TECHNICAL APPENDIX FOR *WHY LEADERS FIGHT*, BY MICHAEL C. HOROWITZ, ALLAN C. STAM, AND CALI M. ELLIS (NEW YORK: CAMBRIDGE UNIVERSITY PRESS, 2015)

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INTRODUCTION

This document serves as the technical appendix described in the book *Why Leaders Fight*. It contains additional information for interested readers of the book, including detailed statistical models for the charts and figures displayed in the book, technical information on modeling choices described in the book, and the codebook used to create the Leader Experience and Attribute Descriptions (LEAD) dataset.

For the replication data and instructions to re-create the statistical models, tables, charts, and figures in the book and in this appendix, please go to https://dataverse.harvard.edu/dataverse/mchorowitz. There you will find the relevant data and instructions, along with even more statistical tests to validate the results presented in the book. That page also contains additional information on the sources used to code the LEAD dataset.

MONADIC LEADER AND SYSTEM RISK MODELS

Chapter 2 of *Why Leaders Fight* includes several charts and tables estimating "leader risk," the probability that leaders initiate military conflict based on their personal background characteristics, and "system risk," the probability that leaders initiate military conflict (a militarized interstate dispute)[1] based on factors specific to their country or the international system, such as their overall military power or whether the country is a democracy or autocracy. Table A1, Model 1, shows the statistical results of the model that produced Figure 2.3.

Table A.1: Regression Results From Figure 2.3, With Robustness Tests

	(Model 1) Leader Risk Model	(Model 2) Drop Duplicate Non-MID Leaders	(Model 3) One MID Per Leader Year
	B/SE	B/SE	B/SE
Military Service, No Combat	0.709***	0.700***	0.575***
	(0.192)	(0.193)	(0.145)
Military Service, Combat, 1 =	0.414**	0.397**	0.371**
Yes, 0 = No	(0.170)	(0.171)	(0.150)
Prior Rebel Participation, 1 =	0.0223	-0.000664	0.00401
Yes, 0 = No	(0.130)	(0.130)	(0.106)
National War Participation =	0.322*	0.342**	0.256*
Victory, 1 = Yes, 0 = No	(0.165)	(0.166)	(0.147)
National War Participation =	0.0964	0.0812	-0.0122
Loss, 1 = Yes, 0 = No	(0.170)	(0.170)	(0.135)
Rebel War Participation =	-0.0611	-0.0635	-0.000352
Victory, 1 = Yes, 0 = No	(0.151)	(0.152)	(0.129)
Rebel War Participation =	0.714***	0.726***	0.594***
Loss, 1 = Yes, 0 = No	(0.265)	(0.267)	(0.223)
Education Level, 0 = Primary,	0.0464	0.0506	0.0526
1 = Secondary, 2 = University,	(0.0663)	(0.0665)	(0.0547)
3 = Graduate			
Leader Age	0.0103**	0.0116***	0.00616*
	(0.00430)	(0.00429)	(0.00359)
Occupation: Teacher, 1 = Yes,	-0.0202	-0.0356	0.0269
0 = No	(0.130)	(0.131)	(0.108)
Occupation: Journalism, 1 =	-0.136	-0.107	-0.125

[1] Ghosn and Palmer 2006.

Yes, 0 = No	(0.198)	(0.202)	(0.160)
Occupation: Law, 1 = Yes, 0 = No	-0.147	-0.146	-0.0366
	(0.131)	(0.132)	(0.113)
Occupation: Medicine, 1 = Yes, 0 = No	-0.553**	-0.561**	-0.358
	(0.260)	(0.261)	(0.242)
Occupation: Religion, 1 = Yes, 0 = No	0.362	0.382	-0.156
	(0.459)	(0.464)	(0.357)
Occupation: Activist, 1 = Yes, 0 = No	0.147	0.145	0.190*
	(0.130)	(0.130)	(0.112)
Occupation: Career Politician, 1 = Yes, 0 = No	-0.0579	-0.0715	-0.0281
	(0.103)	(0.103)	(0.0835)
Occupation: Creative, 1 = Yes, 0 = No	0.525**	0.520**	0.202
	(0.246)	(0.247)	(0.177)
Occupation: Business, 1 = Yes, 0 = No	-0.101	-0.0750	-0.0796
	(0.143)	(0.145)	(0.122)
Occupation: Aristocrat/Landowner, 1 = Yes, 0 = No	-0.251	-0.243	-0.0843
	(0.212)	(0.211)	(0.200)
Occupation: Police, 1 = Yes, 0 = No	0.231	0.178	0.0187
	(0.421)	(0.426)	(0.302)
Occupation: Military Career, 1 = Yes, 0 = No	-0.303	-0.278	-0.141
	(0.192)	(0.192)	(0.152)
Occupation: Science/Engineering, 1 = Yes, 0 = No	0.217	0.192	0.231
	(0.241)	(0.245)	(0.200)
Occupation: Blue Collar, 1 = Yes, 0 = No	-0.0453	-0.0857	-0.129
	(0.201)	(0.199)	(0.164)
LEAD Gender, 0 = Female, 1 = Male	-0.394	-0.361	-0.533**
	(0.286)	(0.297)	(0.260)
Number of Spouses (Count)	-0.0201	-0.0200	-0.0220
	(0.0185)	(0.0189)	(0.0182)
Married (Ever), 1 = Yes, 0 = No	0.0394	0.0788	0.257
	(0.353)	(0.353)	(0.258)
Married in Power, 1 = Yes, 0 = No	-0.175	-0.196	-0.175
	(0.198)	(0.208)	(0.179)
Divorced (Ever), 1 = Yes, 0 = No	-0.0163	-0.0184	-0.0401
	(0.120)	(0.122)	(0.105)
Total number of children	0.00397	0.00383	0.00488
	(0.00546)	(0.00528)	(0.00488)
Parental Status, 0 = Together, 1 = Divorced	0.378*	0.376*	0.369**
	(0.199)	(0.201)	(0.174)
Considered "Illegitimate" Child, 1 = Yes, 0 = No	-0.526**	-0.555**	-0.485**
	(0.233)	(0.237)	(0.195)
Royalty, 1 = Yes, 0 = No	-0.214	-0.227	-0.154
	(0.209)	(0.206)	(0.189)
Orphan, 1 = Yes, 0 = No	-0.0975	-0.107	-0.0278
	(0.258)	(0.268)	(0.231)
Office Tenure (days)/1000	0.0243*	0.0129	0.0210*
	(0.0146)	(0.0147)	(0.0125)
Years since country MID initiation	-0.330***	-0.354***	-0.253***
	(0.0230)	(0.0245)	(0.0185)
Years since country MID initiation ^2	0.0109***	0.0118***	0.00788***
	(0.00136)	(0.00148)	(0.00107)
Years since country MID initiation ^3	-0.0000990***	-0.000109***	-0.0000691***
	(0.0000192)	(0.0000213)	(0.0000146)
Constant	-0.762	-0.733	-1.053***
	(0.522)	(0.521)	(0.371)

Observations	11518	11228	10942
Pseudo R^2	0.186	0.201	0.121
ll	-4542.1	-4411.2	-3998.6

Standard errors in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Models 2 and 3 incorporate the robustness checks involving leader selection discussed on pages 65 and 66. To avoid excluding too many leaders, if more than one leader was in office during a given country-year, we included both leaders if one of the leaders started a military dispute that year. The reason was that something about the transition of leaders may have influenced the probability of a military dispute. Model 2 drops those additional observations, keeping only the leader who started a military dispute (as described in the book, given the relative rarity of military disputes) in that year. The consistency of the results with Model 1 shows that this decision did not play a significant role.

Model 3 reduces the dataset down to one observation per leader per country year. The main model includes multiple observations per leader year if a leader initiated more than one military dispute in a year (e.g., if Saddam Hussein initiated two military disputes in 1990, there would be two Saddam Hussein observations in 1990). This was the right decision for two reasons. First, the relative rarity of military disputes means we lose too much data if we exclude those observations. Second, in cases such as Hitler at the outset of World War II, multiple military disputes in a year are broadly related (insofar as all actions have opportunity costs), but can have independent decision processes. Thus, excluding the second –to-nth military dispute initiations in a year fundamentally changes the dataset. Model 3 shows, however, that even with those changes, the results are mostly consistent, though there are some differences, as one would expect when that much data is lost. Nevertheless, the overall consistency of Model 3 with Models 1 and 2 reinforces the idea that the specific choice of model specification for Figure 2.3 did not overly drive the results.

