war as a breakdown of the pre-war bargaining process, as states incur the Pareto inferior costs of conflict by being
incapable of reaching a mutually agreeable resolution to their disputes. Recent research in
the literature, however, has re-conceptualized conflict hostilities as an integral component of
the bargaining process rather than as a failure of the process to yield a mutually agreeable
outcome. In this sense, the bargaining literature has approached the study of conflict as a
political negotiation process, more fully capturing Clausewitz’s characterization of war as
“politics by other means.” Rather than modeling war as separate from (or as the result of a
failure of) the political negotiations between states (Bueno de Mesquita and Lalman, 1992;
Morgan, 1994), war is considered to be an important component of the negotiation process
(Wagner, 2000; Powell, 2004a, b, 2006; Filson and Werner, 2002; Slantchev, 2003, 2004; Smith
and Stam, 2004).

Using the same logic of information asymmetries, then, this literature should be equally
capable of explaining both war onset and duration.\(^1\) In other words, war duration can be
explained by the revelation of private information on the battlefield.\(^2\) In conflict, states are
less capable of misrepresenting their strength and resolve. Conflict reveals each adversary’s
true capacities. Wins and losses on the battlefield send clear and unambiguous signals to
state leaders about their opponent’s capabilities and the relative likelihood of eventually
achieving victory or suffering defeat in war.

With each subsequent battlefield event, states update their expectations. In doing so,
states become increasingly capable of finding negotiated resolutions that fall sufficiently
between each state’s reservation points, thus successfully avoiding the decisive defeat of one
side (Filson and Werner, 2002; Smith and Stam, 2004). Losses on the battlefield should yield
more concessions at the bargaining table by the side suffering defeats on the battlefield. This
should then increase the likelihood that offers made by the losing side will be accepted by the

\(^1\) For a formal example of such a unified model of war onset and duration/termination, see Filson and
Werner (2002).

\(^2\) See (Slantchev, 2004) for an empirical assessment of several predictions generated from the information
asymmetry bargaining model and war duration.
state experiencing battlefield success. From the perspective of information asymmetries one would expect that as wars endure, more private information is revealed, and the likelihood of negotiated resolutions to the violence should increase. Over time, then, continued conflict should increase the likelihood of reaching a peaceful resolution to the hostilities.

2.2 Commitment Problems and State Learning Processes

Information Asymmetries and Long Wars

In explaining war onset and duration, an information asymmetry approach is a reasonable one. In an anarchic international environment, states lack supranational constraints that could otherwise ensure the exchange of reliable information. Without institutional oversight or systematic enforcement of agreed upon rules, states have incentives to misrepresent their true resolve, strength, and reservation points in an effort to achieve better outcomes at the negotiation table.

However, from the perspective of information asymmetries, it is unclear how much information is revealed on the battlefield or, for that matter, how much states learn from this information before they can come to a mutually agreeable peaceful resolution to the conflict. This is an interesting issue, as wars last for variable periods of time. The Correlates of War data on interstate wars (Sarkees, 2000), for example, reports the mean duration of all wars in the 1816 to 1997 time period to be approximately 427 days. The longest recorded war during that time period, the Vietnam War, endured for 3,735 days. At the other extreme, the Football War of 1969 between Honduras and El Salvador lasted for only 5 days. Indeed the standard deviation for war duration during this time period is rather large, approaching 700 war days. If war duration can reasonably be assumed to be a suitable proxy for the number of battlefield events that reveal critical information, then either variable amounts of information are produced by each event or states vary in the amount that they learn from
these events. Neither possibility is particularly appealing.\(^3\)

In fact, as Powell (2006) notes, such a reliance on information asymmetries yield a peculiar reading of longer wars. Are states not understanding the information that is revealed from the battlefield? Do some issues take a longer period of fighting to produce a mutually recognizable resolution? It may be that some wars are fought over issues that are inherently indivisible, as Fearon (1995) notes. Yet, Fearon actually questions the prevalence such indivisible issues in interstate bargaining. Issue indivisibility should yield “absolute” wars that are fought until one side submits fully rather than “real” wars that eventually yield a negotiated settlement. However most wars are not fought to submission. Rather “real” war reveals information to the competing sides that indicates what the outcome of an “absolute” war would be (Wagner, 2000).

