

A Framework for Measuring Leaders' Willingness to Use Force*

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Abstract

Political leaders' relative willingness to use military force is central to many theoretical models of interstate conflict. Unfortunately, existing indicators tend to measure a single aspect of the general concept, have limited spatial or temporal coverage, and/or are derived partially from leaders' participation in interstate conflicts. This paper outlines a strategy for constructing measures of leaders' underlying willingness to use force by combining data on their personal attributes, political orientations, and psychological traits in a Bayesian latent variable framework with informative priors. Our framework produces measures of latent hawkishness for all national political executives between 1875 and 2004 that offer multiple advantages over existing proxies used in the literature. A pair of applications demonstrate the utility of our measures of leaders' latent hawkishness and provide insight into the relationships between leader survival and interstate conflict and patterns of international terrorist attacks.

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1 Introduction

The increased theoretical and empirical focus on the role of political leaders arguably represents the most important development in international relations scholarship during the last twenty five years. National political executives have been shown to influence the initiation, escalation, duration, and outcomes of interstate conflicts (Bueno de Mesquita et al. 2003, Chiozza and Goemans 2011, Horowitz, McDermott and Stam 2005, Weeks 2012, Ausderan 2015), the outcomes of civil wars (Prorok 2016), third-party interventions (Kertzer 2016), and the formation of interstate military coalitions (Wolford and Ritter 2016). At this point, there is something approaching a consensus among scholars from a diverse set of research traditions that political leaders are ultimately responsible for the foreign policies their states pursue.

Theoretical explanations of leaders' influence on coercive foreign policy and patterns of interstate conflict often center around their willingness to use military force. The initial wave of recent leader-centric research typically explained political incumbents' willingness to engage in interstate conflict as a function of their desire to remain in power and the domestic political environment (Bueno de Mesquita et al. 1999, Chiozza and Goemans 2004, Debs and Goemans 2010, Croco 2011). While theoretically useful, this framework assumes that all leaders will make the same decisions when facing the same domestic and international environments, implying that individual leaders are interchangeable. Drawing on insights from the foreign policy analysis tradition (Hudson 2005, Schafer and Smith 2017), an alternative and increasingly popular approach takes seriously the idea that who leads a country matters. In particular, scholars argue that leaders' underlying willingness to use force, or latent hawkishness, and the decisions they make are a function of their background experiences (Horowitz, Stam and Ellis 2015, Colgan and Weeks 2015), political orientations (Schultz 2005, Heffington 2018), and/or psychological traits (Hermann 2005, Kertzer 2016). This research program has led to an accumulation of knowledge about the effects of particular leader attributes and characteristics, but has made relatively little progress on how leaders' general willingness to use military force influences foreign policy and interstate conflict processes. The reason for this is straightforward: measures of leaders' latent hawkishness with broad spatial and temporal coverage

require systematic data that have not existed until relatively recently. In this article, we develop a Bayesian latent variable (IRT) framework that utilizes information from multiple data sets to construct measures of leaders' underlying willingness to use military force.

The central challenge in constructing measures of leaders' general latent hawkishness is the formulation of a strategy that can reduce information from multiple sources that vary substantially in terms of spatial and temporal coverage into a one-dimensional measure. We do this by incorporating model-identifying information available for (sometimes very small) portions of the overall data set into Rasch-like models identified otherwise with priors and hyperpriors. Our approach estimates from the data the contribution the sparsely available information makes to the underlying latent variable and then uses these estimates to structure the information's contribution to a one-dimensional measure of leaders' latent willingness to use military force. Our measures are built upon publicly available data sets of leaders' personal attributes and background experiences (Ellis, Horowitz and Stam 2015), political orientation (Seki and Williams 2014, Brambor, Lindvall and Stjernquist 2017), and psychological characteristics (Hermann 2005, Keller 2005). Our approach generates indicators of leaders' latent hawkishness for 2,965 national political executives between 1875 and 2004.

Our framework produces measures with five desirable characteristics. First, our measures do not structurally depend upon data that indicate whether a leader has initiated or is involved in an interstate conflict. This is important for multiple reasons, most notably because it allows our measures to be used to predict the initiation or onset of interstate conflict. Second, the spatial and temporal coverage of our measures is just as good or better than that of existing indicators. Third, our measures are transparently constructed, allowing other scholars to easily replicate and build upon our work. Fourth, our statistical framework is very flexible. This is useful because it allows scholars to construct measures of leaders' willingness to use force using different data sources and other assumptions about the data generating process that could produce better measures of leaders' latent hawkishness. Fifth, our statistical framework produces measures of uncertainty around our estimates of leaders' latent hawkishness. Although space considerations prevent us from discussing this aspect of our framework here, this is a very welcome feature as it provides analysts with

measures that can be used to test theoretical claims about how uncertainty over decision-makers' preferences influences crisis bargaining and interstate conflict.

This paper makes substantive and methodological contributions to the scientific study of politics. Substantively, our measures of leaders' latent hawkishness will be useful for scholars interested in a range of topics at the intersection of domestic politics and international relations. This includes, but certainly is not limited to, questions about the relative influence of leaders, states, and the international system on patterns of interstate conflict (Waltz 1959, Chiozza and Goemans 2011, Horowitz, Stam and Ellis 2015), the initiation, escalation, and outcomes of interstate crises (Wolford 2007, Debs and Goemans 2010, Croco 2011), the politics and performance of military coalitions and alliances (Leeds, Mattes and Vogel 2009, Wolford and Ritter 2016), and the effect of foreign policy and international relations on elections and partisan politics (Gadarian 2010, Holman, Merolla and Zechmeister 2011, Getmansky and Zeitzoff 2014). From a methodological perspective, we develop a novel way to incorporate information from multiple sources into measurement models that can improve the performance of the resulting indicators. This will be useful for scholars developing measures of latent variables regardless of the substance, especially when the data are too sparse or there is insufficient overlap among sources for standard imputation methods to be used effectively (Honaker, King and Blackwell 2007) and/or observations do not vary over time within units (Reuning, Kenwick and Fariss N.d.).

The remainder of the paper proceeds as follow. The next section offers an overview of three existing research programs that provide insight into how leaders' traits map onto their willingness to use military force. The third and fourth sections present the data upon which our measures are built and our statistical framework. The fifth describes our measures while the sixth section presents two applications. We conclude with a brief summary and a discussion of how scholars might use and improve upon the indicators developed here and our broader measurement framework.

2 Determinants of Leaders' Underlying Willingness to Use Force

Scholars typically argue variation in leaders' underlying willingness to use military force stems from either their personal preferences or psychological processes. All rational choice theories of politics, whether formal or informal, assume that decision-makers' valuations of possible outcomes influence the choices they make. Variation in leaders' relative preferences for using force is typically incorporated into theoretical models of interstate crises by assuming "hawkish" leaders pay a lower subjective cost for participating in a conflict than "dovish" leaders (Schultz 2005, Wolford 2007). Research that focuses on psychological processes typically argues leaders vary in their willingness to use force due to their beliefs about the world or how they process information (George 1969, Hermann 2005). Within these two broad approaches, there are three prominent research traditions that link leaders' characteristics to variation in their latent willingness to use military force. The first focuses on leaders' psychological traits or beliefs, the second considers their political orientation, and the third focuses on their background experiences (Carter and Chiozza 2018).

While mainstream international conflict research focused nearly exclusively on system- and state-level analyses in the decades following the publication of Waltz (1959), scholars working in the foreign policy analysis tradition have long located the source of states' behavior in the psychological traits and beliefs of political leaders (for nice reviews of this literature, see Hudson (2005), Houghton (2017) and Schafer and Smith (2017)). Research on political executives' psychological traits and "operational code" directly speak to leaders' underlying willingness to use military force. Analyses of leaders' psychological traits and their implications for interstate conflict are closely associated with the work of Margaret Hermann. Hermann argues leaders differ in their underlying willingness to challenge political constraints, openness to new information, and motivation for pursuing policies (among others, Hermann 1980, Kaarbo and Hermann 1998, Hermann et al. 2001). To test these arguments, Hermann developed cross-national data on the leadership styles and psychological traits of political executives and elites during the post-World War II era based on their political speeches (Hermann 2005). Empirically, individuals who are more willing to challenge political constraints, have lower levels of cognitive complexity, or have higher levels of distrust, are more likely to pursue

aggressive foreign policies (Keller 2005, Keller and Foster 2012, Foster and Keller 2014).

A related strand of research focuses on political leaders' operational codes. Leaders' operational codes refer to their 1) philosophical beliefs that shape their views of the world and political goals and 2) instrumental beliefs regarding the methods that will best allow them to achieve their goals (George 1969, Renshon 2008). A leader's operational code influences her decisions and, consequently, her state's foreign policies. For example, leaders who believe the world is fundamentally one of competition and goals are best pursued with aggression are more likely to engage in conflictual behaviors (Schafer and Walker 2006). Most empirical operational code scholarship tends to focus on the specific beliefs of a single leader or a small group of leaders. Walker (1995) and Walker, Schafer and Young (1998), for example, consider how the operational codes of U.S. President Woodrow Wilson and U.S. President Bill Clinton and U.K. Prime Minister Tony Blair influence their decision-making. Unfortunately, the idiographic nature of these studies makes systematic, cross-national analyses of the relationship between leaders' operational codes and their states' participation in interstate conflicts rare (a point made by Schafer and Smith 2017).

A second research tradition links leaders' willingness to use military force with their political orientation. Concentrated in studies of intra-democratic variation in foreign policy and conflict behavior, this approach argues that leaders of governments and parties on the right are relatively more hawkish and pro-military than the leaders of governments and parties on the left (Schultz 2001). Scholars consistently find empirical support for this argument using indicators of political orientation and policy preferences derived from political parties' manifestos. For example, democracies run by leaders of hawkish or right-wing parties are more likely to initiate interstate conflicts than are democracies led by dovish or left-wing leaders (Palmer, London and Regan 2004, Arena and Palmer 2009, Clare 2010, Heffington 2018). Political orientation also influences conflict duration, as left-wing governments fight shorter conflicts (Koch 2009) and are quicker to pull out of unpopular military interventions (Koch and Sullivan 2010) than are governments run by leaders and parties on the right.