Another choice was to use peace year cubic polynomials for Figure 2.3 based on the country year. Instead of splines, the peace year variables approximate a cubic polynomial, e.g., x, x^2, x^3. We did this for consistency with prior literature and consistency with the splines used in the "system risk" model whose results are captured in Tables 2.2 and 2.3 (regression results further below).[2] Table A.2 replicates the leader-specific part of Table 2.2, but with leader-specific peace year variables. Thus, if it has been two years since a leader started a military conflict, $x = 2$, $x^2 = 4$, and $x^3 = 8$. Switching to leader-specific peace year variables actually improves the accuracy of the model somewhat at predicting the most dangerous leaders.

While, as described in the book, the specific leaders in the "Top 10" is not as important as the distinction between the "Top 10" of the leader model and the system model (which demonstrates that the leader model is not simply a proxy for how system attributes drive leader selection), it is still interesting to compare the "Top 10" of the original leader model in Table 2.2 with one based on leader-specific peace years.

The results are mostly similar, but there are distinctions. For example, including leader-specific peace years leads to the elevation of Guy Mollet, the Prime Minister of France who escalated the war in Algeria in 1956.[3] Soviet-era leaders such as Chernenko and Stalin also rise, while US presidents such as Ford and Kennedy fall. The general consistency, however, suggests again that it is not particular modeling choices driving the overall trend of the results, even though particular leaders rise and fall depending on modeling choices.

[2] Beck et al. 1998; Signorino and Carter 2010.
[3] Evans 2012.

Table A.2: Comparing Basic Leader Risk Model To Model With Leader Peace Years

Leader Risk Top 10 – Original Table 2.2			Leader Risk Top 10 - Leader Peace Years		
Country	*Leader Name*	*Leader Risk Score*	*Country*	*Leader Name*	*Leader Risk Score*
China	Deng Xiaoping	0.69	Iran	Ayatollah Khomeini	0.68
Iran	Ayatollah Khomeini	0.69	China	Deng Xiaoping	0.68
U.S.	Ronald Reagan	0.68	France	Guy Mollet	0.67
Croatia	Franjo Tudjman	0.67	Croatia	Franjo Tudjman	0.65
France	Georges Bidault	0.65	China	Mao Zedong	0.63
China	Mao Zedong	0.63	U.S.	Ronald Reagan	0.62
South Africa	Jan Smuts	0.63	France	Georges Bidault	0.61
Iraq	Hassan Al-Bakr	0.61	Russia	Konstantin Chernenko	0.56
U.S.	John F. Kennedy	0.60	Russia	Josef Stalin	0.55
U.S.	Gerald Ford	0.58	Yemen	Ali Nassir Hassani	0.54

Shifting from different ways of evaluating leader risk to comparing leader risk with system risk, Table 2.3 in *Why Leaders Fight* compares the performance of a leader-attribute model of international conflict in predicting the most conflict-prone leaders from 1875 to 2000 compared with a model using traditional system- and state-level factors scholars use to explain international conflict. The variables in the leader model come from Model 1 in Table A.1. The system model includes a series of traditional variables used to explain conflict propensity,[4] including:

- National material capabilities, taken from the Correlates of War data
- Dummy variables for whether a country is a democracy or an autocracy
- The concentration level of power in the international system
- Whether the leader entered office through irregular means such as a coup
- The relative satisfaction of a state in a given year with the most powerful country in the international system in that year
- A dummy variable for whether a country has faced an international militarized challenge in the last five years
- Dummy variables for the outcome of the last war in which the country participates (win/lose/draw)
- Peace year cubic polynomials (described above)

Models 1 and 2 in Table A.3 thus show the regression models used to generate the predictions in Table 2.3.

[4] The sources for the data are described in Chapter 2 or were generated using EUGene (Bennett and Stam 2000). The irregular entry variable in particular comes from Archigos (Goemans et al. 2009).

Table A.3: Comparing Leader Risk And System Risk

	(Model 1) Leader Risk Model B/SE	(Model 2) System Risk Model B/SE	(Model 3) Combined Model B/SE
Military Service, No Combat	0.709***		0.410**
	(0.192)		(0.162)
Military Service, Combat, 1 =	0.414**		0.298*
Yes, 0 = No	(0.170)		(0.175)
Prior Rebel Participation, 1 =	0.0223		0.252**
Yes, 0 = No	(0.130)		(0.118)
National War Participation =	0.322*		0.000696
Victory, 1 = Yes, 0 = No	(0.165)		(0.166)
National War Participation =	0.0964		0.0881
Loss, 1 = Yes, 0 = No	(0.170)		(0.150)
Rebel War Participation =	-0.0611		-0.189
Victory, 1 = Yes, 0 = No	(0.151)		(0.140)
Rebel War Participation =	0.714***		0.147
Loss, 1 = Yes, 0 = No	(0.265)		(0.200)
Education Level, 0 = Primary,	0.0464		0.0376
1 = Secondary, 2 = University,	(0.0663)		(0.0569)
3 = Graduate			
Leader Age	0.0103**		-0.0000644
	(0.00430)		(0.00382)
Occupation: Teacher, 1 = Yes,	-0.0202		0.135
0 = No	(0.130)		(0.113)
Occupation: Journalism, 1 =	-0.136		-0.0414
Yes, 0 = No	(0.198)		(0.175)
Occupation: Law, 1 = Yes, 0	-0.147		0.0253
= No	(0.131)		(0.117)
Occupation: Medicine, 1 =	-0.553**		0.0125
Yes, 0 = No	(0.260)		(0.245)
Occupation: Religion, 1 = Yes,	0.362		0.595
0 = No	(0.459)		(0.385)
Occupation: Activist, 1 = Yes,	0.147		0.245**
0 = No	(0.130)		(0.119)
Occupation: Career Politician,	-0.0579		0.0503
1 = Yes, 0 = No	(0.103)		(0.0944)
Occupation: Creative, 1 = Yes,	0.525**		0.358**
0 = No	(0.246)		(0.179)
Occupation: Business, 1 =	-0.101		0.112
Yes, 0 = No	(0.143)		(0.133)
Occupation:	-0.251		-0.142
Aristocrat/Landowner, 1 =	(0.212)		(0.186)
Yes, 0 = No			
Occupation: Police, 1 = Yes, 0	0.231		0.417
= No	(0.421)		(0.302)
Occupation: Military Career, 1	-0.303		-0.0750
= Yes, 0 = No	(0.192)		(0.164)
Occupation:	0.217		0.288
Science/Engineering, 1 = Yes,	(0.241)		(0.206)
0 = No			
Occupation: Blue Collar, 1 =	-0.0453		0.0541
Yes, 0 = No	(0.201)		(0.188)
LEAD Gender, 0 = Female, 1	-0.394		0.0771
= Male	(0.286)		(0.367)
Number of Spouses (Count)	-0.0201		-0.00960