This is not to say that “absolute” wars resulting from issue indivisibility are impossible. Previous research has argued that conflict can arise over psychological or constructed issues. Some explanations suggest that conflict over ethnicity (Toft, 2002/3) or sacred territory (Hassner, 2003) may exhibit indivisible properties. However, given the occasion for states to divide the benefits of the status quo between them and the opportunities to select from an infinite pool of side payment options, most if not all disputed issues should be divisible prior to the outbreak of costly violence (Fearon, 1995). Therefore, what may appear to be “absolute” wars in terms of conflict duration are in fact “real” wars, as the opposing sides are capable of finding a mutually agreeable resolution to their ongoing conflict without

\(^3\)Theoretically, it is somewhat unclear which types of events produce the most information on the battlefield. Also, common bargaining models of conflict do not speak to the manner in which states process the information produced on the battlefield. Do states have biases in their information processing? Do different regime types process information differently? Is the information that is reported to policymakers from the battlefield accurate? Empirically, accounting for a typology of battlefield events would be difficult without specific information on battlefield processes and outcomes. Such information is not readily available over a long period of time inclusive of all countries. The United States Army CDB90 dataset (Dupuy, 1995) is one such effort, but it is limited in the coverage of wars in its temporal domain. Even if such data did exist, creating a rank-order of battle events and their informational value would require normative judgements in the coding process. Lacking theoretical and empirical direction, we are left with the assumption that states fighting long wars simply learned less from the battlefield than states fighting short wars.
suffering total defeat. To explain the variation in duration from an information asymmetry perspective, either information is revealed in varying amounts from the battlefield, states vary in their ability to accurately process this information, or the issues under dispute vary in their level of importance to the adversarial states.

An Alternative: Commitment Credibility

Powell (2006) provides a more coherent alternative to these possibilities. Powell shows that the fact that war is costly essentially ensures that a bargaining space exists within which states can find peaceful resolution to their disputes. He highlights the fact that wars may occur even when states are fully informed. He reasons that even when states possess no private information, wars may still occur as the result of a commitment problem. Engaging in war to resolve a dispute is a Pareto inferior outcome given the costs borne on both sides of a violent conflict. However, states may have difficulties in committing themselves to meaningful peace, yielding wars of longer duration. In an anarchic international system, there is no systemic institutional framework to ensure the enforcement of resolution terms. As a result, states may face a number of incentives to renege on their negotiated commitments. For example, a shift in the distribution of power should increase a state’s likelihood of challenging the status quo distribution of benefits, thus increasing the likelihood of war.

With respect to war duration, when the issue under dispute affects one or both states’ future power relative to the other, then states will have future interests in more favorably redistributing the status quo share of benefits. As a result, committing to peace is difficult given future incentives to shirk on the resolution terms. Conceptualizing war as a commitment problem thus resolves some of the shortcomings of the informational approach. After years of fighting to demonstrate one’s strength and resolve, an emphasis on information asymmetries loses traction in explaining continued conflict. Indeed, information asymme-

\[4\] This may help to explain why the results reported by Slantchev’s (2004) empirical information asymmetry
tries dissolve, and states approach full information as wars persist. Rather, states engaged in conflict may have an inability to commit to a negotiated peace, believing that the type of crisis adversary faced in a dispute is one that it would rather fight than accommodate.

State Reputation as a Record of Commitment Credibility

One way in which states gain critical information about their conflict adversaries is by drawing upon knowledge of one another’s historical reputation for conflictual or cooperative interactions. Such information helps each state ascertain which type of adversary they are faced with in their disputes, and whether that type is one that can credibly commit to a peaceful resolution to the conflict. Over time, states build histories of interactions with other states in the international system. This historical record essentially provides a basis of information upon which states draw in calculating the propensity of their conflict adversary to engage in peaceful or conflictual forms of resolving their international disputes.

Much of quantitative research in international conflict processes implicitly assumes that interactions occur in a temporal vacuum, as researchers record dyadic information without consideration of historical processes. Yet, states draw upon their dyadic historical record when making policy decisions. This is especially the case for two states embroiled in conflict, as states must make policy decisions quickly to respond to unfolding events. The historical information available to states comes in two forms. The first stream of information is generated by past shared dyadic interactions between the conflict adversaries. A shared dyadic history of interactions often shapes the way state approach one another in the future, as past interactions commonly influence future interactions between states.

The second stream of information is more diffuse than direct dyadic history, but it is the more generally applicable form of information from which states learn. This information stream is generated by the reputation for conflict or cooperation that each state develops model become less reliable as wars endure for long periods of time.
over time. It is this stream of information that is the major focus of this paper. States in the international system interact regularly. Over time, a state generates a reputation as perceived by other states in the system. The perception that a country has of another state’s reputation is the result of that state’s historical interaction with every other state in the international system. In other words, a country perceives another state’s record of interactions by observing how it has treated the rest of its interaction partners in the past.