A third research program argues variation in leaders' willingness to use military force follows from their personal attributes and background experiences. There is strong evidence from psy-

chology, sociology, and political science that formative experiences influence individuals' attitudes, beliefs, and preferences (among others, Matthews 1954, Serpell 1981, Jennings and Niemi 2014). In general, early experiences are more likely to influence a leader's willingness to use force when they are relevant to conflict and/or reward risk taking (Horowitz, Stam and Ellis 2015, especially Chapters 1 and 2). The experiences most relevant to leaders' willingness to use force are associated with the military. In general, leaders who previously served in the military are more likely to initiate interstate conflicts than leaders with a civilian background (Horowitz and Stam 2014, Horowitz, Stam and Ellis 2015, Carter and Nordstrom 2017). However, not all military service is the same. Leaders who saw combat, and thus more directly experienced the costs of war, are less likely to initiate conflicts than those leaders with a military background that did not involve combat (Horowitz and Stam 2014, Horowitz, Stam and Ellis 2015). Beyond national military service, leaders who participated in armed rebellion against the state are more likely to initiate interstate conflicts than other political leaders (Horowitz and Stam 2014, Horowitz, Stam and Ellis 2015) .

Personal attributes and background experiences beyond prior military service or participation in a rebellion also have been linked to leaders' foreign policy decision-making. Political executives who led a revolutionary movement prior to obtaining power (Colgan 2013) or obtained office through irregular means (Debs and Goemans 2010) are disproportionately likely to initiate conflicts. Older leaders are more likely to initiate conflicts than younger leaders in most scenarios (Horowitz, McDermott and Stam 2005), although this relationship appears to be conditional on both regime type and how long a leader has been in power (Horowitz, Stam and Ellis 2015, Calin and Prins 2015). Perhaps less obvious from a theoretical perspective, Horowitz, Stam and Ellis (2015, pg. 67) report that leaders who had a job in the medical field prior to obtaining office or were considered "illegitimate" as a child were relative less likely to initiate a conflict than other political executives while those who had a creative occupation before assuming power were more likely to start an interstate conflict than other leaders.

An important variant of this approach uses multiple personal attributes and background experiences to construct measures of leaders' general preferences and orientation towards the use of force. The most prominent example of this strategy is Horowitz, Stam and Ellis's (2015) *Leader*

Risk Index. Their *Leader Risk Index* was created by estimating interstate conflict initiation as a function of thirty-three leader attributes and background experiences and calculating a given leader's average annual probability of initiating a conflict over his or her time in office (Horowitz, Stam and Ellis 2015, pgs. 67, 73-74).¹ A downside to this strategy is that the *Leader Risk Index* should not be used to estimate interstate conflict initiation or onset because it is derived from a statistical model that predicts the probability a leader will initiate an interstate conflict based on his or her personal attributes.

Existing research makes clear that leaders' personal attributes and experiences, political orientation, and psychological traits influence patterns of interstate conflict. Taking a step back, the idea that leaders' relative willingness to use force influences their states' involvement in conflict underlies research in each of these traditions. This implies leaders' political orientations, psychological traits, and background experiences provide information about their latent willingness to use force in an interstate crisis. Empirical measures from each of these research traditions have relative strengths and weaknesses with respect to what they can tell us about leaders' general willingness to use military force. For example, variables capturing leaders' psychological traits and political orientation are more nuanced and often have a stronger theoretical connection to leaders' underlying willingness to use force than dichotomous indicators of leaders' background experiences. Further, arguments about how personal attributes and background experiences influence leaders' willingness to initiate conflict are often about how prior experiences influence or reflect psychological traits and decision-making biases.² This suggests psychological and orientation-based measures might more precisely capture the underlying relationships and effects of interest than indicators of leaders' attributes and experiences prior to assuming office. Data on leaders' personal attributes and background experiences, though, offer far greater spatial and temporal coverage than measures of leaders' psychological traits and political orientation. Most notably, the Leader Experience and Attribute Data (LEAD) project (Ellis, Horowitz and Stam 2015) includes data on leaders' personal attributes and background experiences of 2,965 national political executives

¹The description here is of the monadic version of the *Leader Risk Index*. Horowitz, Stam and Ellis (2015, pgs. 118-119) also construct a version of the *Leader Risk Index* based on directed-dyadic data.

²For example, participation in a rebel movement is thought to indicate a leader is relative risk-acceptant and, therefore, more willing to use military force than leaders who were not rebels (Horowitz, Stam and Ellis 2015).

between 1875 and 2004. In contrast, measures of leaders' psychological traits largely are drawn from the post-World War II period (Hermann 2005) while most data on leaders' hawk-dove and left-right orientations are concentrated among developed, parliamentary systems in Europe (Seki and Williams 2014, Heffington 2018).

The preceding discussion suggests using data on leaders' political orientation, psychological traits, *and* background experiences should yield a more comprehensive measure of leaders' general willingness to use force than an indicator based exclusively on any one of the three approaches. There are two primary reasons for this. First, if leaders' willingness to use force is a function of their experiences, psychological traits, and political orientation, then indicators based on any one of these types of characteristics necessarily contain less information about the underlying concept than measures based on data that captures information about all three types of characteristics. Second, measures derived from data on leaders' background experiences, psychological traits, and political orientation could potentially leverage the advantages associated with indicators from each tradition while minimizing their less desirable qualities. The next two sections describe the data and latent variable framework we use to construct such measures.

3 Underlying Data

Our indicators of leaders' latent willingness to use military force are based on four data sets that include information on leaders' background experiences, political orientations, or psychological traits. Data on leaders' personal attributes and background experiences are drawn from the LEAD project (Ellis, Horowitz and Stam 2015). As noted above, the LEAD project includes data on a range of personal attributes and experiences for 2,965 national political executives between 1875 and 2004.³ Table 1 presents the thirty-six variables from the LEAD project we use to construct measures of leaders' latent hawkishness. These variables cover leaders' military service, involvement in a rebel movement, sex, family life, occupations, and other experiences.⁴ We strongly suspect

³The leader-level LEAD data is available at <https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/ZK3FYV>.

⁴A description of how the variables in Table 1 are coded can be found in the codebook associated with the LEAD project.

some of the variables in Table 1 are more relevant than others in shaping leaders’ willingness to use force. However, as Horowitz, Stam and Ellis (2015, pg. 34) argue, considering a wide range of attributes and experiences allows for a more comprehensive picture of what influences leaders’ latent hawkish. Further, as we explain in more detail below, our statistical framework weights how much each attribute contributes to leaders’ latent willingness to use force, minimizing issues associated with including irrelevant predictors in statistical models.

Table 1: Variables from LEAD

| | | |
|-------------------------------|--------------------|----------------------|
| Military Service | Older Leader | Journalism |
| Military Service - Non-Combat | Education | Law |
| Military Service - Combat | Number of Spouses | Medical |
| Win War | Married | Religion |
| Lose War | Married in Power | Activist |
| Military Career | Divorced | Career Politician |
| Military Education | Number of Children | Creative Occupation |
| Rebel | Parental Status | Businessman |
| Rebel - Win War | Legitimate Child | Aristocrat/Landowner |
| Rebel - Lose War | Royalty | Police |
| Irregular Entry | Orphan | Science/Engineer |
| Male | Teacher | Blue Collar |

We use information on leaders’ political orientations towards the use of military force from two data sets. The first, Seki and Williams’s (2014) Annual Government Partisanship data set,⁵ includes measures of a leader’s general political orientation (*Right-Left*), support for peaceful international relations in general or with respect to specific countries (*International Peace*), and net support for military engagement with other countries (*Hawk*) based on data from the Manifesto Data Project (Volkens et al. 2013, version 16a). These variables are coded such that higher values are associated with more hawkish policy preferences. The Seki and Williams data includes information on thirty-seven democracies between 1944 and 2014, offering greater spatial and temporal coverage than other measures of actors’ political orientations derived from party manifestos. Converting Seki and Williams’s (2014) annual measures to the leader-level produces data on 398 political executives included in the LEAD data set (Ellis, Horowitz and Stam 2015).

Our second source of information about leaders’ political orientations is the Heads of Gov-

⁵Available at <http://faculty.missouri.edu/williamslaro/govtdata.html>.

ernment (HoG) data set (Brambor, Lindvall and Stjernquist 2017).⁶ The HoG data identify the ideological orientations of the heads of government in 33 countries between 1870 and 2012. Ultimately, converting the leader-year HoG measure to a leader-level unit-of-analysis yields data on 1,199 political executives. The HoG data has two advantages over measures of leaders’ political orientations derived from the Comparative Manifestos Project. First, it offers greater regional and temporal coverage. Second, the HoG project includes data on the political orientation of non-democratic leaders. There are two downsides to the HoG data for our purpose, though. First, it conceives of ideology as a trichotomous phenomenon (“left” vs. “right” vs. “center”). The trichotomous coding scheme necessarily limits our ability to differentiate among leaders relative to the continuous measures associated with the Seki and Williams (2014) data. Second, Brambor, Lindvall and Stjernquist (2017) code ideology based on heads-of-governments’ economic positions, not their foreign policy positions regarding the use of military force. Thus, the HoG data offers greater spatial and temporal coverage, but its measure of political orientation does not tap into our theoretical quantity of interest as neatly as the indicators from Seki and Williams’s (2014) data.

Incorporating systematic data on leaders’ psychological traits into a general measure of leaders’ latent willingness to use force with substantial spatial and temporal coverage is challenging. This is because, as discussed above, most of the psychology-based research on political executives and conflict tends to analyze a small number of leaders in a given study (Schafer and Smith 2017). We use a measure of leaders’ psychological willingness to challenge constraints from Keller (2005).⁷ Keller’s indicator is derived from Hermann’s (2005) leadership trait data and covers 42 national leaders between 1937 and 1998. This measure, and the underlying data from Hermann, are based on an analysis of at least 50 speeches by each national political executive. In this case, speeches were coded for what they revealed about leaders’ underlying “need for power,” “task emphasis,” “distrust of others,” and “nationalism.” Keller standardized and combined leaders’ scores on these four indicators to create a single index that represents leaders’ “willingness to challenge potential pacifying constraints in the pursuit of aggressive foreign policy behavior” (Keller 2005, pg. 211-

⁶Data available at <https://heads-of-government.github.io/>.

⁷Replication data are available from <https://dataverse.harvard.edu/dataset.xhtml?persistentId=hdl:1902.1/10053>.