	(0.0185)		(0.0170)
Married (Ever), 1 = Yes, 0 =	0.0394		-0.123
No	(0.353)		(0.274)
Married in Power, 1 = Yes, 0	-0.175		0.136
= No	(0.198)		(0.180)
Divorced (Ever), 1 = Yes, 0 =	-0.0163		0.0670
No	(0.120)		(0.114)
Total number of children	0.00397		0.00250
	(0.00546)		(0.00543)
Parental Status, 0 = Together,	0.378*		0.129
1 = Divorced	(0.199)		(0.181)
Considered "Illegitimate"	-0.526**		-0.277
Child, 1 = Yes, 0 = No	(0.233)		(0.218)
Royalty, 1 = Yes, 0 = No	-0.214		-0.0263
	(0.209)		(0.183)
Orphan, 1 = Yes, 0 = No	-0.0975		0.0130
	(0.258)		(0.231)
Office Tenure (days)/1000	0.0243*		0.0176
	(0.0146)		(0.0152)
Years since country MID	-0.330***	-0.269***	-0.256***
initiation	(0.0230)	(0.0237)	(0.0202)
Years since country MID	0.0109***	0.00929***	0.00877***
initiation ^2	(0.00136)	(0.00132)	(0.00118)
Years since country MID	-0.0000990***	-0.0000889***	-0.0000828***
initiation ^3	(0.0000192)	(0.0000180)	(0.0000168)
Material Capabilities (CINC)		9.404***	9.302***
		(2.027)	(1.268)
Democracy: 1 = Yes, 0 = No		-0.240	-0.162
		(0.159)	(0.113)
Autocracy: 1 = Yes, 0 = No		0.168	0.118
		(0.130)	(0.103)
System concentration (CON),		-3.487***	-2.729***
entire system		(1.066)	(1.002)
Irregular Entry into Office: 1		0.212*	0.0770
= Yes, 0 = No		(0.116)	(0.114)
Tau betw CCode and system		-0.0436	0.116
leader.		(0.162)	(0.126)
Country faced MID initiation		0.659***	0.645***
in prior five years: 1 = Yes, 0		(0.0784)	(0.0694)
= No			
Last National War = Win: 1 =		0.734***	0.743***
Yes, 0 = No		(0.153)	(0.122)
Last National Loss = Win: 1 =		0.648***	0.627***
Yes, 0 = No		(0.132)	(0.113)
Last National Draw = Win: 1		0.929***	0.797***
= Yes, 0 = No		(0.212)	(0.156)
Constant	-0.762	-0.725**	-1.493**
	(0.522)	(0.339)	(0.606)
Observations	11518	11388	11338
Pseudo R^2	0.186	0.232	0.241
ll	-4542.1	-4230.9	-4167.9

Standard errors in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Model 3 in Table A.3, as described in footnote 37 on page 73, shows what happens when we combine both sets of variables into a single model. The resulting model (Model 3 in Table A.3)

supports our overall findings in three ways. First, even when controlling for unit and system level factors, many leader attributes are still statistically significant. Second, Model 3 has a larger R^2 than either of the first two models, demonstrating a better fit in general. Third, postestimation likelihood ratio tests show that Model 3 is an improvement over either Model 1 or Model 2. This demonstrates a point we make in *Why Leaders Fight* – our results show that it is the combination of leader attributes with traditional international relations variables that best predicts international conflict.

There is also the possibility that the particular dependent variable chosen – military dispute initiations as defined by the Militarized Interstate Disputes (MIDs) project – could bias the results because there are too many low-level military incidents in the dataset. In reality, the MIDs conflict initiation data are the best possible dependent variable for our purposes. Even low-level military disputes reflect the military readiness and rules of engagement set up as a result of national leader preferences. Moreover, interstate war is a sufficiently rare event in the international system that changing the dependent variable to focus on war initiation means there is only limited variation on the dependent variable. Nevertheless, as a robustness check, we estimate an additional model that builds on Table 2.3 in the book. In this model, the dependent variable is not just the initiation of a low-level military dispute, but the initiation of a dispute that escalates to the point where both sides use military force.[5] We then replicate the procedure used to generate Figure 2.3:

- Generate a leader risk index and system risk index using the new dependent variable.
- Generate predicted values from each model for each leader and convert those values into percentages relative to other leaders. For example, 99% for Ayatollah Khomeini in the leader risk model means that model predicts he will be more conflict-prone than 99% of the leaders in the dataset.
- Compare those predicted values with the actual behavior of the leaders to see the advantages and disadvantages of the leader risk index and system risk index

Table A.4 thus shows the result of this process. It is exactly the same as Table 2.3 on pages 80-81, except the dependent variable is now whether a leader initiated a conflict that escalated to the point where both sides used military force. The list of leaders is the top 2% of all leaders in terms of total numbers of higher-level military conflicts (those that escalate to both sides actually using military force) initiated. Thus, the higher the percentages are for each model in predicting the risk propensity of each leader, the more accurate that model is at predicting the behavior of that leader.

Table A.4: Leader And System Risk Model Accuracy For Higher-Level Military Conflicts

Country Name	Leader Name	Leader Risk Prediction (%)	System Risk Prediction (%)	Military Conflict Initiations (Both Sides Use Force)
China	Mao Zedong	99	99	17
North Korea	Kim Il-Sung	99	93	16
Germany	Adolf Hitler	94	98	15
Russia	Josef Stalin	98	98	9
Pakistan	Ayub Khan	96	99	8
India	Jawaharlal Nehru	89	91	7
Ethiopia	Mengistu Marriam	99	89	7

[5] Data generated with EUGene (Bennett and Stam 2000).

Uganda	Yoweri Museveni	98	98	6
Germany	Wilhelm II	85	79	6
Syria	Hafez Al-Assad	93	91	6
Syria	Nureddin al-Atassi	98	99	6
China	Deng Xiaoping	99	99	6
Russia	Nicholas II	83	84	6
Russia	Vladimir Lenin	92	99	5
Somalia	Osman Daar	86	71	5
Italy	Benito Mussolini	89	92	5
Iran	Mohammad Reza	87	96	5
Egypt	Gamal Abdel Nasser	99	99	5
Syria	Amin al-Hafez	95	99	5
Zimbabwe	Ian Smith	76	70	5
Morocco	Hassan II	59	86	5
Somalia	Siad Barre	97	89	5
Iraq	Saddam Hussein	93	92	5
Iran	Ayatollah Khomeini	82	99	5
Democratic Republic of the Congo	Mobutu Sese Seko	72	92	5
Uganda	Idi Amin	95	91	5
Taiwan	Chiang Kai-shek	93	83	4
Vietnam	Ho Chi Minh	94	89	4
Pakistan	Muhammad Zia-ul-Haq	94	98	4
Cameroon	Paul Biya	71	39	4
U.S.	Lyndon Johnson	94	97	4
Israel	David Ben Gurion	99	93	4
India	Rajiv Gandhi	76	97	4
Laos	Kaysone Phomvihane	90	98	4
Poland	Jozef Pilsudski	99	97	4
Russia	Boris Yeltsin	71	89	4
Libya	Muammar Qaddafi	93	93	4
Indonesia	Sukarno	86	59	4
Jordan	Hussein Ibn Talal El-Hashim	54	78	4

The results demonstrate that, as with lower-level militarized disputes initiations, both models do well at predicting some of the most dangerous leaders in history, and there are certainly instances where the leader model outperforms the system model. For example, the model more accurately

captures the behavior of two of the most risk-prone leaders in history: Kim Il-Sung and Mengistu of Ethiopia. One leader where the system model more accurately predicts the risk propensity of that leader is King Hussein of Jordan. The system model underpredicts his overall propensity to initiate the use of military force, but predicts him at a much higher risk level than the leader model. And indeed, early in King Hussein's time in office, he participated in several military conflicts against Israel. However, Jordan was rarely the ringleader of those wars, and during his reign, Jordan evolved to become one of the more peaceful states in the region and more cooperative with Israel than its neighbors were. The leader model accurately depicts him as not especially aggressive, but the system model picks up some of the ways the strategic environment shaped his behavior early in his reign in favor of the use of military force.

LEADER SELECTION

As we discuss in the text of the book, critics of *Why Leaders Fight* could argue that our findings about the importance of leaders reflect the simple fact that countries facing more dangerous security environments tend to select leaders with background experiences that the selectorate in those countries believe will make the country safe. If this is true, it would mean that it is not leader backgrounds that drive national behavior, but the way leaders are selected.

Moreover, critics could argue that countries that have experienced more dangerous security environments, especially military conflict, are likely to have a larger percentage of leaders with background characteristics such as military service without combat experiences. Since a larger percentage of their population has military service, they are more likely to select leaders with that experience, and the selectorate is more likely to want a leader with military experience. Thus, our background characteristic data, and results, reflect a country's military past rather than anything about leaders themselves.

As we argue in the book, this view is misguided. We agree completely that leader selection processes play a significant role in influencing national military behavior. Chapter 4 discusses how the effect of military service, in particular, varies significantly across regime type. While in democracies, those with prior combat experience are, on average, no more or less likely than those without military experience to start military conflicts, autocratic leaders with combat experience are extremely conflict prone. This is likely because autocratic leaders more often come to power through coups and other irregular means. Those are inherently risky activities, meaning those who react to their combat experiences by becoming more risk acceptant are more likely to end up in power in autocracies than in democracies, on average.