Reputational history is at the same time more diffuse and more generally applicable than direct dyadic history because states need not have interacted with one another previously to know important historical information about one another. Rather, states can observe how their dyadic partners have treated every other member of the international system when attempting to calculate the expected tenor of their future dyadic relationship. A state’s tendency to deal with its disputes using hostile means will saddle it with an international reputation for violence. On the other hand, a cooperative reputation signals a state’s penchant for committing itself to peaceful forms of resolving its international disputes.

In addition to the tenor of a state’s extra–dyadic interaction record, actor similarity plays an important role. In other words, if state A wishes to learn from state B’s international reputation, A can learn more from B’s interaction record with all states C when C is similar to A than when C is substantially different from A (Crescenzi, 2007; Crescenzi, Kathman and Long, 2007). This reputational concept reflects Heider’s (1946) approach to learning processes that holds The friend of my friend is my friend, the friend of my enemy is my enemy, the enemy of my enemy is my friend, the enemy of my friend is my enemy. As such, B’s extra–dyadic reputation should be increasingly relevant to A as A’s similarity to all states C increases. Should A find itself in dispute with B, A’s perception of B’s reputation will be especially salient to the resolution of the conflict. If, for example, from state A’s perspective, state B has a violent reputation for resolving its international disputes, A will learn of

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B’s apparent inability to commit to peaceful forms of conflict resolution. Using Powell’s language, A will perceive B to be a particular type of state that A would prefer to fight rather than accommodate given B’s historical reputation for violence. Alternatively, should A find itself in dispute with B, A’s perception of B’s reputation will reflect B’s historical ability to find peaceful remedies to its international conflicts. As such A will recognize B as a type that should be capable of credibly committing to peaceful conflict resolution rather than resorting to costly and inefficient hostilities to resolve their differences (Powell, 2006).

**Historical Reputation and War Duration**

While Powell’s argument in favor of conceptualizing war as a commitment problem between states is convincing, he provides no systematic empirical support for his formal work. We argue that states form reputations over time that reflect their conflictual or cooperative pasts. These reputations provide an accurate representation of a state’s propensity either to credibly commit to peaceful conflict resolution or to suffer from commitment problems in their interactions with other countries in the system. An historical reputation for using violence in resolving one’s international disputes, and thus a demonstration of a state’s inability to commit to more efficient peaceful resolution processes, should increase the likelihood of prolonged hostilities when states find themselves in conflict with one another. On the other hand, an historical reputation for cooperative interaction, and thus a positive portrayal of a state’s peaceful commitment credibility, should decrease the likelihood of prolonged hostilities when states become embroiled in conflict.

The state learning and rivalry literatures provide examples of empirical research that support these arguments. These literatures note the propensity of disputatious states to suffer from recurring conflict. These states thus exhibit an apparent inability to commit to more efficient means of dividing the interstate share of status quo benefits. Historical conflict produces a context in which future confrontation is expected. The expansive litera-
ture on interstate rivalry is based upon the idea that interactions between states should be considered in the context of long temporal relationships. Additionally, recent research in the state learning and state reputation literatures has made theoretical and empirical advances in understanding how historical conflict affects a state’s future propensity to engage in hostilities (Crescenzi and Enterline, 2001; Crescenzi, Enterline and Long, 2007; Crescenzi, 2007; Crescenzi, Kathman and Long, 2007).

As Crescenzi, Kathman and Long (2007) argue, pressures produced within the policymaking community or generated through group dynamics in the selectorate produce an environment that is ripe for commitment problems between historically conflictual states. For example, in an exhaustive research agenda, Russell Leng (1983; 1988; 1993; 2000) argues that policymakers rely upon their realpolitik belief systems when confronting adversarial states. Over time, policymakers in conflicting countries come to view one another as enemies. As a result a coercive bargaining approach essentially becomes a dominant strategy for states in conflict, as each side doubts the credibility of the other to commit to peace. Such coercive strategies increase the likelihood of recurring conflict, producing a cycle of hostility between states that is difficult to reverse. In addition, a large literature notes the group dynamics of domestic selectorates and the tendency of domestic audiences to unify in their focus when faced with an external threat to their national security. Domestic selectorates may then increase the pressure felt by policymakers to pursue hostile strategies, as leaders wish to appease powerful domestic audiences in order to maintain political power (Bueno de Mesquita, Siverson and Woller, 1992; Bueno de Mesquita and Siverson, 1995; Fearon, 1994).