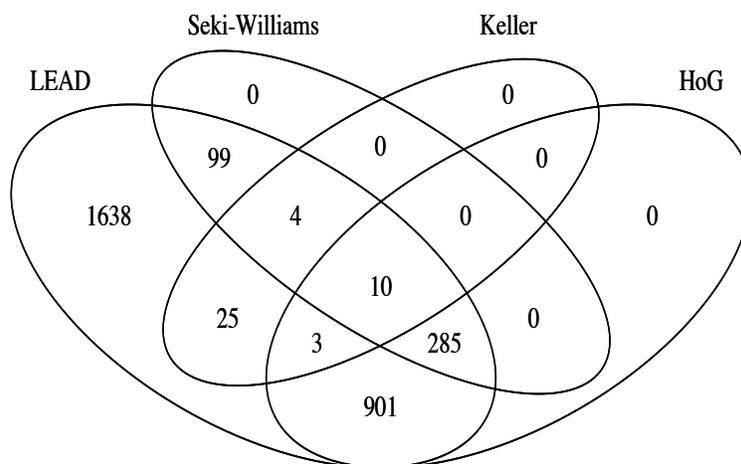


Figure 1: Leaders Covered by Each Data Set

212). Following Keller, we assume leaders who are relatively willing to challenge environmental constraints are relatively more willing to use military force than are leaders who are relatively more willing to accept their environmental constraints.

Figure 1 graphically depicts the overlapping coverage of these four data sets. The LEAD project (Ellis, Horowitz and Stam 2015) provides our universe of 2,965 national political executives and represents the only source of information we have for 1,638 leaders. In terms of overlapping coverage for leaders’ political orientations, there are 901 leaders for whom we only have data on from LEAD and the HoG project (Brambor, Lindvall and Stjernquist 2017), 99 leaders for whom we only have data on from LEAD and Seki and Williams (2014), and 295 leaders for whom we have data on from LEAD, HoG, and Seki and Williams. With respect to data on leaders’ psychological willingness to challenge constraints, we have data only from LEAD and Keller (2005) for 25 leaders, information from only LEAD, Keller, and HoG for 3 leaders, and data from only LEAD, Keller, and Seki and Williams for 4 leaders. Finally, there are 10 leaders for whom we have information from all four data sources: Dwight Eisenhower, John F. Kennedy, Lyndon Johnson, Ronald Reagan, George H.W. Bush, and Bill Clinton from the United States; Gaston Eyskens from Belgium; Charles De Gaulle from France; Konrad Adenauer from Germany; and Andreas Papandreu from Greece.

Figure 1 highlights the variation in leaders included in any given data set and overlapping coverage across data sets. The extent of non-random missingness among political orientation and psychological data limits the applicability of standard multiple imputation methods. Accordingly, developing measures of leaders’ willingness to use military force based on their background experiences, political orientations, and psychological traits with broad spatial and temporal coverage requires a method that can account for sparsely available information. The next section describes a statistical framework that addresses this challenge.

4 Statistical Framework and Measures

There are two primary challenges to constructing measures of leaders’ general hawkishness.⁸ First, an individual’s underlying willingness to use military force is not directly observable. Second, empirical proxies of hawkishness vary in their spatial and temporal coverage, often suffer from missing data, and/or come in very different forms. Together, these challenges present a question of how to go about structuring measurement models that use all of the available information. Some covariates of the latent variable might best be reduced via principal components analysis, while others may present empirically and theoretically such that the data contain an IRT model-like structure, and are thus better reduced via a modern variant of the classic Rasch model (Rasch 1960). Political scientists have long relied on variants of the latter strategy (prominent examples include Poole and Rosenthal (1991), Martin and Quinn (2002), and Voeten (2000)), and we do so here. We incorporate information on small fractions of the overall data as covariates in Rasch-like IRT models that help resolve identification issues. We then estimate from the data what (if any) contribution the added information makes to the underlying latent variable and use the estimates to structure the information’s contribution to a one-dimensional measure of leaders’ latent willingness to use force.

We use the probabilistic programming language Stan (Carpenter et al. 2016), a relative newcomer in the toolbox of Bayesian analysis, to estimate four models of leaders’ latent hawkishness.

⁸The data and code needed to replicate all analyses associated with this paper will be put on Github upon publication.

Stan is distinguishable from the familiar BUGS lineage (e.g. WINBUGS, JAGS, and OPENBUGS) of Bayesian programming/software in a variety of ways, but two stand out. First, Stan uses Hamiltonian rather than Markovian mechanics as its formal model of probabilistic state transitions over Monte Carlo trials.⁹ Second, Stan samples probability space using Hoffman and Gelman’s (2014) “No-U-Turn” sampler rather than some form of Gibbs sampling. Stan’s implementation of NUTs relieves the user of many sensitive tuning tasks that have slowed the application of Hamiltonian Monte Carlo to a variety of tasks to which it is well-suited. These features, coupled with well-tuned defaults and excellent diagnostic documentation, make Stan efficient and straightforward to use.

We used the R implementation of Stan (`rstan`) to estimate our IRT models. Each model was estimated by running four HMC chains with 2000 iterations, half dedicated to burnin (or more-exactly in the HMC context, “warmup”). Problems with Stan models are easy to spot, and we encountered none with our models. All of the between-to-across chain posterior variance ratios (\hat{R} ’s, see Gelman and Rubin(1992)) were ideal. Further, there were no divergent transitions after warmups, no rejected Hamiltonian proposals, our effective “n” sizes were adequate everywhere, and searches never exceeded the maximum tree depth we specified (15 for all four models). Thus, diagnostic analyses identified no issues with our models.

Before outlining the particulars of our models, we need a baseline model against which their predictive validity can be assessed. We choose a model with deep connections to a very traditional data reduction strategy for this purpose: principal components. Specifically, we reduce the LEAD data to a one-dimensional latent variable using Landgraf’s (2015) binomial deviance extension of de Leeuw’s (2006) logistic singular value decomposition. The method is implemented in Landgraf’s (2016) R package, `LogisticPCA` (see also Landgraf and Lee, 2015). The choice of a baseline estimation technique for the latent variable is nontrivial, as our general empirical strategy is model comparison using information-theoretic indicators of predictive capacity. As a result, analysts seeking to improve upon our primary measurement modeling efforts may also wish to formulate different and perhaps less-noisy baselines of assessment. However, as we shall see, the logistic principal component baseline measure is hardly a straw-person, as it yields a statistically relevant latent indicator

⁹See Betancourt, Byrne, Livingstone, and Girolami (2014) and Betancourt (2017).

in our assessments.

Our first measure of leaders’ latent hawkishness, θ_0 , is a Bayesian version of a Rasch (1960) model that relies exclusively on leader attribute data from the LEAD project (Horowitz, Stam and Ellis 2015).¹⁰ This model takes the form:

$$\begin{aligned} Pr(Y_{ij} = 1) &= \text{logit}^{-1}(\theta_i - \alpha_j) \\ \theta &\sim \mathbf{N}(0, 1) \\ \alpha &\sim \mathbf{N}(0, 10) \end{aligned}$$

where $Pr(Y_{ij} = 1)$ is the probability that the i th leader ($n = 2965$) has the j th characteristic ($J = 36$). The prior on θ is unit normal, which mitigates identification problems associated with scale invariance (see Jackman 2009) in this type of model, and for α is largely uninformative.

This is a very common model for student test score data (questions scored as correct (1) or incorrect (0)) in educational testing research. The logit^{-1} term represents the inverse of the logistic function. In the education tradition, θ_i represents the “ability” of the student, and the α_j terms form cutpoints on the “ability” dimension around which the θ_i terms float. Again in testing terminology, the α_j terms should increase in value according to the increasing “difficulty” of the questions. In our circumstance, to the extent that the data fit the model, we should expect characteristic vectors containing many ones and few zeroes to be associated with low α_j values. An example in our case is the sex of a given leader. Approximately 99% of the leaders covered by the LEAD project (Horowitz, Stam and Ellis 2015) are male (scored as one); a leader’s sex is thus an “easy question,” and should be associated with a low α_j . On the other extreme, our data contains an indicator scored as “one” when and only when a leader joined a rebellion that subsequently won a war. This vector is of course dominated by zeroes (approximately 96%), and thus by analogy is associated with a “hard question” that should in turn be associated with a higher α_j estimate.

Our second measure of leaders’ latent willingness to use military force, θ_1 , differs from our first in that it includes four weighted (β) covariates that fashion the θ terms in combination with a unit

¹⁰The subscript “0” in θ_0 denotes that this measure does not make use of any variables other than those associated with the LEAD project.

normal error (v_i), as in:

$$\begin{aligned}\theta_i &= X_i\beta + v_i \\ v &\sim \mathbf{N}(0, 1) \\ \beta &\sim \mathbf{N}([0, 1], 1)\end{aligned}$$

where v_i is the latent trait estimated from the LEAD data. The four X vectors (associated with *Ideology*, *Right-Left*, *Hawk*, *International Peace*, and *Constraint Challenger*) contain zeroes in every cell where the associated covariate is either missing or observed at its mean (they are all scaled unit normal). The β vector is estimated from the data, with coefficients confined to the interval $[0,1]$. Accordingly, $\theta_i = v_i$ if either the β vector or the X matrix is null. Otherwise, the variance of θ will be larger than the variance of v , with the difference being a weighted (β) function of the variances on the X vectors. This set-up allows us to incorporate leaders' political orientations and psychological traits into our measures despite the fact that we have information about these characteristics for such a small percentage of the leaders included in our data.

Last, we estimate a pair of models of the form:

$$Pr(Y_{ij} = 1) = \text{logit}^{-1}(\gamma_j(\theta_i - \alpha_j))$$

Here, γ_j is an item-level discrimination term that takes on higher values for items that do well grouping similarly-situated leaders on the latent dimension (θ) to the right and left of the cutpoints (α_j). This is the two-parameter logistic (2PL) item response (IRT) model, another mainstay of modeling test data. The discrimination term floats in the search of the high-dimensional parameter space with the others and can have a powerful effect on the estimated posteriors of the θ_i terms. Our third measure of leaders' latent hawkishness, θ_2 , uses a weakly-informed prior with a customary restriction to positive values ($\gamma \sim \mathbf{N}(0, 10)$). As demonstrated below, this version of the 2PL model weights most of the LEAD data to zero and floats the θ terms such that they are almost entirely dependent upon the variables that pertain to military service. There is nothing afoul about this effect in theory, but in practice (see the next section), the 2PL model with a weakly-informed prior

is an inferior predictor relative to the 1PL alternative. As a result, we sought to tame the model’s reliance on a few of the LEAD items using a strong prior for γ in our fourth measure of leaders’ underlying willingness to use force (θ_3). Our proposed prior is:

$$\gamma \sim \mathbf{N} (0.5, 0.1)$$

inside the interval $[0, 1]$.