Also, while these selection arguments fit theoretically with dominant strands of international relations scholarship, they miss several things – such as the fact that nearly all countries select leaders based on their domestic policy preferences, rather than beliefs about how their background experiences will shape their military behavior in office. Selectorates, whether or not voters are elites, also generally pay much more attention to candidate policies when thinking about leader selection. For example, despite the fact that both had military service but not combat experience and that one had served on a submarine while the other served on a Hollywood sound stage, voters in the 1980 U.S. presidential election, on average, saw Ronald Reagan as tougher than Jimmy Carter. This is because Reagan's policy preferences were more hawkish.

Beyond these arguments, and those raised in the book, there is additional evidence suggesting it is not simply leader selection processes or national history that influences leader background experiences driving our results.

- In many of our models, we control for the propensity of countries to get involved in military disputes in the first place with a lagged variable coded 1 if a country faced a military challenge[6] in the last five years (meaning that country might be looking for a leader with hawkish foreign policy credentials, if the criticism is correct) and 0 otherwise.
- The differences in predicted leader risk between the leader risk model and system risk model demonstrate that leader backgrounds are not simply a proxy for national experiences. If that were the case, the results from both models would be identical.
- A likelihood ratio test conducted on the models used to produce Tables 2.2, 2.3, and A.3 shows the model combining leader and system/unit attributes is statistically superior to either one on its own. If leader attributes just reflected selection processes, there would be no improvement from adding each set of variables.
- Model 3 in Table A.3 has a larger R^2 and superior fit than either the leader model or system model alone, showing the importance of combining both sets of factors.

Additional tests, as described on pages 126-127 in *Why Leaders Fight*, show that leader selection processes do not drive our results. Table A.5 replicates Table 2.3, but only for those leaders who can be considered most "randomly" selected into office – those who entered office by regular means (preordained policy) following the death by natural causes of the previous leader. While it is true that no leader is ever entirely randomly selected, as we argue in the book – and as economists and others looking at the effects of leaders on national economic outcomes have argued – this is the cleanest possible set of leaders for testing purposes.[7] This reduces the total dataset significantly, meaning the predicted values are therefore based on much less information (and arguably less reliable). However, that the leader model does well at predicting conflict behavior – and even better than the system model for important leaders such as Kim Jong-Il – highlights that leader background experiences, even when controlling for selection into office, matter a great deal.

In Table A.5, since the number of leaders is so small compared with the full LEAD dataset, the table shows all leaders who initiated more than one militarized dispute who fit the selection criteria, along with predicted risk percentage from the leader model, the predicted risk percentage from the system model, and the actual risk percentage based on the number of military conflicts initiated.

Table A.5: Leader And System Risk Model Accuracy For Randomly Selected Leaders

Country Name	Leader Name	Leader Risk Prediction (%)	System Risk Prediction (%)	Actual Military Conflict Initiations (%)
Russia	Josef Stalin	96	95	99
Russia	Nicholas II	95	94	98
Morocco	Hassan II	77	77	97
Portugal	Caetano Veloso	88	93	96
China	Jiang Zemin	91	97	95
Thailand	Thanon Kittakachorn	90	90	95
Taiwan	Lee Teng-Hui	89	80	93
North Korea	Kim Jong-Il	97	91	93
Vietnam	Le Duan	79	84	92

[6] Defined as the initiation of a militarized dispute.
[7] Jones and Olken 2005; Besley and Reynal-Querol 2011.

Egypt	Anwar Sadat	85	89	92
Angola	Jose Eduardo dos Santos	67	72	90
Egypt	Farouk I	62	71	90
Russia	Mikhail Gorbachev	75	96	87
China	Hua Guofeng	94	96	87
Russia	Yuri Andropov	87	99	87
Saudi Arabia	Saud bin Abdulaziz Al Saud	79	76	87
Kenya	Daniel Arap Moi	59	46	84
Saudi Arabia	Fahd bin Abdulaziz Al Saud	58	82	84
Iraq	Abd al-Ilah	50	57	84
Ethiopia	Haile Selassie	81	67	78
Iraq	Abdul Rahman Arif	98	85	78
Russia	Konstantin Chernenko	92	98	78
Bulgaria	Valko Chervenkov	63	74	78
Romania	Ferdinand I	62	66	78
Turkey	Ismet Inonu	75	80	78
Italy	Francesco Crispi	93	88	78
Denmark	Viggo Kampmann	54	63	78

Other statistical tests on the models used to generate Table A.5 further show the importance of leaders even when looking at only the most randomly selected leaders into office. The positive predicted value of the model is the ability of the model to predict those cases that lead to the initiation of military conflicts. This is important because international conflict is a relatively rare event. Therefore, while many models can accurately predict the cases where international conflict does not happen, it is harder to predict the cases where conflict happens. The positive predicted value of the leader risk model is 71%, meaning the model accurately predicts 71% of the cases that end in military conflict (e.g., the dependent variable outcome is 1, not 0).[8] These results reinforce the importance of leader attributes.

Another way to control for how country-specific attributes may bias the background experiences of leaders in a given country is to use a technique called matching. Matching, conceptually, involves pairing up cases where the relevant covariates are the same or close, except for a treatment variable (the variable to be tested). In this case, if the prior propensity of countries toward military conflict, or their current security environment, biases the background experiences of potential leaders, that is likely to manifest itself in whether prior leaders have military experience. Thus, we use military experience as the treatment variable to "match" on, trying to find leaders who are similar on the country-level dimensions such as material power and political regime type, but different on the military service variable.

To implement this, we use a technique called coarsened exact matching, developed by Iacus et al.[9] As in prior research on leader backgrounds and military conflict,[10] we collapse our two

[8] The system risk model does almost as well – predicting 64% of the positive cases.
[9] Iacus et al. 2011.
[10] Horowitz and Stam 2014.

uniformed military service variables, Military Service, No Combat and Combat into a Military Service variable that is 1 if the leader had prior national military service and 0 otherwise, for simplicity's sake. This reduces the imbalance in our data from .52 prior to matching to .31 afterward, a significant improvement. Table A.6 shows the regression results are consistent with the original model used to generate Figure 2.3 and Table 2.3 in *Why Leaders Fight*.

Table A.6: Leader Risk Model – Coarsened Exact Matching

	(Model 1) Leader Risk Model B/SE
Military Service, 1 = Yes, 0 = No	0.464**
	(0.191)
Prior Rebel Participation, 1 = Yes, 0 = No	0.167
	(0.146)
National War Participation = Victory, 1 = Yes, 0 = No	0.267
	(0.173)
National War Participation = Loss, 1 = Yes, 0 = No	-0.00493
	(0.169)
Rebel War Participation = Victory, 1 = Yes, 0 = No	-0.139
	(0.176)
Rebel War Participation = Loss, 1 = Yes, 0 = No	0.666**
	(0.272)
Education Level, 0 = Primary, 1 = Secondary, 2 = University, 3 = Graduate	0.00977
	(0.0760)
Leader Age	0.00429
	(0.00559)
Occupation: Teacher, 1 = Yes, 0 = No	-0.0548
	(0.155)
Occupation: Journalism, 1 = Yes, 0 = No	-0.182
	(0.217)
Occupation: Law, 1 = Yes, 0 = No	-0.00531
	(0.169)
Occupation: Medicine, 1 = Yes, 0 = No	-0.0940
	(0.429)
Occupation: Religion, 1 = Yes, 0 = No	1.003**
	(0.507)
Occupation: Activist, 1 = Yes, 0 = No	0.178
	(0.141)
Occupation: Career Politician, 1 = Yes, 0 = No	-0.0684
	(0.132)
Occupation: Creative, 1 = Yes, 0 = No	0.352
	(0.277)
Occupation: Business, 1 = Yes, 0 = No	-0.130
	(0.184)
Occupation: Aristocrat/Landowner, 1 = Yes, 0 = No	-0.184
	(0.236)
Occupation: Police, 1 = Yes, 0 = No	-0.0638
	(0.436)
Occupation: Military Career, 1 = Yes, 0 = No	-0.282
	(0.225)
Occupation: Science/Engineering, 1 = Yes, 0 = No	0.274
	(0.316)
Occupation: Blue Collar, 1 = Yes, 0 = No	-0.0944
	(0.237)
LEAD Gender, 0 = Female, 1 = Male	0.310

	(0.454)
Number of Spouses (Count)	-0.0114
	(0.0186)
Married (Ever), 1 = Yes, 0 = No	0.324
	(0.378)
Married in Power, 1 = Yes, 0 = No	-0.425*
	(0.239)
Divorced (Ever), 1 = Yes, 0 = No	0.0253
	(0.151)
Total number of children	0.00963*
	(0.00513)
Parental Status, 0 = Together, 1 = Divorced	0.333*
	(0.200)
Considered "Illegitimate" Child, 1 = Yes, 0 = No	-0.0868
	(0.282)
Royalty, 1 = Yes, 0 = No	-0.363
	(0.227)
Orphan, 1 = Yes, 0 = No	0.0494
	(0.254)
Office Tenure (days)/1000	-0.00588
	(0.0209)
Years since country MID initiation	-0.284***
	(0.0310)
Years since country MID initiation ^2	0.00996***
	(0.00171)
Years since country MID initiation ^3	-0.0000979***
	(0.0000250)
Constant	-1.303**
	(0.643)
Observations	10726
Pseudo R^2	0.144
ll	-4417.5

Standard errors in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.7 then shows a replication of Table 2.3 using matching. Note that a few leaders are missing because it was not possible to find "matches" for them, as one might expect. The results demonstrate consistency with the findings in the book, showing the robustness of our argument even when accounting for leader selection.