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6 See Diehl and Goertz (2000) for a review of the rivalry literature.
7 For a similar argument see Vasquez (1993) and Senese and Vasquez (2003). In addition, Colaresi (2004) notes that unreciprocated cooperation within rival dyads increases the likelihood that cooperative leaders will be removed from office. As a result, leaders prefer to employ coercive policies against adversaries with historical reputations for conflict behavior for fear that cooperative strategies will yield a coercive response.
8 See Mueller (1970) and Brody (1984) for a discussion of the “rally around the flag” effect of external security risks. More generally, refer to Coser (1956) for an explanation of group dynamics that result from external threats.
Crescenzi, Kathman and Long (2007) explain the onset of interstate war by noting a cycle of coercion like that which is described above. A similar logic can be employed when addressing expectations with regard to war duration, as policymakers and domestic selectorates are less likely to prefer peaceful resolutions to an ongoing conflict when faced with an adversary whose negative reputation indicates a distinct inability or unwillingness to commit to peaceful resolution processes. Even if a historically hostile state indicates its interest in a peaceful resolution to an ongoing war, its conflict adversary is unlikely to accept such overtures on faith alone. Instead, as the formal and empirical work on this topic suggests, states analyze the reputations of their conflict adversaries as indications of one another’s peaceful commitment credibility. Where a state observes little such credibility in its adversary, wars are expected to persist for longer periods of time. This results because the state’s adversary is more likely to be of a particular type that the state will be less willing to accommodate than it is to fight. This discussion leads us to our primary hypothesis with regard to the effect state reputation on war duration:

- H1: Extra-dyadic reputations for conflict will increase the expected duration of war hostilities.

In the following sections we will describe the way in which we model past interactions and reputations. We will subsequently operationalize these concepts to be tested on the population of wars in the 1816 to 1991 period.

3 Modeling Extra-Dyadic Reputation

The reputation concept used in this project (see Crescenzi (2007) and Crescenzi, Kathman and Long (2007)) considers the manner in which a state has treated other members of the international system in the past and the relevance of these interactions to the state’s conflict
adversary. For example, consider a dyad consisting of states A and B. For A to calculate B’s reputation, it first observes B’s interaction history with all other states C in the international system. However, not all states C are reasonable proxies for how A should expect B to treat it in current and future interactions in the A–B dyad. Therefore, A weights the similarity between it and all other states C with which B has interacted in the past using relevance criteria. In this model, the relevance criteria used by state A measures the proxy value of C by considering two issues that are preeminent in international relations: foreign policy congruence and power similarity. State A thus considers its best proxies to be those states C that are closely aligned with A’s foreign policy preferences and are most similar to A in terms of international strength.

The Reputation Model below reflects A’s perspective of B’s historical reputation by observing B’s behavior to other states in the system over time, yielding a directed–dyad–year account of all B–C dyads. It then weights this B–C dyadic history by the two relevance criteria, producing the following equation representing A’s calculation of B’s reputation ($R_{abN}$):

\[
R_{abN} = \frac{\sum_{c \neq a,b} \rho_{bc} \phi_{ac} \psi_{ac}}{N - 2}
\]

(1)

where $N$ is the size of the system

- $\rho_{bc}$ is the relationship between B and C, $\rho_{bc} \in (-1, 1)$,
- $\phi_{ac}$ is the policy similarity between A and C, $\phi_{ac} \in (-1, 1)$,
- $\psi_{ac}$ is the power similarity between A and C, $\psi_{ac} \in (0, 1)$.

The three components in the model represent the dimensions of reputation mentioned above. First, the $\rho_{bc}$ component considers the dyadic history between states B and C. To operationalize this dimension, we employ Crescenzi and Enterline’s Interstate Interaction Model. We use the model to represent A’s observation of B’s historical interactions with all other
Crescenzi and Enterline argue that interactions between states should be conceptualized as a dynamic temporal phenomenon rather than as temporally distinct or independent observations. In their model, hostile or cooperative interactions between states are treated as negative or positive shocks, respectively, to the overall dyadic relationship. In this sense, each dyadic relationship can be characterized as increasing or decreasing levels of hostility or cooperation. As time passes between each interaction, the lasting effects of these shocks decay toward neutrality. The *Interstate Interaction Score (IIS)* is produced by their calculation. It is specified below to represent the $\rho_{bc}$ component of state reputation:

$$
IIS_{bct} = \left( e^{-\alpha \left( \frac{\text{Event Temporal Distance}_{bct}}{\text{Event History}_{bct} + 1} \right)} \right)_{t-1} - \beta_1 \left( \frac{\text{Degree of Conflict}_{bct}}{\text{Conflict Temporal Distance}_{bct}} \right) + \beta_2 \left( \frac{\text{Degree of Cooperation}_{bct}}{\text{Cooperation Temporal Distance}_{bct}} \right)
$$