The logic underneath this prior is rooted in the behavior of distributions in bounded spaces. Probability space is the simplest example. We assign priors such that the $[0,1]$ interval will contain the estimated posteriors for the discrimination terms. The parameter searches begin in the middle (0.5) with small (0.1) and approximately symmetric (\mathbf{N}) standard deviations. Wootters (1980) shows that such distributions are not Euclidean distant, but rather are separate in accordance with arc lengths. Figure 2 illustrates this point. Note that the vertical lines with downward tips are equally spaced on the upper, horizontal line, and yet map increasing arc lengths (distribution distances) as you move toward the boundaries. Indeed, 1 is more than twice the “statistical distance” from 0.75 than is 0.5. Our most informed priors thus have the effect of constraining the updates of the priors given the data such that the items that would get the heaviest weights as well as those that would fall out have further to travel. In the subsection to follow, we see that constraining the prior in this way allows us to largely recover the explanatory power loss between the 1PL model and the less-restricted form of the 2PL version.

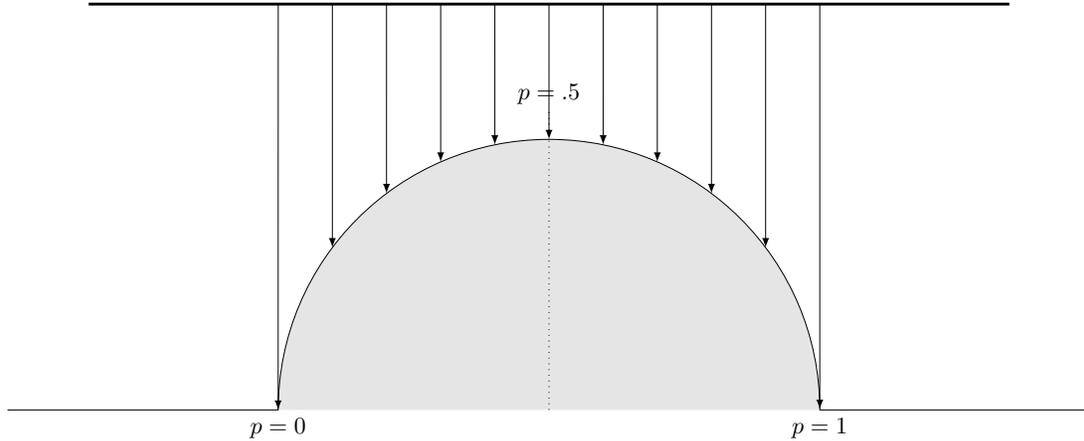


Figure 2: The Curvature of Probability Space

To see the consequences of using the different priors, Figure 3 compares the estimated posterior distributions associated with the item-level discrimination terms from θ_2 (weak prior, Panel A) and θ_3 (strong prior, Panel B). The orders by magnitude of the estimated first moments of the discrimination weight distributions are quite similar, with military-related items receiving the highest scores and basic demographics (e.g. education and age) getting scores near zero in both models. The estimated posteriors differ fundamentally, however, in the relative extent to which non-military items are discounted in the estimation of the θ distributions. The highly informed prior keeps the bulk of the discrimination estimates around the middle of the interval. With the vague prior, in contrast, all but two of the posterior standard deviation estimates are tiny, and relatedly,¹¹ the modal discrimination estimate across the whole model is effectively zero.

¹¹The discrimination parameters are constrained to be positive – a custom in educational testing research, but not always in political science.

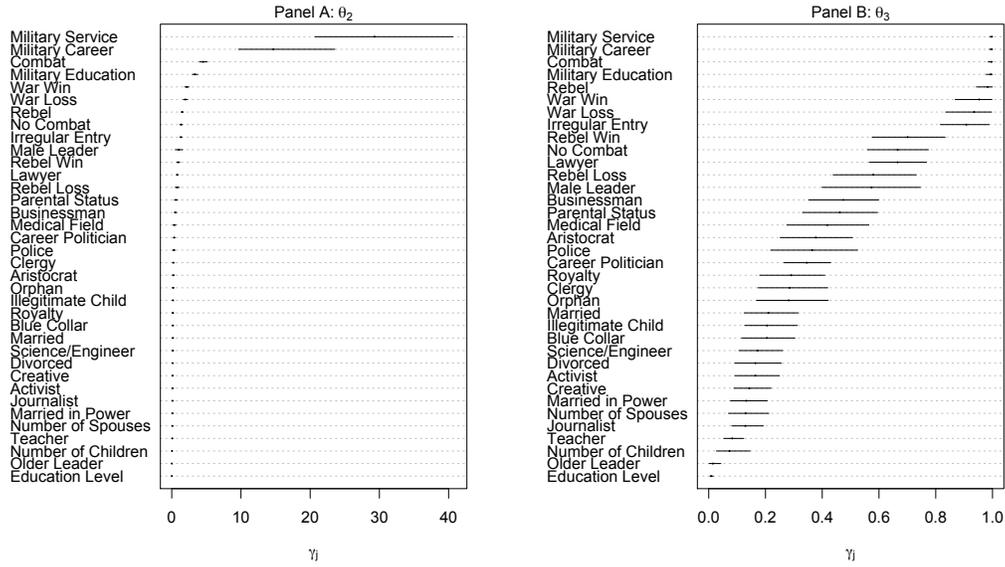


Figure 3: Item-Level Discrimination Parameters with 95% Credible Intervals from θ_2 and θ_3 .

One of the most useful features of our framework is that it allows us to incorporate information about leaders' political orientations and psychological traits into measures of their latent willingness to use military force. Figure 4 reports the estimated effects of *Ideology*, *Right-Left*, *Hawk*, *International Peace*, and *Constraint Challenger* on leaders' latent hawkishness in θ_1 , θ_2 , and θ_3 (Panels A, B, and C, respectively). The positive parameter estimates imply that, all else equal, leaders who score higher on these variables are relatively more willing to use military force. Importantly, the 95% credible intervals associated with each β_i do not contain zero in any of our models. The results in Figure 4, therefore, suggest that leaders' political orientations and psychological characteristics influence their relative hawkishness. In terms of their relative influence, *Constraint Challenger* and *International Peace* have stronger effects on leaders' latent willingness to use military force than do *Ideology*, *Right-Left*, and *Hawk*.

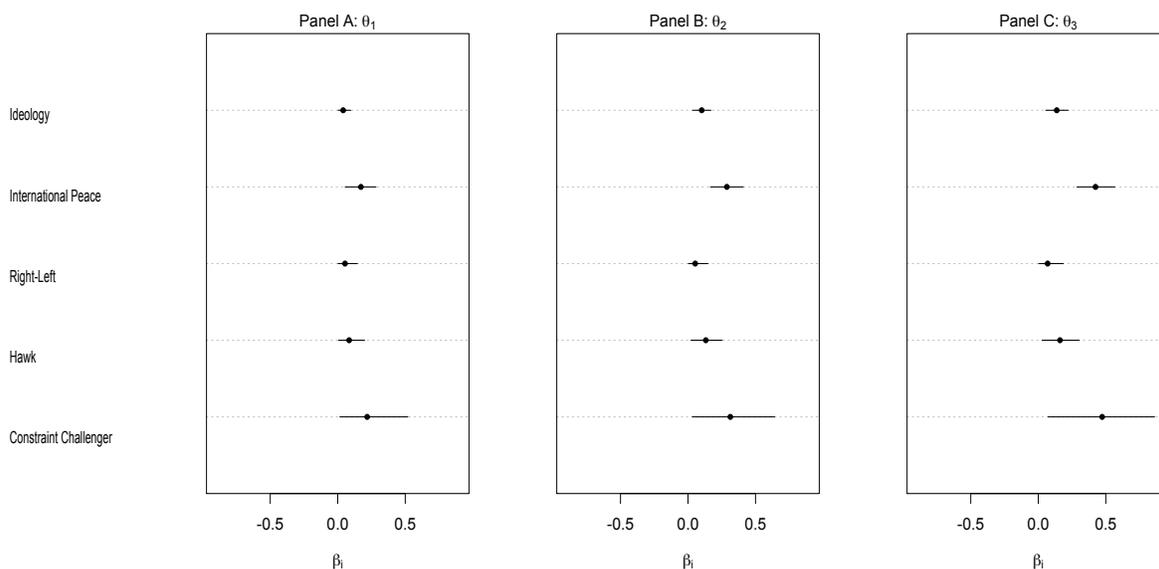


Figure 4: Effects of Political Orientation and Psychological Variables on Latent Hawkishness with 95% Credible Intervals.

To assess the performance of our measures, Table 2 reports a set of models that estimate the initiation of a militarized interstate dispute (MID) (Ghosn, Palmer and Bremer 2004, version 3.1) on a leader-year data set that covers the period from 1875 to 2001.¹² Model 1 estimates MID initiation as a function of the first dimension yielded by logistic PCA based on the thirty-six personal attributes and background characteristics from the LEAD project (Horowitz, Stam and Ellis 2015) listed in Table 1. This model provide us with a baseline with which to compare the performance of our measures. Models 2-5 estimate MID initiation as a function of θ_0 , θ_1 , θ_2 , and θ_3 , respectively. Each model in Table 2 also includes a set of control variables commonly employed in quantitative models of interstate conflict initiation or onset.¹³ We report these results in the appendix for presentational purposes.

¹²The data set was taken from the replication material associated with Horowitz, Stam and Ellis (2015) and is available at <https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/ZK3FYV>.

¹³In particular, we employ the specification used by Horowitz, Stam and Ellis (2015) and control for a state's *CINC* score (Correlates of War 2001), *Democracy* and *Autocracy* scores from Polity IV (Marshall and Jaggers 2005), a state's τ_b score with the system leader (Bueno de Mesquita 1975), a dummy variable coded one if a state had been challenged in a MID in the previous five years, and the cubic polynomial of the number of years since a state last initiated a MID.