Table A.7: Leader Risk Model Accuracy Using Coarsened Exact Matching

Country Name	Leader Name	Leader Risk Prediction (%)
Iran	Ayatollah Khomeini	99
Germany	Adolf Hitler	97
China	Mao Zedong	99
Iraq	Saddam Hussein	97
Russia	Josef Stalin	98
Russia	Leonid Brezhnev	98
Italy	Benito Mussolini	98
Russia	Nikita Khrushchev	98

Germany	Wilhelm II	78
Russia	Nicholas II	84
Russia	Boris Yeltsin	85
North Korea	Kim Il-Sung	97
Taiwan	Chiang Kai-shek	92
Democratic Republic of the Congo	Mobutu Sese Seko	86
India	Jawaharlal Nehru	89
Syria	Hafez Al-Assad	90
China	Deng Xiaoping	99
Libya	Muammar Qaddafi	88
U.S.	Ronald Reagan	99
U.S.	William Clinton	81
Morocco	Hassan II	94
Indonesia	Sukarno	95
Egypt	Gamal Abdel Nasser	97
Pakistan	Ayub Khan	
Austria-Hungary	Francis Joseph I	67
South Africa	Louis Botha	81
Zimbabwe	Ian Smith	85
Ethiopia	Mengistu Marriam	96
Yugoslavia	Slobodan Milosevic	93
Uganda	Idi Amin	98
U.K.	Salisbury (3rd Marquess)	93
U.S.	Dwight Eisenhower	97
France	Francois Mitterrand	95
U.K.	Neville Chamberlain	81
U.S.	Woodrow Wilson	83
Russia	Vladimir Lenin	87
Portugal	Caetano Veloso	83
Iran	Akbar Hashemi Rafsanjani	88
Cuba	Fidel Castro	73
Syria	Abid Shishakli	93
Turkey	Turgut Ozal	88
U.K.	Winston Churchill	92

MONADIC LEADER ATTRIBUTE MODELS (CHAPTERS 4 AND 5)

Chapter 4 of *Why Leaders Fight* presents multiple figures designed to show the individual importance of leader attributes such as military experience, rebel participation, and age. Table A.8 shows the statistical results for the models used to create these figures.

Table A.8: Logit Models Used To Generate Chapter 4 Figures

	(1) Model For Figure 4.1 B/SE	(2) Model For Figure 4.2 B/SE	(3) Model For Figure 4.3 B/SE	(4) Model For Figure 4.4 B/SE
Military Service, No Combat	0.374***	0.174	0.699***	0.668***
	(0.135)	(0.166)	(0.189)	(0.183)
Military Service, Combat, 1 =	0.103	0.106	0.398**	0.402**
Yes, 0 = No	(0.144)	(0.192)	(0.165)	(0.164)
Prior Rebel Participation, 1 =	0.385***	0.594***	0.0287	-0.00363
Yes, 0 = No	(0.145)	(0.226)	(0.131)	(0.132)
National War Participation =	0.0698	0.0291	0.323*	0.321*
Victory, 1 = Yes, 0 = No	(0.154)	(0.160)	(0.166)	(0.165)
National War Participation =	0.128	0.101	0.101	0.0941
Loss, 1 = Yes, 0 = No	(0.147)	(0.142)	(0.171)	(0.169)
Rebel War Participation =	-0.248	-0.193	-0.0626	-0.0541
Victory, 1 = Yes, 0 = No	(0.151)	(0.145)	(0.152)	(0.151)
Rebel War Participation =	0.218	0.269	0.709***	0.719***
Loss, 1 = Yes, 0 = No	(0.222)	(0.225)	(0.267)	(0.255)
Leader Age	0.00919*	0.00810*	0.0102**	0.0141***
	(0.00546)	(0.00490)	(0.00434)	(0.00490)
Autocracy: 1 = Yes, 0 = No	0.156	-0.122		
	(0.101)	(0.153)		
National Material Capabilities	9.589***	9.467***		
(COW)	(1.336)	(1.301)		
Tau B with System Leader	0.150	0.163		
	(0.122)	(0.119)		
Office Tenure (days)/1000	0.0118	0.0174	0.0238	0.0217
	(0.0131)	(0.0135)	(0.0146)	(0.0151)
Country faced MID initiation	0.783***	0.787***		
in prior five years: 1 = Yes, 0	(0.0746)	(0.0744)		
= No				
Years since country MID	-0.280***	-0.278***	-0.330***	-0.330***
initiation	(0.0224)	(0.0220)	(0.0229)	(0.0229)
Years since country MID	0.00962***	0.00959***	0.0109***	0.0109***
initiation ^2	(0.00127)	(0.00126)	(0.00135)	(0.00136)
Years since country MID	-0.0000912***	-0.0000912***	-0.0000988***	-0.0000993***
initiation ^3	(0.0000180)	(0.0000180)	(0.0000192)	(0.0000194)
Military Service, No Combat *		0.819***		
Autocracy		(0.238)		
Military Service, Combat *		0.621***		
Autocracy		(0.217)		
Prior Rebel Participation *		-0.174		
Autocracy		(0.200)		
Military Service, No Combat *		-0.335		
Rebel		(0.287)		
Military Service, Combat *		-0.368		
Rebel		(0.235)		

Education Level, 0 = Primary, 1 = Secondary, 2 = University, 3 = Graduate	0.0453	0.0614
	(0.0651)	(0.0624)
Occupation: Teacher, 1 = Yes, 0 = No	-0.0192	-0.0263
	(0.131)	(0.131)
Occupation: Journalism, 1 = Yes, 0 = No	-0.136	-0.139
	(0.199)	(0.198)
Occupation: Law, 1 = Yes, 0 = No	-0.137	-0.125
	(0.133)	(0.134)
Occupation: Medicine, 1 = Yes, 0 = No	-0.558**	-0.593**
	(0.260)	(0.256)
Occupation: Religion, 1 = Yes, 0 = No	0.366	0.342
	(0.460)	(0.463)
Occupation: Activist, 1 = Yes, 0 = No	0.147	0.130
	(0.128)	(0.126)
Occupation: Career Politician, 1 = Yes, 0 = No	-0.0551	-0.0531
	(0.102)	(0.101)
Occupation: Creative, 1 = Yes, 0 = No	0.526**	0.507**
	(0.246)	(0.237)
Occupation: Business, 1 = Yes, 0 = No	-0.0997	-0.0894
	(0.144)	(0.145)
Occupation: Aristocrat/Landowner, 1 = Yes, 0 = No	-0.261	-0.263
	(0.213)	(0.218)
Occupation: Police, 1 = Yes, 0 = No	0.231	0.177
	(0.418)	(0.434)
Occupation: Military Career, 1 = Yes, 0 = No	-0.292	-0.305*
	(0.182)	(0.179)
Occupation: Interpreter, 1 = Yes, 0 = No	-0.924***	-1.006***
	(0.352)	(0.347)
Occupation: Science/Engineering, 1 = Yes, 0 = No	0.216	0.219
	(0.240)	(0.235)
LEAD Gender, 0 = Female, 1 = Male	-0.394	-0.438
	(0.286)	(0.279)
Married (Ever), 1 = Yes, 0 = No	0.0400	0.0503
	(0.353)	(0.340)
Married in Power, 1 = Yes, 0 = No	-0.174	-0.166
	(0.200)	(0.200)
Divorced (Ever), 1 = Yes, 0 = No	-0.0135	-0.0248
	(0.118)	(0.120)
Number of Spouses (Count)	-0.0207	-0.0244
	(0.0186)	(0.0202)
Total number of children	0.00375	0.00285
	(0.00549)	(0.00572)
Parental Status, 0 = Together, 1 = Divorced	0.378*	0.352*
	(0.199)	(0.198)
Considered "Illegitimate" Child, 1 = Yes, 0 = No	-0.481**	-0.512**
	(0.228)	(0.228)
Royalty, 1 = Yes, 0 = No	-0.190	-0.212
	(0.210)	(0.213)
Orphan, 1 = Yes, 0 = No	-0.116	-0.122
	(0.255)	(0.251)
Autocracy: 1 = Yes, 0 = No		0.748*
		(0.406)
Autocracy * Age		-0.00999
		(0.00732)