This model represents the historical relationship between a given dyad in the interstate system: countries B and C. The first component specifies the decay function, where the dyad’s history of events are moderated by the amount of time that occurs between them. As the amount of time between events increases, the speed with which the relationship decays toward neutrality increases.\(^9\) The interaction events that occur between B and C are then weighted by each event’s severity. Different interaction events vary in their intensity, and the event weights account for this. Each event is then moderated by the amount of time since the last event. The second component of the IIS calculation reflects the effect of a conflictual event, or negative shock, between countries B and C at time $t$. The third component in the model reflects the effect of a cooperative event, or a positive shock, in the

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\(^9\)Note that $\alpha \geq 0$. In the analysis that follows, $\alpha = 1$ because no assumptions are made with regard to an event’s rate of decay. However, the model is flexible, and this value can be manipulated in future research to match researcher assumptions about decay rate.
dyad at time t. This calculation yields an interstate interaction score for each B–C dyad, which uses militarized interstate dispute data to represent conflictual events (Jones, Bremer and Singer, 1996) and joint IGO membership to represent cooperative events (Pevehouse, Nordstrom and Warnke, N.d.). The IIS score between B and C is dynamic, thus allowing the overall reputation model to change over time as B’s reputation changes. The IIS model is bounded between -1 and 1, where -1 represents an extremely hostile interaction history and 1 represents a history of highly cooperative interactions. Fully operationalized, the IIS ranges between -0.94 to 0.42.

Second, the $\phi_{ac}$ component represents the foreign policy similarity between states A and C. The way in which state B treats state C is important to A’s expectation of B’s future actions toward it. Events in the B–C dyad are increasingly relevant to A as A’s foreign policy orientation is increasingly comparable to C’s. Heider’s relevance rule is captured by the $\phi_{ac}$ component and is operationalized by the the S-Similarity Score introduced by Signorino and Ritter (1999). This measure ranges from 1, representing completely similar foreign policy orientations between A and C (friends), to -1, representing completely opposite foreign policy orientations between A and C (enemies). Finally, $\psi_{ac}$ captures the overall power congruence of states A and C. The suitability of C as a proxy for A increases as the similarity of power capability increases between the two countries. This is an important component of estimating B’s reputation, as A can gain greater insight into its future interactions with B if both A and C are increasingly similar. The $\psi_{ac}$ component is operationalized by employing the Composite Indicator of National Capability data from the Correlates of War Project (Singer, Bremer and Stuckey, 1972). To measure power similarity, the following measure was calculated, $1 - |CINC_A - CINC_C|$. This measure produces a range from 0, indicating complete power dissimilarity between A and C, to 1, indicating complete power similarity.

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Taken together, the three components in the reputation model produce the following fully operationalized Reputation Information Score (RISc):

\[
RIS_{ab} = \frac{\sum_{c \neq a,b} IIS_{bc} S_{ac} C_{ac}}{N - 2}
\]  

(3)

\(RIS_{ab}\) thus reflects the product of the weighted information that A seeks regarding B’s behavior toward other states in the international system. \(IIS_{bc}\) represents this interaction history, which is then weighted by foreign policy similarity \(S_{ac}\) and power similarity \(C_{ac}\) between states A and C. This interaction history is calculated for every state other than A and B, aggregated into a single reputation score for state B, and normalized by the size of the system (\(N-2\)), excluding the A–B dyad. The operationalized RISc measure thus ranges between -1 and 1, reflecting A’s perspective of B’s reputation, ranging from purely hostile to completely cooperative reputation, respectively. The RISc measure is updated in each time period, offering a dynamic representation of the reputational learning process that states undertake when observing past extra-dyadic interactions and judging the relevance of those interactions to their own dyadic circumstances.\(^{11}\)

4 Research Design

4.1 Data and Dependent Variable

While data from other empirical studies are also available (Bennett and Stam, 1996; Jones, Bremer and Singer, 1996; Regan and Stam, 2000), we test our hypothesis on a dataset provided by Slantchev (2004), covering the population of interstate wars that occurred during the 1816–1991. These data vary slightly from the Correlates of War Project’s data in

\(^{11}\)The RISc value is also directional. In other words, state A’s perception of B’s reputation is not equivalent to B’s perception of A. In the following section, for testing purposes, we simply record the smaller of the two scores present in each dyad in order to accommodate the non-directional format of the war duration data.
two ways. First, Slantchev records several of wars excluded by the COW data because of
COW’s state membership requirements. Second, several multilateral wars are separated into
a number of bilateral conflicts. This coding procedure results in one observation per war.