Table 2: Leaders' Latent Willingness to Use Force and Interstate Conflict Initiation, 1875-2001

| | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 |
|----------------------|----------|----------|----------|----------|----------|
| (Intercept) | -0.63* | -0.74* | -0.74* | -0.62* | -0.66* |
| | (0.22) | (0.22) | (0.22) | (0.22) | (0.22) |
| Principle Components | 0.01* | | | | |
| | (0.00) | | | | |
| θ_0 | | 0.31* | | | |
| | | (0.05) | | | |
| θ_1 | | | 0.31* | | |
| | | | (0.05) | | |
| θ_2 | | | | 0.24* | |
| | | | | (0.04) | |
| θ_3 | | | | | 0.20* |
| | | | | | (0.03) |
| Observations | 10193 | 10193 | 10193 | 10193 | 10193 |
| AIC | 7107.27 | 7075.49 | 7073.87 | 7080.64 | 7076.76 |
| BIC | 7425.36 | 7393.58 | 7391.96 | 7398.74 | 7394.86 |
| Log Likelihood | -3509.63 | -3493.74 | -3492.93 | -3496.32 | -3494.38 |

Standard errors in parentheses.

* indicates significant at $p < 0.05$ with two-tailed test.

Full results table with control variables is available in the appendix.

Table 2 yields three noteworthy results. First, all of the measures are positive and statistically significant predictors of MID initiation. While perhaps a low bar to cross, this is important because it lends face validity to our approach for measuring leaders' underlying willingness to use military force. Second, θ_0 , θ_1 , θ_2 , and θ_3 all outperform the measure of latent hawkishness derived from the logistic PCA. This inference is based on the model fit statistics reported at the bottom of Table 2. In particular, the AIC, BIC, and log-likelihood statistics associated with Models 2-5 are all lower than those associated with Model 1. Third, incorporating information about leaders' political orientation and psychological willingness to challenge constraints can produce better measures of their willingness to use military force than measures based exclusively on their background experiences, but does not always do so. While differences in the models' fit statistics are small, θ_1 (one parameter IRT with covariates) yields lower AIC, BIC, and log-likelihood statistics than our other measures. However, θ_0 (one parameter IRT without covariates) produces slightly lower model fit statistics than either θ_2 or θ_3 (two parameter IRTs with covariates).

We interpret the results in Table 2 as evidence in support of our general framework for constructing measures of leaders' underlying willingness to use military force. This inference is based on the observations that our Rasch-like measures 1) provide spatial and temporal coverage at least as good as any existing indicator of leaders' latent hawkishness, 2) are constructed independently of data that identifies whether a leader initiated or participated in an interstate conflict while in power, and 3) outperform the measure of leaders' latent hawkishness derived using logistic PCA. Further, our results indicate incorporating information on leaders' political orientations and psychological traits can produce better indicators of their latent hawkishness than measures built exclusively around their background experiences. Notably this is the case despite the relatively small number of leaders for whom we have data about their psychological willingness to challenge constraints and political orientations (see Figure 1 and the accompanying discussion). The next section uses the best performing measure in Table 2 (θ_1) in a pair of applications to demonstrate how scholars might make use of our measures of leaders' latent hawkishness.

5 Applications

We demonstrate the utility of our statistical framework with two applications. The first analyzes how leaders' latent willingness to use force influences the reciprocal relationship between leader survival and the initiation of interstate crises. The second application considers how leaders' underlying hawkishness influences whether their states suffer international terrorist attacks. For space purposes, we focus on the substantive results of these applications here and present standard results tables in the appendix.

5.1 Leader Hawkishness and Peace Through Insecurity

Scholars have long linked leaders' political survival and the initiation of interstate conflict. Diversionary arguments claim leaders whose political standing is threatened will pursue interstate conflict while other scholars demonstrate leaders are more likely to initiate conflicts when they are most secure in power (among many others, Gaubatz 1991, Mitchell and Prins 2004, Johnson

and Barnes 2011, Williams 2013). Reversing the causal arrow, scholars are divided over how interstate conflict participation and outcomes influence leaders' ability to remain in power and whether and how these relationships are conditioned by regime type (Buono de Mesquita and Siverson 1995, Chiozza and Goemans 2004, Debs and Goemans 2010, Croco and Weeks 2016, Carter 2017). Considered holistically, this research suggests a reciprocal relationship between leader survival and interstate crises. However, this point is largely ignored in empirical analyses of how leaders' political considerations and interstate conflict are related. In a notable exception, Chiozza and Goemans (2003) estimate a two-stage probit that analyzes how leader survival and the initiation of interstate crises affect one another. Chiozza and Goemans find that 1) leaders are less likely to initiate conflicts when their political survival is at risk and 2) leaders are more likely to be removed from power when the expectation of an interstate crisis is high.

Existing research suggests two ways in which leaders' relative hawkishness could influence the reciprocal relationship between leader survival and interstate conflict identified by Chiozza and Goemans (2003). First, domestic populations appear to prefer hawkish politicians over dovish politicians when they feel threatened by a foreign actor (e.g., Gadarian 2010, Holman, Merolla and Zechmeister 2011, Getmansky and Zeitzoff 2014). This implies that doves should be more likely to lose office than hawks when an interstate conflict is likely. Second, given their relatively lower subjective costs of conflict and relatively greater risk-acceptance, hawkish leaders are more likely to be willing to initiate an interstate conflict under more circumstances than dovish leaders (Arena and Palmer 2009, Clare 2010, Heffington 2018). One of the risks of initiating an interstate crisis is that losing a conflict, especially one that escalates to war, increases the likelihood a leader will suffer an irregular removal from office (Chiozza and Goemans 2011). This suggests dovish leaders should be less likely to engage in diversionary behavior than hawkish leaders.

We assess how leaders' latent willingness to use military force affects the reciprocal relationship between leader survival and interstate crises using a modified version of Chiozza and Goemans's (2003) main model. We first estimate reduced-form probit models of the probability a leader will be removed from power and initiate an interstate crisis using the same exogenous variables as Chiozza and Goemans and θ_1 . We then calculated the linear expectations yielded by the two reduced

form models and used them as endogenous regressors in a structural model of leader removal and interstate conflict initiation. We interact $\widehat{Leader\ Removal}$ and $\widehat{Crisis\ Initiation}$ with θ_1 in the respective equations of the structural model to assess how leaders' latent hawkishness might condition the relationships between leader survival and conflict initiation. Given that standard results tables limit our ability to interpret the results of multiplicative interaction terms (e.g., Brambor, Clark and Golder 2006), we conducted a set of post-estimation simulations and present the results of our simulations graphically in Figures 5 - 8.¹⁴

We first consider how leaders' latent hawkishness and their probability of removal interact to influence patterns of interstate conflict initiation. Panel A in Figure 5 reports the mean probability of crisis initiation for hawkish leaders (dashed red line) and dovish leaders (solid blue line) across the range of their expectation of removal while Panel B reports the difference in these probabilities (solid black line) with 95% confidence intervals represented by the shaded areas. The ticks in the rug plot represent values of $\widehat{Leader\ Removal}$. We define hawkish and dovish leaders as falling two standard deviations above or below the mean of θ_1 , respectively.

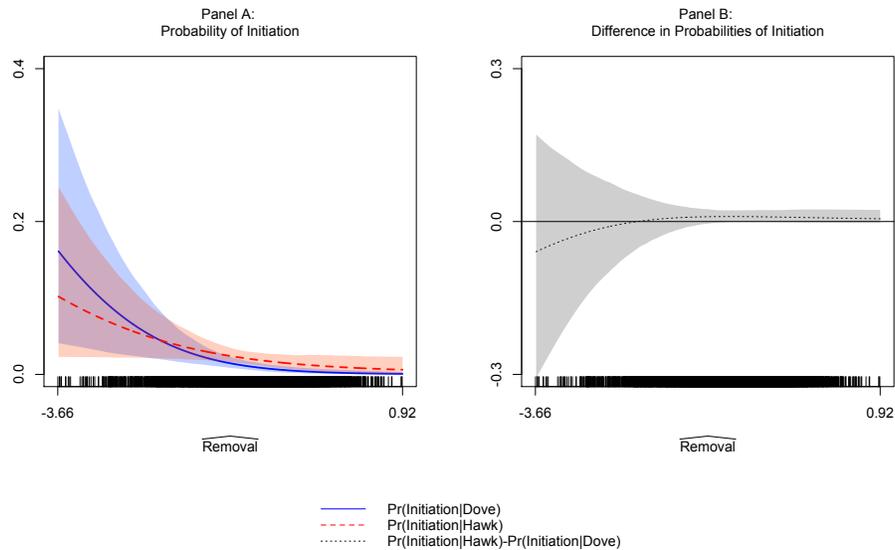


Figure 5: Probability of Crisis Initiation for Hawks and Doves across Expectation of Removal

The results in Figure 5 indicate that there is no significant difference in the probability of

¹⁴Details about the post-estimation simulations are available in the appendix.

conflict initiation as a function of leaders' latent hawkishness when the expectation of removal is relatively low, but that hawkish leaders are significantly more likely to initiate an interstate conflict than are dovish leaders when the expectation of removal is relatively high. This suggests two things. First, the mean difference in the probability of hawks and doves initiating a conflict is driven by differences in their behavior when their political survival is threatened. Second, to the extent diversionary conflict occurs, hawks are more likely to engage in diversion than are doves.

Panel A in Figure 6 plots the probability of conflict initiation for leaders' whose political survival is secure (solid blue line) and insecure (dashed red line) across the range of θ_3 . We define a secure leader and an insecure leader as being two standard deviations below or above the mean of $\widehat{Leader\ Removal}$, respectively. Panel B presents the difference in these probabilities. The results in Figure 6 are consistent with Chiozza and Goemans's (2003) findings: leaders are more likely to initiate interstate crises when their political survival is relatively secure than when they face a high probability of being removed from power. Figure 6 also suggests that leaders' latent willingness to use force has a relatively stronger effect on the probability of conflict initiation when leaders' political survival is threatened than when it is secure. Moving from the most dovish leader to the most hawkish leader increases the probability of crisis initiation by 9.4% (from 0.038 to 0.042) among secure leaders and by 522% (from 0.002 to 0.012) for insecure leaders. Thus, the results in Figures 5 and 6 indicate that while peace is still best obtained through insecurity, leaders' latent willingness to use force and the probability they will be removed from political power interact to influence the initiation of interstate conflicts.