Constant	-2.067***	-2.001***	-0.761	-1.013**
	(0.282)	(0.274)	(0.519)	(0.495)
Observations	11345	11345	11518	11518
Pseudo R^2	0.224	0.227	0.186	0.187
ll	-4264.9	-4248.4	-4540.8	-4534.5

Standard errors in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Figure 5.1 shows childhood exposure to war in the LEAD dataset. While our research in this area is still in its early stages, experiencing war during childhood may shape future risk propensity in important ways – just as exposure to other dangerous stimuli can shape future behavior. Table A.9 below shows an initial logit regression model where the dependent variable is militarized dispute initiation and the independent variables are childhood war exposure and adult military service. As discussed on page 156, the childhood war exposure variable is positive and significant even when controlling for adult exposure to the uniformed military.

Table A.9: Childhood War Exposure And Militarized Dispute Initiation

	(Model 1) Childhood War Model B/SE
Military Service: 1 = Yes, 0 = No	0.557***
	(0.101)
War Experience (dummy, age 0-16)	0.261***
	(0.0963)
Constant	-1.090***
	(0.0705)
Observations	2107
Pseudo R^2	0.016
ll	-1286.8

Standard errors in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

While this finding is tentative and additional data gathering and theorizing is necessary, this is a potentially fruitful area for further research.

DYADIC LEADER AND SYSTEM RISK MODELS

Chapter 3 of *Why Leaders Fight* discusses the relative importance of leader risk in a regional and global context. This section of the Technical Appendix displays the regression results and other results of interest for critical choices described in Chapter 3. Table A.10 shows the regression results for the two models used to generate Table 3.1 on page 121. After the data are split randomly by leader-year, the first step is to run a regression where the dependent variable is militarized dispute initiation and the independent variables are our leader attribute variables. Model 1 shows the regression results for the first half of the data. We then generate an out-of-sample prediction of the leader risk score for the second half of the data and use those out of sample predictions just on the second half of the data, where the dependent variable is once again militarized dispute initiation (step 2, expressed in Model 2). The other independent variables, however, are common country and

system-level attributes, such as political regime type and relative power. We use this model to generate Table 3.1 in the book.

Table A.10: Dyadic Regression Models Used To Generate Table 3.1

	(Model 1) Leader Risk Model on First Half of Data B/SE	(Model 2) Combined Model on Second Half of Data B/SE
Military Service, No Combat	0.650**	
	(0.280)	
Military Service, Combat	0.343*	
	(0.203)	
Prior Rebel Participation	-0.0298	
	(0.225)	
National War Participation = Victory, 1 = Yes, 0 = No	0.836***	
	(0.216)	
National War Participation = Loss, 1 = Yes, 0 = No	0.181	
	(0.242)	
Rebel War Participation = Victory, 1 = Yes, 0 = No	0.352*	
	(0.211)	
Rebel War Participation = Loss, 1 = Yes, 0 = No	0.784***	
	(0.298)	
Education Level, 0 = Primary, 1 = Secondary, 2 = University, 3 = Graduate	-0.0505	
	(0.0904)	
Leader Age	0.0118*	
	(0.00700)	
Occupation: Teacher, 1 = Yes, 0 = No	0.202	
	(0.207)	
Occupation: Journalism, 1 = Yes, 0 = No	0.0891	
	(0.326)	
Occupation: Law, 1 = Yes, 0 = No	-0.0481	
	(0.195)	
Occupation: Medicine, 1 = Yes, 0 = No	-0.434*	
	(0.263)	
Occupation: Religion, 1 = Yes, 0 = No	0.702	
	(0.736)	
Occupation: Activist, 1 = Yes, 0 = No	0.198	
	(0.173)	
Occupation: Career Politician, 1 = Yes, 0 = No	-0.0523	
	(0.144)	
Occupation: Creative, 1 = Yes, 0 = No	0.0733	
	(0.680)	
Occupation: Business, 1 = Yes, 0 = No	-0.186	
	(0.169)	
Occupation: Aristocrat/Landowner, 1 = Yes, 0 = No	-0.208	
	(0.423)	
Occupation: Police, 1 = Yes, 0 = No	0.215	
	(0.415)	
Occupation: Military Career, 1 = Yes, 0 = No	-0.451	
	(0.285)	
Occupation: Science/Engineering, 1 = Yes, 0 = No	0.0533	
	(0.280)	

Occupation: Blue Collar, 1 = Yes, 0 = No	-0.0882	
	(0.225)	
LEAD Gender, 0 = Female, 1 = Male	0.433	
	(0.383)	
Number of Spouses (Count)	-0.0204	
	(0.0289)	
Married (Ever), 1 = Yes, 0 = No	0.119	
	(0.582)	
Married in Power, 1 = Yes, 0 = No	-0.535	
	(0.373)	
Divorced (Ever), 1 = Yes, 0 = No	-0.174	
	(0.152)	
Total Number Of Children	-0.00396	
	(0.00792)	
Parental Status, 0 = Together, 1 = Divorced	0.457**	
	(0.213)	
Considered "Illegitimate" Child, 1 = Yes, 0 = No	-0.377	
	(0.282)	
Royalty, 1 = Yes, 0 = No	0.351	
	(0.372)	
Orphan, 0 = No, 1 = Yes	0.0302	
	(0.273)	
Office Tenure/1000	0.0154	
	(0.0130)	
Leader Peace Years Spline 1	0.00817***	
	(0.00148)	
Leader Peace Years Spline 2	-0.0138***	
	(0.00472)	
Leader Peace Years Spline 3	0.0155*	
	(0.00799)	
Predicted Leader Risk Score		156.7***
		(12.63)
Democracy, Side A		0.444***
		(0.124)
Democracy, Side B		0.724***
		(0.132)
Joint Democracy		-1.231***
		(0.213)
Balance of Force (COW data)		0.394***
		(0.147)
Defense pact between these two states, 0=no, 1=yes		1.293***
		(0.311)
States are directly contiguous on land, 0/1		3.251***
		(0.122)
Concentration Of Power In International System		2.311**
		(1.006)
Dyadic Satisfaction (Tau_b)		-2.057***
		(0.553)
# Of Great Powers In International System		0.209***
		(0.0474)
Country Peace Years Spline 1		0.00253***
		(0.000193)
Country Peace Years Spline 2		-0.00185***
		(0.000153)
Country Peace Years Spline 3		0.000417***
		(0.0000390)
Constant	-6.950***	-7.625***

	(0.843)	(0.526)
Observations	565055	494839
Pseudo R^2	0.036	0.221
ll	-7460.5	-5599.5

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

One reason the results appear reliable is that they replicate some of the stronger and more robust findings in existing international relations literature. For example, the significance of the joint democracy variable is consistent with research on the democratic peace.[11] We therefore replicate Table A.10 with an additional measure of the democratic peace to further explore the relationship between leaders and political regime type. Table A.11 shows a model that is identical to Model 2 in Table A.10, except it changes the way political regime type is measured. Model 1 in Table A.11 drops the dummy variables for whether each side is a democracy and the joint democracy dummy variable. Instead, it includes *DemHigh*, the polity score of the most democratic state in the dyad, and *DemLow*, the polity score of the least democracy state in the dyad.[12] The statistical significance of the predicted leader risk score variable and *DemLow* in model 1 further reinforces our results by demonstrating their consistency with existing findings.