Given our interest in the duration of war hostilities, the dependent variable codes the
amount of time from the onset of violence to its termination. This information is measured
by war–month, where the initiation of a conflict is recorded as the time at which a formal
war declaration is issued or, lacking this information, the point at which sustained fighting
between the adversaries begins. A war’s termination is recorded upon the occurrence of one
of the following events: armistice, cease–fire, treaty, decisive victory by one side, or formal
capitulation by the defeated.\textsuperscript{12}

4.2 Model and Variables

Following Slantchev’s choice, we employ a time–accelerated log–logistic hazard model given
the superiority of its fit to the data over other available event history methods. The choice of
a parametric specification is appropriate in the face of evidence of nonproportional hazards
for some of the control variables, but a Cox version of the same model yields very similar
results, with the interpretation of signs and significance for almost all variables being the
same in both models.\textsuperscript{13}

The majority of the variables used in the following analysis are also taken directly from
Slantchev (2004) in order to provide a cumulative comparison of our results to previous
research. Slantchev’s dataset and analysis provides a particularly advantageous platform for
our current analysis, as several of his variables attempt to account for explanations generated
directly from the bargaining literature on information asymmetries.

\textsuperscript{13}The variable $RIS_c$ is slightly less statistically significant (p=0.023) in the Cox analysis.
The $RISc$ variable represents the extra–dyadic reputation of a state in the warring dyad. The $RISc$ variable is directional. In other words, in a dyad of states A and B, A’s interaction reputation is distinct from B’s. Therefore, the $RISc$ value for A would not equate to the $RISc$ value for B. Given the non–directional nature of the data, we account for the directional character of our primary independent variable by recording only the lower of the two $RISc$ values in the dataset. With respect to our hypothesis, our expectation is that as the minimum $RISc$ value for a dyad increases, the expected duration of war should decrease. The assumption in this procedure is that for a problem of commitment credibility to exist in a warring dyad, only a single state in the dyad need exhibit an inability to commit to peaceful forms of resolving its interstate disputes. Such a negative reputation for hostility by one state in the dyad should cause its conflict adversary to view the conflict as one that likely will need to be resolved using violent means, thus extending the conflict’s duration. Indeed any overtures for peaceful resolution by the state with a negative reputation are likely to be discounted as relatively inconsequential since a negative reputation is a strong signal of a state’s inability to commit to peace.

Introducing this measure into Slantchev’s data set creates a problem that requires explanation. The data containing information about each combatant’s reputation (based on past interactions with other states) is sometimes missing for the year in which the wars in our data set began. This is not true for all of the wars, but a sufficient number that a large amount of observations are lost in the analysis due to missing data on this variable. As a solution, we imputed missing $RISc$ values using the prior year’s value where that information was not also missing. This allowed us to recover a substantial share of the lost observations for analysis, while sacrificing little in terms of real information lost. This is because the $RISc$ and $IIS$ measures change fairly gradually, so a state’s score from the prior year should, theoretically, often be reasonably close to the unmeasured year.
Since we posit that historical interactions between dyadic partners affect the duration of war through the demonstration of state reputation, we feel obliged to include a measure of the conflicting dyad’s own historical relationship that is separate from the \( RISc \) variable. As such, we use Crescenzi and Enterline’s (2001) Interstate Interaction Model to generate an IIS value for the conflicting dyad. This is similar to the IIS calculation included in the generation of the \( RISc \) measure. However, whereas the IIS calculation embedded in the reputation score measured state B’s history with all other states C in the international system (\( IIS_{bc} \)), the \( IIS \) measure included in the following analysis reflects the dyadic history between the actual conflict adversaries, states A and B (\( IIS_{ab} \)). We expect that as \( IIS \) increases (reflecting more dyadic historical cooperation), the duration of war hostilities should decrease.\textsuperscript{14}

**Military Parity**

In the abstract, the *Military Parity* variable is meant to reflect the potential for information problems between the warring parties. The potential for policymakers to misjudge their own strength or the strength of their opponent is greater as their military strength approaches equality. To test this expectation, Slantchev calculates *Military Parity* by taking the absolute value of the difference between army sizes for each conflicting pair of states. This value is then subtracted from 1 to represent his expectation that lower values of the *Military Parity* variable represent higher levels of asymmetry (e.g. lower levels of uncertainty). As this variable rises, uncertainty increases, and war duration is expected to increase.