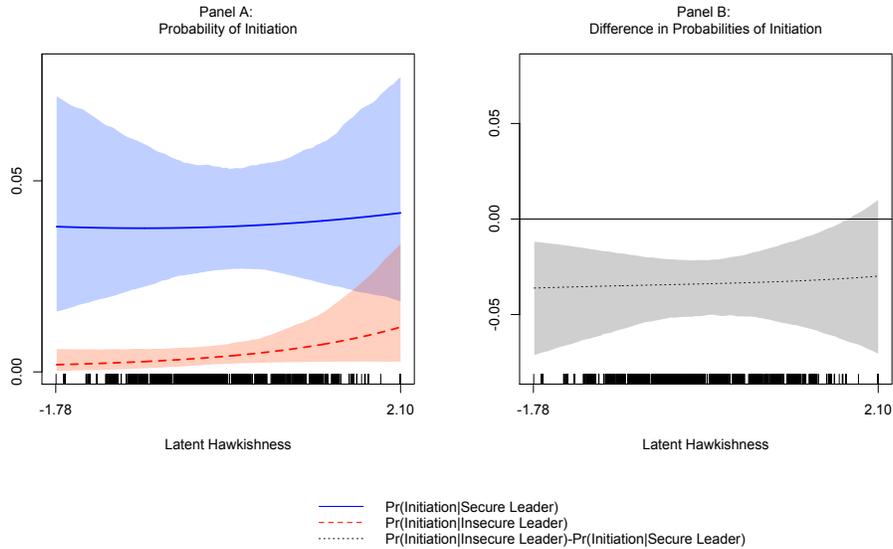


Figure 6: Probability of Crisis Initiation for Secure and Insecure Leaders across Hawkishness

We also find evidence that leaders' latent hawkishness and interstate crisis initiation influence the likelihood a leader will lose office. Panel A in Figure 7 plots the probability a relatively hawkish leader (dashed red line) and a relatively dovish leader (solid blue line) will be removed from power across the range of $\widehat{Crisis\ Initiation}$. Panel B presents the difference in these probabilities of removal (solid black line). We find that dovish incumbents are consistently more likely to lose office than hawks, not just when the probability of conflict initiation is high.

Figure 8 reports the probability a leader will be removed from power when structural conditions make a crisis likely (dashed red line) or unlikely (solid blue line) across the range of θ_3 (Panel A) and the difference in these probabilities (Panel B). We define interstate crisis initiation as likely or unlikely as equal to two standard deviations above or below the mean of $\widehat{Crisis\ Initiation}$, respectively. Our findings echo those of Chiozza and Goemans (2003) in that all leaders face a higher probability of removal when an interstate crisis is likely than when a crisis is unlikely. Beyond this general relationship, though, leaders' latent willingness to use force has a larger effect on incumbents' probability of survival when a crisis is relatively likely than when a crisis is unlikely. Moving from the most dovish leader to the most hawkish leader has very little effect on the probability of removal when a crisis is unlikely (changes from 0.02 to 0.01) but results in a rather large reduction

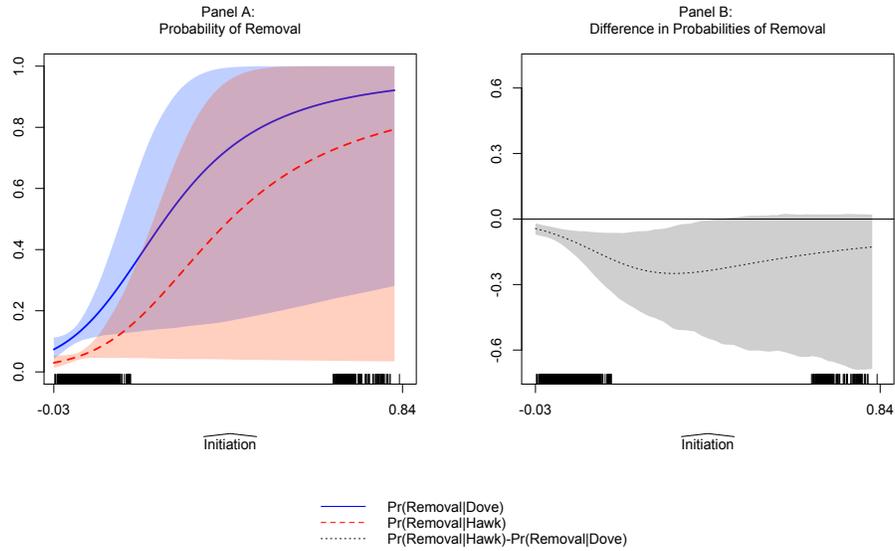


Figure 7: Probability of Removal for Hawks and Doves across Expectation of Crisis Initiation

in the probability of leader replacement when a crisis is likely (changes from 0.53 to 0.25).

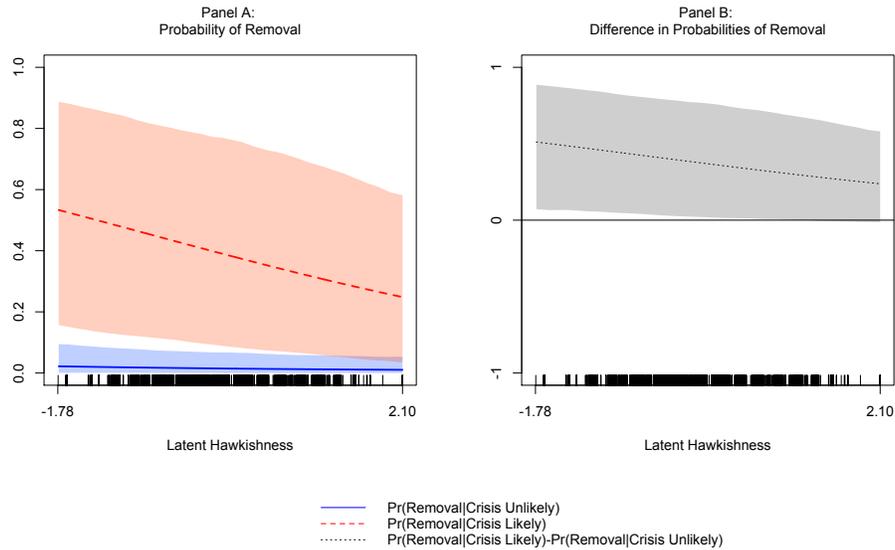


Figure 8: Probability of Removal when Crisis Initiation is Likely and Unlikely across Hawkishness

Our analyses indicate that leaders' latent willingness to use military force influences both directions of the reciprocal relationship between leader survival and interstate crisis initiation. While peace is generally more likely to obtain among politically insecure leaders, hawkish leaders are more likely to engage in diversionary conflict than dovish leaders and leaders' latent hawkishness

has a larger effect on conflict initiation when their tenure is threatened than when they are secure in power. We also find that doves are systematically more likely to be removed from office than are hawks, and that the difference in these probabilities are smallest when an interstate conflict is unlikely. Further, while all leaders are more likely to lose office when a crisis is likely, our results suggest that leaders' relative willingness to use military force has a larger influence on their political survival when the probability of crisis initiation is high than when it is low. Thus, our measure of leaders' latent hawkishness provides insight into how leaders' political survival and crisis initiation are related to one another.

5.2 Hawks, Doves, and Terrorist Attacks in Democracies and Dictatorships

In the run-up to the 2004 U.S. Presidential Election, Vice President Richard (Dick) Cheney implored the attendees of a town hall to make the “right choice” and re-elect Republican President George W. Bush over Democratic challenger John Kerry. Cheney warned the audience that “if we make the wrong choice then the danger is that we’ll get hit again and we’ll be hit in a way that will be devastating” (Koch and Cranmer 2007, pg. 311). While Cheney’s appeal undoubtedly was driven by his desire to be re-elected, it also appears to be consistent with the empirical record: democratic governments on the left were more likely to suffer international terrorist attacks than are democratic governments on the right between 1975 and 1997 (Koch and Cranmer 2007). Koch and Cranmer’s explanation for this finding is that, compared to left-oriented governments, democracies led by parties on the right are less attractive targets because they are more hawkish and, therefore, less likely to compromise with and more likely to fight back against terrorist organizations.

The measures we develop allow us to build upon the work of Koch and Cranmer (2007) in two ways. First, we can analyze how leaders' relative hawkishness, and not simply a government's left-right orientation, affects whether countries suffer from international terrorist attacks. Second, we can analyze how the leadership of democracies and dictatorships influences patterns of international terrorism. This is useful for two reasons. First, there is nothing in Koch and Cranmer's (2007) core argument that hawks should be better at deterring terrorist attacks than doves that suggests this relationship is limited to democracies. Thus, our measures allow for a broader test

of the argument than was previously possible. Second, it is likely the case that a leader’s relative hawkishness has a larger effect on whether a non-democracy suffers an international terrorist attack than a democracy suffers an attack. Dictators tend to have greater policy autonomy and, therefore, a greater effect on their states’ policies and behaviors than democratic leaders (McGillivray and Stam 2004, McGillivray and Smith 2008). If this general phenomenon holds with respect to deterring terrorist attacks, leaders’ relative hawkishness should have a larger effect on whether non-democracies are targeted by terrorists than democracies.

We assess the relationship between international terrorism, leader hawkishness, and regime type by extending the main model in Li and Schaub (2004). Li and Schaub (2004) use a negative binomial to estimate the number of transnational terrorist attacks countries suffer on country-year data set that covers the period between 1975 and 1995. We interact a state’s *polity2* score (21-point scale ranging from -10 to +10) with a collapsed version of θ_1 that identifies the mean hawkishness of a state’s leader in a given year to model the expected conditional relationship between terrorist attacks, leader hawkishness, and regime type. We use a set of post-estimation simulations to calculate the expected number of transnational terrorist attacks against a democracy and a dictatorship (defined as +7 and -7 on the *polity2* scale, respectively) as a function of leaders’ latent willingness to use military force. Panel A in Figure 9 presents the mean expected number of attacks against a democracy (solid blue line) and a dictatorship (dashed red line) across θ_1 while Panel B reports the difference in these quantities (shaded areas represent 95% confidence intervals).