Table A.11: Dyadic Robustness Using Alternative Regime Type Measurement

	(Model 1) Alternative Regime Type Measure: Dem Low B/SE
Predicted Leader Risk Score	156.4***
	(12.53)
Democracy Level (High State	0.0523***
In Dyad)	(0.00850)
Democracy Level (Low State	-0.0419***
In Dyad)	(0.00763)
Balance of Force (COW data)	0.359**
	(0.148)
Defense pact between these	1.280***
two states, 0=no, 1=yes	(0.305)
States are directly contiguous	3.271***
on land, 0/1	(0.121)
Concentration Of Power In	2.199**
International System	(1.007)
Dyadic Satisfaction (Tau_b)	-1.971***
	(0.540)
# Of Great Powers In	0.215***
International System	(0.0478)
Country Peace Years Spline 1	0.00255***
	(0.000194)
Country Peace Years Spline 2	-0.00187***
	(0.000153)
Country Peace Years Spline 3	0.000420***
	(0.0000392)
Constant	-7.787***

[11] Russett 1993.
[12] Dafoe and Caughey 2011.

	(0.523)
Observations	494839
Pseudo R^2	0.221
ll	-5600.1

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The results presented in Chapter 3 beginning around page 122 are also robust to the use of different dependent variables. As with the monadic discussion above, a critic could argue that militarized disputes are too low level to really tell us something important about international politics. We therefore replicate Table A.10 once again, but with two different dependent variables (though as with Table A.11, we display only part 2, where we use the out-of-sample predictions of leader risk and put them in a separate regression model).

Model 1 in Table A.12 shows the statistical significance of leader risk when the dependent variable is whether Side A initiated a militarized dispute important enough that is escalated to both sides using actual military force. Model 2 shows that the results are robust when the dependent variable is whether Side A initiated a militarized dispute that escalated to the point where fatalities occurred. In both models, the predicted leader risk score (part 2 above) is statistically significant even when put in a model with prominent system and country-level attributes.

Table A.12: Dyadic Robustness Using Different Dependent Variables

	(Model 1) Leader Risk Model on First Half of Data	(Model 2) Combined Model on Second Half of Data
Predicted Leader Risk Score	294.5***	666.3***
	(47.93)	(160.8)
Democracy, Side A	0.577**	0.446
	(0.224)	(0.290)
Democracy, Side B	0.581**	0.591*
	(0.241)	(0.302)
Joint Democracy	-1.866***	-1.940***
	(0.487)	(0.743)
Balance of Force (COW data)	0.0996	-0.205
	(0.242)	(0.302)
Defense pact between these	0.695*	0.262
two states, 0=no, 1=yes	(0.408)	(0.519)
States are directly contiguous	4.308***	4.488***
on land, 0/1	(0.226)	(0.274)
Concentration Of Power In	1.362	-0.320
International System	(1.878)	(2.317)
Dyadic Satisfaction (Tau_b)	-1.606**	-1.704*
	(0.716)	(0.879)
# Of Great Powers In	0.00757	-0.153
International System	(0.0921)	(0.114)
Country Peace Years Spline 1	0.00392***	0.00405***
	(0.000538)	(0.000749)
Country Peace Years Spline 2	-0.00292***	-0.00308***
	(0.000438)	(0.000631)
Country Peace Years Spline 3	0.000680***	0.000740***
	(0.000119)	(0.000182)
Constant	-7.739***	-6.705***
	(0.890)	(1.037)
Observations	493984	493984

Pseudo R^2	0.326	0.323
ll	-1565.1	-1044.0

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Finally, in footnote 56 on page 120, we suggest that we used bootstrapped standard errors in the stepwise regression models used to determine the variables included in the stepwise regression replication of the results described on page 120. This is incorrect. We used bootstrapped standard errors for robustness testing of the overall models, not the stepwise regression models. Regardless, this does not influence the results, based on subsequent testing.

CODEBOOK AND VARIABLE EXPLANATION

As explained in *Why Leaders Fight*, the LEAD database contains a number of different leader background experiences. Some of them were not included in the model for technical reasons, generally because we lacked data or confidence in that data. We explain the data itself in greater detail here and this supplements the information available in our other published work on the LEAD dataset.[13] The LEAD dataset codes leader background attributes by country year for all heads of states from 1875 to 2004, though nearly all of the data analysis conducted using LEAD has covered the 1875-2001 timeframe. This codebook describes the key variables associated with the LEAD dataset, along with any relevant information necessary to understand important coding decisions.

Leader Identification and Service		
ccode	Ccode	COW numeric country code
idacr	Country	COW alpha country code
year	Year	Year
leaderid	LEAD Leader ID	Leader ID in the LEAD dataset
leadername	Leader Name	Leader name
startdate	Start Date	Leader start date
inday	Entry Day	Leader start day
inmonth	Entry Month	Leader start month
inyear	Entry Year	Leader start year

[13] Ellis et al. 2015

startyearlyobs	Yearly Start Date	Leader start date in a given year
enddate	Leader Exit Date	Leader exit date
outday	Exit Day	Leader exit day
outmonth	Exit Month	Leader exit month
outyear	Exit Year	Leader exit year
endyearlyobs	Yearly End Date	Leader exit date in a given year
yearlyduration	Yearly Duration	Days in office

Notes: Some Archigos variables included for comparability and ease of merging. They are generally close to identical, with some updates in the comparable LEAD variables.

National Military Service Variables		
milservice	National Military Service	Did the leader previously serve in the national military? (0 no, 1 yes)
combat	National Military Service, Combat	Did the leader previously serve in the national military but not see combat? (0 no, 1 yes)
warwin	War Win	Did the leader participate in a conflict while in national military and did their side win? (0 no, 1 yes)
warloss	War Lose	Did the leader participate in a conflict while in national military and did their side lose? (0 no, 1 yes)
miledu	Military Education	Did the leader have a military education? (0 no, 1 yes)

Notes: The core national military service variables are coded based on whether credible sources indicate that a leader participated in the national military of a country, and then whether credible sources suggest the leader had one of the other experiences referenced above.

For the *combat* variable, participating in combat is defined as deployment as part of a national military in what would generally be considered a war zone (absent evidence of nonparticipation), deployment/general participation in a battle, or affirmative evidence of direct combat. Note that this does not require affirmative evidence of a given person firing a weapon, but instead adopts a definition requiring the soldier to be deployed in a war zone facing the risk of death in general. In

general, *combat* was coded 0 in the absence of affirmative evidence that a leader who served in the military had combat experience.

The *warwin* and *warloss* variables are coded based on version 3.0 of the Correlates of War Inter-state, Intra-state, and Extra-state datasets. They are 1 if the leader participated in a conflict that ended in a win (loss) based on COW 3.0, and 0 otherwise.

Rebel Participation		
rebel	Rebel Participation	Did the leader serve in a rebellion against the state? (0 no, 1 yes)
rebelwin	Rebel War Win	Did rebel group participation lead to conflict against the state and did their side win? (0 no, 1 yes)
rebelloss	Rebel War Lose	Did rebel group participation lead to conflict against the state and did their side lose? (0 no, 1 yes)

Notes: *Rebel* is defined as someone who participates in actions designed to fight against the state or overturn the state. Thus, someone who participates in a coup counts as a rebel even if the coup is nonviolent, because coup plotters take on the risk of violence (and the risks if they are caught) in attempting a coup. Someone is also a rebel if he or she is fighting against the ruling government in a territory, even if he or she believes that the ruling government is illegitimate. Thus, the category of rebel includes both future autocratic leaders such as Mao Zedong as well as future democratic leaders such as Charles de Gaulle.

The *rebelwin* and *rebelloss* variables are coded based on version 3.0 of the Correlates of War Inter-state, Intra-state, and Extra-state datasets. They are 1 if the leader participated in a conflict on the rebel side that ended in a win (loss) based on COW 3.0, and 0 otherwise. This coding was supplemented with case-specific descriptions of rebellion outcomes when there were significant military actions not coded by COW for one reason or another.