**Reserve Parity**

*Reserve Parity* is another measure to approximate uncertainty. As *Reserve Parity* increases, so too will the level of uncertainty between warring states, leading to longer conflicts. This

\textsuperscript{14}The operationalized version of the *IIS* used here is described in citetcel07.
variable is calculated in the same fashion as Military Parity. However, Reserve Parity uses total population values for each of the conflict adversaries when constructing the measure.

**Terrain**

Terrain uses measurement methods provided by Stam (1999) to code for the overall difficulty of the geographic terrain within which the conflict is being fought. It is hypothesized that as the terrain becomes increasingly difficult to traverse, wars should endure for longer periods of time. This outcome may result for a number of reasons. For example, one or both warring sides may use the difficult terrain to dig in and create a defensive conflict, making it difficult for either side to strike a debilitating blow against the other. This too should make both sides less willing to negotiate a peaceful settlement, since the ability to avoid decisive defeat is increasingly likely as the terrain becomes increasingly difficult.

**Contiguity**

This variable simply uses COW’s ordinal contiguity data to determine if the warring parties share a land border. These data range from 1, representing a shared land border, to 6, indicating that the states are not contiguous by a maximum of 400 miles of water. Slantchev hypothesizes that contiguous states should face longer wars since they face fewer inhibitors to a continued supply of men and materiel to the battlefield. Alternatively, this variable may produce longer wars as proximate states face the continued threat of a neighbor’s military advances even after a conflict has ceased. The enduring opportunity for future conflict may make a decisive victory more attractive to the warring parties for fear of a resumption of violence at a later date. Both hypotheses point to contiguity leading to longer conflicts.
Number of States

The expectation for *Number of States* follows Blainey’s (1988) logic for the relationship between the number of actors and a war’s duration. As the number of states partaking in conflict hostilities increases, the number of interests to be satisfied in resolving the dispute increases, resulting in longer wars. This is a simple count variable of the number of participant states in the conflict.

Total Military Personnel

*Total Military Personnel* uses the data from *Military Parity* to calculate a summed value of each warring state’s army size. As the absolute size of the militaries available to the warring states increases, so too should a war’s duration.

Total Population of Reserves

*Total Population of Reserves* simply adds the total population of both states in the dyad to produce a single population value using the same data employed in generating *Reserve Parity*. As the total population among the states increases, so too should a war’s duration.

Democratic Initiator

*Democratic Initiator* follows Polity coding rules (Gurr, Jaggers and Moore, 1989) to distinguish whether the initiator of the conflict was a democracy. We presume that this variable is meant to reflect arguments in the democratic peace literature that democracies have incentives to choose wars that they can win with little expense given the audience costs faced by elected officials (Fearon, 1994; Bueno de Mesquita and Siverson, 1995; Bueno de Mesquita, Siverson and Woller, 1992). As such we should expect democratic states to initiate conflicts that tend to be shorter relative to wars undertaken by non-democratic initiators. *Democratic Initiator* is a dichotomous variable. All initiators with a Polity score of 6 or greater
is considered a democracy (1), and all others are coded as non-democracies (0).

5 Analysis and Discussion

In Table 1, we present the results of our analysis predicting war duration (in war-months) using the accelerated time failure log-logistic model employed by Slantchev (2004). Beginning with the key independent variable of interest, the RISc measure representing the reputation of the more conflictual of the two members of the warring dyad, we find that the results show strong support for our hypothesis. The negative sign and high level of significance for RISc indicate that data on wars between 1816 and 1991 shows that as states’ reputations for resolving disputes peacefully increases, the probability of the war continuing also increases. If states’ past interactions with other states are taken as credible information about commitment capability, then these results show clearly that states with histories of resolving disputes through conflict have a difficult time convincing their opponents in wars that they are capable of committing to a durable, peaceful settlement.