Figure 9 suggests three empirical patterns. First, the expected number of terrorist attacks against a country is decreasing in leader hawkishness in both democracies and non-democracies. This is consistent with the claim that Koch and Cranmer’s (2007) argument should apply in democracies and dictatorships. Second, the effect of leaders’ willingness to use force on international terrorist attacks is larger in non-democracies than it is in democracies. Across the range of θ_1 , the expected number of international terrorist attacks falls from 1.8 to 0.8 in a democracy and from 4.1 to 0.2 in an autocracy. Third, whether democracies or dictatorships are more likely to suffer terrorist attacks is conditional on the relative hawkishness of their leaders. Compared to democratic regimes, autocracies suffer significantly more terrorist attacks given relatively dovish

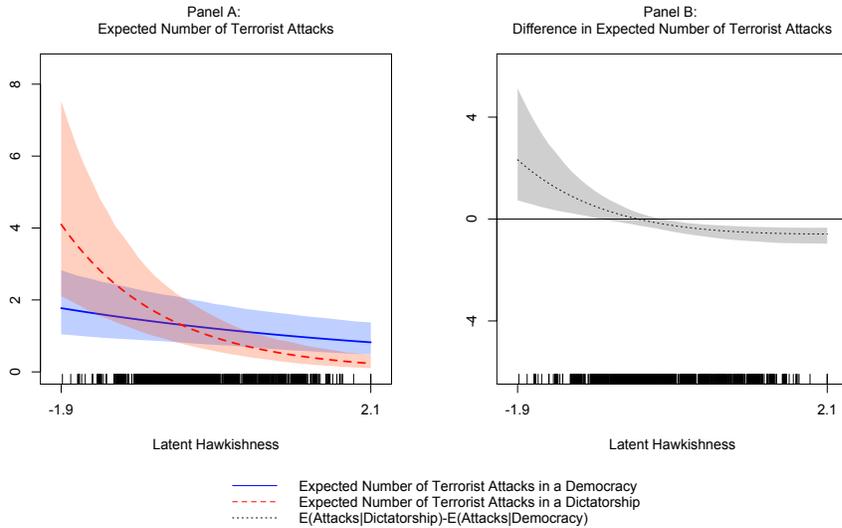


Figure 9: Expected Terrorist Attacks in Democracies and Dictatorships across Hawkishness

leaders and significantly fewer terrorist attacks given relatively hawkish leaders. Existing research generally concludes that democracies are more likely to suffer from international terrorist attacks than dictatorships (e.g., Li and Schaub 2004). Our results suggest that whether this relationship holds is conditional on the relative willingness of dictators and democrats to use military force.

6 Discussion and Conclusion

Political leaders' willingness to use military force underlies many of our formal and informal models of crisis bargaining and interstate conflict, yet the field does not have a comprehensive measure of this important theoretical concept with broad spatial and temporal coverage constructed independently of leaders' previous involvement in an interstate conflict. This paper uses Bayesian Rasch-like models to estimate leaders' latent hawkishness based on their personal attributes, political orientation, and psychological willingness to challenge constraints. The resulting measures cover the universe of national political executives between 1875 and 2004 and have advantages over indicators used in the literature to proxy leaders' underlying willingness to use force on multiple dimensions. A pair of applications with our best performing measure suggests leaders' latent

hawkishness conditions the reciprocal relationship between leader survival and interstate conflict initiation and the frequency with which democracies and dictatorships are attacked by international terrorist groups.

One of the key characteristics of our approach is its flexibility and the ability of other scholars to generate different measures of leaders' latent hawkishness. We think there are five dimensions, in particular, that scholars might usefully consider when constructing alternative indicators of leaders' underlying willingness to use force. The first concerns the variables that underlie a given measure. It is straightforward to include additional variables in either the Rasch-component of the framework (e.g., whether a leader was a revolutionary (Colgan 2013)) or as covariates in the regression-component of the framework (e.g., information about leaders' operational codes or beliefs (Schafer and Smith 2017)). Further, one could omit variables from the model based on either theoretical or empirical grounds. Decisions about what variables to include in the measurement model could be guided by theory or model fit statistics.

Analysts could also consider alterations to all of the assumptions used to produce the measures described in the paper. In Section 4 we describe a single alternative to one vague hyperprior (the discrimination term, γ , for θ_3), and the result was an increase in predictive power for the latent measure from the more standard 2PL model. This is only one of many possible improvements that might be made by further evaluating model performance, thinking through distributional assumptions, motivating new options from theory, and doing more model comparisons. For example, modeling the latent variable with a non-normal distribution or directly modeling the covariance between the item-level terms might improve upon the measures developed here. The possibilities are endless.

A third extension to our framework would be to consider how leaders' latent hawkishness might change over the course of their tenures. This would allow one to assess whether variation in patterns of conflict initiation throughout leaders' tenure is due to changes in their incentives (Williams 2013) or underlying willingness to use force (Renshon 2008). From our perspective, the largest challenge to this extension is the lack of systematic and informative time-varying variables measured independent of conflict involvement that could be used to estimate changes in leaders'

relative hawkishness throughout their tenure. Advances in text-analysis could allow one to collect systematic data on historical leaders' speeches in a more efficient manner than previously possible, but doing so would still represent an immense data collection effort that is far beyond the scope of this project.

Fourth, analysts could allow the relationships between leaders' attributes, political orientations, and/or psychological traits and their underlying willingness to use force to vary by contextual factors. For one example, Horowitz and Stam (2014) argue the relationship between leaders' previous military service and their willingness to initiate a conflict is conditional on regime type due to variation in the types of leaders with military experience democracies and dictatorships select. Extending the models developed here to incorporate this insight and other context-dependent relationships is a fruitful avenue for future research.

Finally, we strongly believe that collecting additional data on leaders' political orientations and psychological traits will allow analysts to construct better measures of leaders' latent willingness to use force. Analysts are greatly constrained by a lack of systematic data on these types of characteristics, at least relative to data on leaders' background experiences and personal attributes. As noted above, we only had information from each of our four data sources on 0.3% (10 of 2,965) of the political executives in our sample, with the missingness driven exclusively by a lack of data on leaders' political orientations and psychological willingness to challenge constraints. Our results demonstrate that including information about leaders' political orientation and psychological attributes can produce better measures of leaders' latent hawkishness than indicators based exclusively on leaders' personal characteristics. Thus, expanding the spatial and temporal coverage of data on leaders' political orientations and psychological traits would allow analysts to produce more predictive measures of leaders' underlying willingness to use force.

The measures developed here will allow scholars to analyze a range of relationships regarding how political leaders influence international relations and domestic politics. Further, the transparent and flexible nature of our statistical framework will allow analysts to easily extend and improve upon our measures of leaders' underlying willingness to use military force. The implications of our work go beyond questions related to leaders' latent hawkishness. Most notably, our method of

incorporating sparse information from multiple sources into measurement models should be useful to scholars regardless of the substantive nature of their research. The measures and statistical framework presented here therefore will be useful to scholars working on a variety of topics and contributes to the scientific study of politics in each of the discipline's empirical fields.

References

- Arena, Philip and Glenn Palmer. 2009. "Is it Politics or the Economy? Domestic Correlates of Dispute Involvement in Parliamentary Systems." *International Studies Quarterly* 53(4):955–975.
- Ausderan, Jacob. 2015. "Following an Experienced Shepherd: How a Leaders Tenure Affects the Outcome of International Crises." *International Interactions* 41(1):26–45.
- Brambor, Thomas, Johannes Lindvall and Annika Stjernquist. 2017. "The Ideology of Heads of Government, 1870–2012. Version 1.5." .
- Brambor, Thomas, William Clark and Matt Golder. 2006. "Understanding Interaction Models: Improving Empirical Analyses." *Political Analysis* 14(1):63–82.
- Bueno de Mesquita, Bruce. 1975. "Measuring systemic polarity." *Journal of Conflict Resolution* 19(2):187–216.
- Bueno de Mesquita, Bruce, Alastair Smith, Randolph M. Siverson and James Morrow. 2003. *The Logic of Political Survival*. Cambridge: MIT Press.
- Bueno de Mesquita, Bruce and Randolph Siverson. 1995. "War and the Survival of Political Leaders: A Comparative Study of Regime Types and Political Accountability." *American Political Science Review* 89(4):841–855.
- Bueno de Mesquita, Bruce, James Morrow, Randolph M. Siverson and Alastair Smith. 1999. "An Institutional Explanation of the Democratic Peace." *American Political Science Review* 93(4):791–808.

- Calin, Costel and Brandon Prins. 2015. "The Sources of Presidential Foreign Policy Decision Making: Executive Experience and Militarized Interstate Conflicts." *International Journal of Peace Studies* 20(1).
- Carpenter, Bob, Andrew Gelman, Matt Hoffman, Daniel Lee, Ben Goodrich, Michael Betancourt, Michael A Brubaker, Jiqiang Guo, Peter Li and Allen Riddell. 2016. "Stan: A probabilistic programming language." *J Stat Softw* .
- Carter, Jeff. 2017. "The Political Cost of War Mobilization in Democracies and Dictatorships." *Journal of Conflict Resolution* 61(8):1768–1794.
- Carter, Jeff and Giacomo Chiozza. 2018. State Leaders and Foreign Policy. In *Oxford Encyclopedia of Foreign Policy Analysis*, ed. Cameron Thies. Oxford University Press.
- Carter, Jeff and Timothy Nordstrom. 2017. "Term Limits, Leader Preferences, and Interstate Conflict." *International Studies Quarterly* 61(3):721–735.
- Chiozza, Giacomo and H.E. Goemans. 2003. "Peace Through Insecurity: Tenure and International Conflict." *Journal of Conflict Resolution* 47(4):443–467.
- Chiozza, Giacomo and H.E. Goemans. 2004. "International Conflict and the Tenure of Leaders: Is War Still *Ex Post* Inefficient?" *American Journal of Political Science* 48(3):604–619.
- Chiozza, Giacomo and H.E. Goemans. 2011. *Leaders and International Conflict*. Cambridge University Press.
- Clare, Joe. 2010. "Ideological Fractionalization and the International Conflict Behavior of Parliamentary Democracies." *International Studies Quarterly* 54(4):965–987.
- Colgan, Jeff D. 2013. "Domestic Revolutionary Leaders and International Conflict." *World Politics* 65(04):656–690.
- Colgan, Jeff D and Jessica LP Weeks. 2015. "Revolution, Personalist Dictatorships, and International Conflict." *International Organization* 69(01):163–194.