Education		
leveledu	Level of Education	What is the highest level of education a leader had? (0 Primary, 1 Secondary, 2 University, 3 Graduate)
primaryedu	Primary Education	What type of primary school did the leader attend? (0 Public, 1 Private)
boarding	Boarding School	Did the leader attend boarding school? (0 no, 1 yes)

Notes: For the education variable *leveledu*, once a leader begins a given level of education, the leader is coded as if he or she has that level of education, e.g., a 3 just means starting graduate school, not necessarily finishing graduate school. Leaders with law degrees are generally coded as having finished

graduate school, which is one potential limitation on this data because the level of education necessary to get a law degree varies across countries.

Upbringing		
illegit	Considered "illegitimate" child	Was the leader considered an "illegitimate" child? (0 no, 1 yes)
orphan	Orphan	Was the leader an orphan? (0 no, 1 yes)
parstability	Parental Stability	Were the parents of the leader married? (0 together, 1 divorced)
royalty	Royalty	Was the leader royalty/raised as royalty? (0 no, 1 yes)
dadwork	Father's Occupation	What was the father's occupation? (text)
momwork	Mother's Occupation	Did the mother work? (0 no, 1 yes)
onlychild	Only Child	Was the leader an only child? (0 no, 1 yes)
firstborn	First Born	Was the leader a first born? (0 no, 1 yes)
lastborn	Last Born	Was the leader the last born? (0 no, 1 yes)
firstson	First Son	Was the leader the first-born son? (0 no, 1 yes)
firstdau	First Daughter	Was the leader the first-born daughter? (0 no, 1 yes)
kidhealth	Kid Health	Was the leader sickly as a child? (0 no, 1 yes)

Notes: The *illegit* variable is one of the few in the LEAD dataset that is coded somewhat subjectively. It was coded 1 if researchers uncovered evidence that the child was considered illegitimate, and 0 otherwise, rather than coded purely on the basis of a technical definition of birth out of wedlock. This is due to different societal norms in different time periods. Similarly, *kidhealth* is a subjective assessment of the researchers based on the available evidence.

Coding birth order proved one of the most complicated facets of the entire LEAD dataset, which is why birth order variables are not currently included in any papers. Most theories about the relevance of birth order have to do with role specialization and how the way that children interact in the household may influence long-lasting personality characteristics. There are two issues, however, that significantly complicate coding even when it is possible to find basic birth order data for leaders. First, because birth order theories have to do with role specialization, there is the potential for cohort effects.[14] For example, if a future leader is born fifteen years after the first born in their

[14] Eckstein and Kaufman 2012; Stewart 2012.

family, they are not really competing for resources because of the enormous age gap, or they are competing for only a few years. This raises the question of whether that leader should be considered a non-first born or a first born. Second, in different societies in different time periods, there are strong gender effects that drove the treatment of children. A first-born girl in the United States today, on average, receives treatment relative to male children different from she would have 100 years ago. This matters for coding because it means that researchers not only need to know the specific gender and birth dates of any siblings, but also need to know details about how that given society in that time period treated female children (along with details, optimally, on that family in particular). This research requirement was beyond the scope of this project, which places a significant constraint on any birth order data as well.

Family		
age	Age	What was the age of the leader in that year? (number)
gender	Gender	What was the gender of the leader? (0 female, 1 male)
married	Married	Was the leader ever married? (0 no, 1 yes)
marriedinpower	Married While in Power	Was the leader married while holding office? (0 no, 1 yes)
divorced	Divorced	Was the leader ever divorced? (0 no, 1 yes)
totalspouses	Total Spouses	Number of spouses in lifetime (number)
sons	Sons	How many sons did the leader have? (number)
daughters	Daughters	How many daughters did the leader have? (number)
adopted	Adopted	How many children did the leader adopt? (number)
childtotal	Child Total	How many children, total, did the leader have? (number)
childrendied	Children Died	How many children did the leader have that had died prior to a given year? (number)

Notes: The gender variable treats gender as a 0/1 binary. Reality is more complicated, of course, but for coding purposes, the researchers simplified to 0/1.

The *totalspouses* variable is a proxy, in some ways, for polygamist leaders, looking at the distribution. In most cases, *childtotal* is simply the sum of *sons* plus *daughters* plus *adopted*. In some cases, however, total data were available but not data on the breakdown.

The *childrendied* variable and the *divorced* variables, in particular, sometimes show variation when a leader is in office, if they are divorced while in office (such as Nelson Mandela) or have a child who passes away while they are in office.

Prior Occupation		
militarycareer	Career Military	Was the leader a career military officer/enlisted before entering office? (0 no, 1 yes)
law	Law	Was the leader primarily a lawyer before entering office? (0 no, 1 yes)
business	Business	Was the leader primarily a business person before entering office? (0 no, 1 yes)
creative	Creative	Was the leader primarily a creative professional (e.g. arts) before entering office? (0 no, 1 yes)
careerpolitican	Career Politician	Was the leader primarily a career politician before entering office? (0 no, 1 yes)
police	Police	Was the leader primarily in the police before entering office? (0 no, 1 yes))
teacher	Teacher	Was the leader primarily a teacher before entering office? (0 no, 1 yes)
journalism	Journalism	Was the leader primarily a journalist before entering office? (0 no, 1 yes)
engineering	Engineering	Was the leader primarily an engineer before entering office? (0 no, 1 yes)
medicine	Medicine	Was the leader primarily a medical professional (e.g. nurse, doctor) before entering office? (0 no, 1 yes)
religion	Religion	Was the leader primarily a religious professional (e.g. pastor) before entering office? (0 no, 1 yes)
activist	Activist	Was the leader primarily an activist before entering office? (0 no, 1 yes)

aristocratlandowner	Aristocrat	Was the leader primarily an aristocrat before entering office? (0 no, 1 yes)
science	Science	Was the leader primarily in the sciences before entering office? (0 no, 1 yes)
bluecollar	Blue Collar	Was the leader primarily a blue-collar worker before entering office? (0 no, 1 yes)
economics	Economics	Was the leader primarily in economics before entering office? (0 no, 1 yes)
agriculture	Agriculture	Was the leader primarily in agriculture before entering office? (0 no, 1 yes)
filmmusic	Film/Music	Was the leader primarily in film/music before entering office? (0 no, 1 yes)
interpreter	Interpreter	Was the leader primarily an interpreter before entering office? (0 no, 1 yes)
Writer	Writer	Was the leader primarily a writer before enterting office? (0 no, 1 yes)

Notes: Though this did not happen that often, leaders could have more than one prior occupation when applicable, e.g., when they had two sustained careers prior to entering office.
The *science* variable aggregates the *engineering* variable along with a secondary science variable. Thus, when the *science* variable is used, the *engineering* variable should not be used.
The *bluecollar* variable aggregates the *labor* variable along with *agriculture*. Thus, when the *bluecollar* variable is used, the *activist* variable should not be used.

Other		
wealth	Wealth	What was the wealth level of the family of the leader growing up? (0 low, 1 middle class, 2 high)
socstatus	Social Status	What was the social status of the family of the leader growing up? (0 low, 1 middle class, 2 high)
mentalhealth	Mental Health	Are there reports the leader had mental health issues? (0 no, 1 yes)
physhealth	Physical Health	Were there reports the leader had physical health issues in that given year? (0 no, 1 yes)

yrsexper	Years of Experience	How many years of prior experience did the leader have before entering office? (count)

Notes: These are the most subjective of the variables in the LEAD dataset. They also contain the most missing data. They are not used in any of the data analysis but we provide them to potentially assist future researchers interested in these areas.

Variables from Archigos		
Leadid30	Archigos Leader ID	Leader ID in the Archigos dataset, updated with a few new leader IDs from Archigos leadid29
leaderarchigos	Archigos Leader Name	Leader name in the Archigos dataset
sdarchigos	Archigos Start Date	Leader start date in the Archigos dataset
edarchigos	Archigos Exit Date	Leader exit date in the Archigos dataset
entry	Leader Entry Method	Method of entry into office (0 reached power through regular means, 1 reached power through irregular means, 2 directly imposed by another state)
exit	Leader Exit Method	Method of exit from office (0 lost power through regular means, 1 died of natural causes, 2 retired due to ill health)
puppet	Puppet	Are there reasons to think the leader was a puppet? (0 no, 1 yes)

Notes: We also include some variables from Archigos to ensure comparability and ease of merging.[15]

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[15] Goemans et al. 2009.

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