The results also yield interesting results for the control variables, mostly consistent with the findings presented in Slantchev (2004). Consistent with his findings, we find with high levels of significance that wars involving difficult terrain are more likely to continue than other wars, and wars between contiguous states are less likely to continue. Wars involving more participants are also more likely to continue, while wars initiated by democracies are less likely to continue, both consistent with Slantchev’s reported findings. Somewhat more surprising are the results for the IIS, or dyadic history, and Military Parity. Both are statistically insignificant in our model, counter to findings by Slantchev (2004) and Long (2003). The difference in results for the dyadic history measure may be due to the inclusion of more information (cooperative events) in the measure used here than the measure used in Long (2003) (conflicts only), but the insignificance of Military Parity is puzzling given
the identical data source used in both sets of results. One possible explanation is the loss of observations in our analysis due to missing data, which makes it more difficult to find any significant results. Another possibility is that some aspect of Military Parity is being represented by either the RISc or IIS measures, so their addition to the model wipes out its prior significance, but this seems unlikely given their low correlations with each other.

Taken as a whole, then, our results strongly support our hypothesis that extra-dyadic reputations for conflict will increase the expected duration of war hostilities, while also confirming prior findings on the effects of contiguity, terrain, the number of participants, and regime type.

Conclusion

While the asymmetrical information approach to explaining war duration has seen rich theoretical development over recent years, it has difficulty explaining longer interstate wars. These wars seem to drag on beyond the point at which battlefield events should have revealed credible information about the combatants’ resolve and capabilities. Powell (2006) argues that wars can continue even after both combatants are fully informed because states may have difficulties committing themselves fully to peace, helping fill a gap in explanations provided using the asymmetrical information approach. Applying this insight to interstate war duration, we argue here that these commitment problems are not just a theoretical construct, but that states’ likelihoods of having such problems can be measured by examining their histories of resolving disputes cooperatively or conflictually. Using a measure reflecting the reputation of the less historically cooperative state in each warring dyad, we demonstrate that dyads containing less cooperative members are more likely to have longer wars than other dyads.

There are several interesting implications of these findings. First, states appear to look
beyond their dyadic interactions with a state in order to assess its trustworthiness when considering war-ending settlements. In other words, states do not start fresh as potential peace partners when they have their first war with another state. Instead, they carry with them a credible and easily observed record of conflict and cooperation with other states. The more similar those states are to their current opponents, the more difficult it will be to tempt their opponents into a peace settlement. Second, this study adds support to the notion that states do not interact in the historical vacuum often assumed in modern quantitative analysis. Instead, their historical interactions with other states powerfully affect their current interactions. Finally, it suggests that it is not necessary to see long wars as being odd anomalies, evidence that states sometimes do not know when to quit. Rather, long wars may be the result of very sound calculations by states that, thanks to state reputations, know when not to quit.
References


Table I: Accelerated–Time Failure Log-Logistic Analysis of War Duration

<table>
<thead>
<tr>
<th>Variable</th>
<th>Full Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>RISc</td>
<td>-15.098***</td>
</tr>
<tr>
<td></td>
<td>(4.576)</td>
</tr>
<tr>
<td>IIS</td>
<td>0.061</td>
</tr>
<tr>
<td></td>
<td>(0.440)</td>
</tr>
<tr>
<td>Military Parity</td>
<td>0.862</td>
</tr>
<tr>
<td></td>
<td>(0.603)</td>
</tr>
<tr>
<td>Reserve Parity</td>
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</tr>
<tr>
<td></td>
<td>(0.558)</td>
</tr>
<tr>
<td>Terrain</td>
<td>4.026***</td>
</tr>
<tr>
<td></td>
<td>(0.823)</td>
</tr>
<tr>
<td>Contiguity</td>
<td>0.261***</td>
</tr>
<tr>
<td></td>
<td>(0.092)</td>
</tr>
<tr>
<td>Number of States</td>
<td>0.171**</td>
</tr>
<tr>
<td></td>
<td>(0.068)</td>
</tr>
<tr>
<td>Total Population Reserves</td>
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</tr>
<tr>
<td></td>
<td>(0.629)</td>
</tr>
<tr>
<td>Total Military Personnel</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>(0.001)</td>
</tr>
<tr>
<td>Democratic Initiator</td>
<td>-0.706**</td>
</tr>
<tr>
<td></td>
<td>(0.347)</td>
</tr>
<tr>
<td>Constant</td>
<td>-2.899</td>
</tr>
<tr>
<td></td>
<td>(0.722)</td>
</tr>
<tr>
<td>Gamma</td>
<td>0.686</td>
</tr>
<tr>
<td></td>
<td>(0.056)</td>
</tr>
</tbody>
</table>

Observations | 77
\( \chi^2 \) DF Prob. | \( \chi^2 \) | 0.000
Log likelihood | -123.625

*** = significant at the .01 level, ** = .05, * = .1
Standard errors in parentheses