- Correlates of War. 2001. *National Material Capabilities (v.3.02)*.
- Croco, Sarah E. 2011. "The Deciders Dilemma: Leader Culpability, War Outcomes, and Domestic Punishment." *American Political Science Review* 105(3):457–477.
- Croco, Sarah E and Jessica LP Weeks. 2016. "War Outcomes and Leader Tenure." *World Politics* 68(4):577–607.
- Debs, Alexandre and H.E. Goemans. 2010. "Regime Type, the Fate of Leaders and War." *American Political Science Review* 104(3):430–445.
- Ellis, Cali Mortenson, Michael C Horowitz and Allan C Stam. 2015. "Introducing the LEAD Data Set." *International Interactions* 41(4):718–741.
- Foster, Dennis M and Jonathan W Keller. 2014. "Leaders' Cognitive Complexity, Distrust, and the Diversionary Use of Force." *Foreign Policy Analysis* 10(3):205–223.
- Gadarian, Shana Kushner. 2010. "Foreign Policy at the Ballot Box: How Citizens Use Foreign Policy to Judge and Choose Candidates." *The Journal of Politics* 72(04):1046–1062.
- Gaubatz, Kurt Taylor. 1991. "Election Cycles and War." *Journal of Conflict Resolution* 35(2):212–244.
- George, Alexander L. 1969. "The "Operational Code": A Neglected Approach to the Study of Political Leaders and Decision-Making." *International Studies Quarterly* 13(2):190–222.
- Getmansky, Anna and Thomas Zeitzoff. 2014. "Terrorism and Voting: The Effect of Rocket Threat on Voting in Israeli Elections." *American Political Science Review* 108(03):588–604.
- Ghosn, Faten, Glenn Palmer and Stuart Bremer. 2004. "The MID3 Data Set, 1993-2001: Procedures, Coding Rules, and Description." *Conflict Management and Peace Science* 21(3):133–154.
- Heffington, Colton. 2018. "Do Hawks and Doves Deliver? The Words and Deeds of Foreign Policy in Democracies." *Foreign Policy Analysis* 14(1):64–85.

- Hermann, Margaret G. 1980. "Explaining Foreign Policy Behavior Using the Personal Characteristics of Political Leaders." *International Studies Quarterly* 24(1):7–46.
- Hermann, Margaret G. 2005. Assessing Leadership Style: A Trait Analysis. In *The psychological assessment of political leaders*, ed. Jerrold M. Post. The University of Michigan Press Ann Arbor, MI pp. 178–212.
- Hermann, Margaret G, Thomas Preston, Baghat Korany and Timothy M Shaw. 2001. "Who Leads Matters: The Effects of Powerful Individuals." *International Studies Review* 3(2):83–131.
- Holman, Mirya R, Jennifer L Merolla and Elizabeth J Zechmeister. 2011. "Sex, stereotypes, and security: A study of the effects of terrorist threat on assessments of female leadership." *Journal of Women, Politics & Policy* 32(3):173–192.
- Honaker, James, Gary King and Matthew Blackwell. 2007. "Amelia II: A Program for Missing Data." <http://gking.harvard.edu/amelia/>.
- Horowitz, Michael C, Allan C Stam and Cali M Ellis. 2015. *Why Leaders Fight*. Cambridge University Press.
- Horowitz, Michael C. and Allan C. Stam. 2014. "How Prior Military Experience Influences the Future Militarized Behavior of Leaders." *International Organization* 68:527–559.
- Horowitz, Michael, Rose McDermott and Allan C Stam. 2005. "Leader Age, Regime Type, and Violent International Relations." *Journal of Conflict Resolution* 49(5):661–685.
- Houghton, David. 2017. Political Psychology of Foreign Policy. In *Oxford Research Encyclopedia of Foreign Policy*, ed. Cameron Thies. Oxford University Press. DOI:10.1093/acrefore/9780190228637.013.466.
- Hudson, Valerie M. 2005. "Foreign Policy Analysis: Actor-Specific Theory and the Ground of International Relations." *Foreign policy analysis* 1(1):1–30.
- Jennings, M Kent and Richard G Niemi. 2014. *Generations and Politics: A Panel Study of Young Adults and Their Parents*. Princeton University Press.

- Johnson, Jesse C and Tiffany D Barnes. 2011. "Responsibility and the Diversionary Use of Force 1." *Conflict Management and Peace Science* 28(5):478–496.
- Kaarbo, Juliet and Margaret G Hermann. 1998. "Leadership Styles of Prime Ministers: How Individual Differences affect the Foreign Policymaking Process." *The Leadership Quarterly* 9(3):243–263.
- Keller, Jonathan W. 2005. "Leadership Style, Regime Type, and Foreign Policy Crisis Behavior: A Contingent Monadic Peace?" *International Studies Quarterly* 49(2):205–232.
- Keller, Jonathan W and Dennis M Foster. 2012. "Presidential Leadership Style and the Political Use of Force." *Political Psychology* 33(5):581–598.
- Kertzer, Joshua D. 2016. *Resolve in International Politics*. Princeton University Press.
- Koch, Michael T. 2009. "Governments, Partisanship, and Foreign Policy: The Case of Dispute Duration." *Journal of Peace Research* 46(6):799–817.
- Koch, Michael T and Patricia Sullivan. 2010. "Should I Stay or Should I Go Now? Partisanship, Approval, and the Duration of Major Power Democratic Military Interventions." *The Journal of Politics* 72(03):616–629.
- Koch, Michael T and Skyler Cranmer. 2007. "Testing the Dick Cheney Hypothesis: Do governments of the Left Attract More Terrorism than Governments of the Right?" *Conflict Management and Peace Science* 24(4):311–326.
- Leeds, Brett Ashley, Michaela Mattes and Jeremy S. Vogel. 2009. "Interests, Institutions, and the Reliability of International Commitments." *American Journal of Political Science* 53(2):461–476.
- Li, Quan and Drew Schaub. 2004. "Economic Globalization and Transnational Terrorism: A Pooled Time-Series Analysis." *Journal of Conflict Resolution* 48(2):230–258.
- Marshall, Monty and Keith Jaggers. 2005. "Polity IV Dataset Users' Manual." www.cidcm.umd.edu//polity.

- Martin, Andrew D and Kevin M Quinn. 2002. "Dynamic Ideal Point Estimation via Markov Chain Monte Carlo for the US Supreme Court, 1953–1999." *Political Analysis* 10(2):134–153.
- Matthews, Donald R. 1954. *The Social Background of Political Decision-makers*. Vol. 8 Garden City, NY: Doubleday.
- McGillivray, Fiona and Alastair Smith. 2008. *Punishing the Prince. A Theory of Interstate Relations, Political Institutions, and Leader Change*. Princeton University Press.
- McGillivray, Fiona and Allan C Stam. 2004. "Political Institutions, Coercive Diplomacy, and the Duration of Economic Sanctions." *Journal of Conflict Resolution* 48(2):154–172.
- Mitchell, Sara McLaughlin and Brandon C Prins. 2004. "Rivalry and Diversionary Uses of Force." *Journal of Conflict Resolution* 48(6):937–961.
- Palmer, Glenn, Tamar R. London and Patrick M. Regan. 2004. "What's Stopping You? The Sources of Political Constraints on International Conflict Behavior in Parliamentary Democracies." *International Interactions* 30(1):1–24.
- Poole, Keith T and Howard Rosenthal. 1991. "Patterns of Congressional Voting." *American Journal of Political Science* pp. 228–278.
- Prorok, Alyssa K. 2016. "Leader Incentives and Civil War Outcomes." *American Journal of Political Science* 60(1):70–84.
- Rasch, Georg. 1960. "Probabilistic models for some intelligence and achievement tests." *Copenhagen: Danish Institute for Educational Research* .
- Renshon, Jonathan. 2008. "Stability and Change in Belief Systems: The Operational Code of George W. Bush from Governor to Second-term President." *Journal of Conflict Resolution* .
- Reuning, Kevin, Michael R Kenwick and Christopher J Fariss. N.d. "Exploring the Dynamics of Latent Variable Models." Unpublished manuscript. Available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2828703.

- Schafer, Mark and Gary Smith. 2017. Beliefs and Foreign Policy Decision Making. In *Oxford Research Encyclopedia of Politics*, ed. William R. Thompson. Oxford University Press. <http://politics.oxfordre.com/view/10.1093/acrefore/9780190228637.001.0001/acrefore-9780190228637-e-393>.
- Schafer, Mark and Stephen G Walker. 2006. "Democratic Leaders and the Democratic Peace: The Operational Codes of Tony Blair and Bill Clinton." *International Studies Quarterly* 50(3):561–583.
- Schultz, Kenneth A. 2001. "Hawks and Doves: Estimating Military Policy Positions from Election Platforms."
- Schultz, Kenneth A. 2005. "The Politics of Risking Peace: Do Hawks or Doves Deliver the Olive Branch?" *International Organization* 59(01):1–38.
- Seki, Katsunori and Laron K Williams. 2014. "Updating the Party Government data set." *Electoral Studies* 34:270–279.
- Serpell, James A. 1981. "Childhood Pets and Their Influence on Adults' Attitudes." *Psychological Reports* 49(2):651–654.
- Voeten, Erik. 2000. "Clashes in the Assembly." *International organization* pp. 185–215.
- Volkens, Andrea, Pola Lehmann, Nicolas Merz, Sven Regel, Annika Werner, Onawa Promise Lacewell and Henrike Schultze. 2013. "Comparative Manifesto Project (MRG/CMP/MARPOR)."
- Walker, Stephen G. 1995. "Psychodynamic Processes and Framing Effects in Foreign Policy Decision-Making: Woodrow Wilson's Operational Code." *Political Psychology* pp. 697–717.
- Walker, Stephen G, Mark Schafer and Michael D Young. 1998. "Systematic Procedures for Operational Code Analysis: Measuring and Modeling Jimmy Carter's Operational Code." *International Studies Quarterly* 42(1):175–189.

- Waltz, Kenneth N. 1959. *Man, the State, and War: A Theoretical Analysis*. New York: Columbia University Press.
- Weeks, Jessica L. 2012. “Strongmen and Straw Men: Authoritarian Regimes and the Initiation of International Conflict.” *American Political Science Review* 106(2):326–347.
- Williams, Laron K. 2013. “Flexible Election Timing and International Conflict.” *International Studies Quarterly* 57(3):449–461.
- Wolford, Scott. 2007. “The Turnover Trap: New Leaders, Reputation, and International Conflict.” *American Journal of Political Science* 51(4):772–788.
- Wolford, Scott and Emily Hencken Ritter. 2016. “National Leaders, Political Security, and the Formation of Military Coalitions.” *International Studies Quarterly* 60(3):540–551.