Leaders and International Conflict

Online Appendices

Appendix B: Online Appendix to Chapter 3

The online Appendix will be available on Giacomo Chiozza's website at http://sites.google.com/site/giacomochiozza and on H.E. Goemans' website at www.rochester.edu/college/faculty/hgoemans/.

B.1 Description of the competing risks model

We estimate a competing risks model, in which the dependent variables measure how long a leader has remained in office before he left office *in a particular way*. Competing risks analysis allows us to examine multiple models of exit, or risks, in a generalized duration framework by positing risk-specific hazard rates, one for each outcome state (Diermeier and Stevenson, 1999; Box-Steffensmeier and Jones, 2004). A great strength of the method is that it allows us to examine how a variable affects the timing of one type of failure separately from its effect on another type of failure. As we explained in Chapter 2, we examine two risks: exit due to a regular loss of office, and exit due to forcible removal.

Following the approach of Chiozza and Goemans (2004b), we estimate semiparametric Cox proportional hazard models with frailty terms (Therneau and Grambsch, 2000). The frailty terms are additional unmeasured covariates α_i, sampled from a Gamma distribution with mean 1 and variance θ, that multiplicatively affect the baseline hazards.[1] The frailty parameter is conceptually analogous to a random effect that assesses whether leaders of some countries are more likely to lose power, all the other measured factors being equal. All else being equal, leaders of countries with an α_i greater than 1 face a greater risk of removal from office than accounted for by the explanatory

[1] The specification for the hazard takes the following form: $h_i(t|x) = h_{0i}(t)\alpha_i \exp(\sum_{j=1}^{p} \beta_j x_j)$, where $h_{0i}(t)$ is the baseline hazard, and α_i follows a Gamma distribution with shape and scale parameters equal to $\frac{1}{\theta}$.

variables. Leaders of countries with an α_i smaller than 1 are less likely to lose office than accounted for by the explanatory variables. Hence, both the explanatory variables and the frailty terms account for the risks of losing office in the models. We cluster observations by country, because the leader's chances of survival are likely to depend in some general way on country-specific factors not captured by the explanatory variables in the models (Therneau and Grambsch, 2000).

Before reporting the tables with regression coefficients, which we presented graphically in Chapter 3, we discuss four issues: (*a*) the independence of irrelevant alternatives assumption; (*b*) the estimation of the missing values on the explanatory variables; (*c*) the tests for non-proportional hazards; (*d*) the "empty cell" problem.

B.2 The independence of irrelevant alternatives assumption

The independence of irrelevant alternatives (IIA) assumption holds that the survival times for each mode of exit are independent of the other potential modes of exit – the risk of one mode of exit thus does not affect the risk of the other mode of exit – and each mode of exit could have possibly occurred, given enough time. By further assuming that there exists a latent failure time for each mode of exit and that only the shortest failure time is actually observed, it becomes possible to simply estimate single-state models (one for each mode of exit), where the other modes of exit are treated as randomly right censored.

To this end, we ran a multinomial logit regression, in which the dependent variable recorded whether the leader was in office, lost office in a regular manner, or lost office in a forcible manner. We then computed two tests, the Hausman test and the Small–Hsiao test (Freese and Long, 2006, 243–6). The intuition behind these tests is to compare the coefficients estimated from a full model to the coefficients estimated by recursively eliminating one of the alternatives. This generates $J - 1$ tests, where J is the number of alternatives (in our case, 3). If the test detects no statistical difference between the two sets of coefficients, it means that the presence or absence of an alternative does not affect the odds of selecting one of the existing alternatives, i.e. the hypothesis of independence of irrelevant alternatives is *not* rejected.

In their discusson of the Hausman and Small–Hsiao tests, Freese and Long (ibid., 244) warn that "these tests can produce contradictory results." Moreover, in the case of the Small–Hsiao test, which

requires randomly dividing the data into two subsamples of approximately equal size, we can obtain different results every time the test is performed, given that the sample will be divided differently.[2] While care should be exercised in interpreting these tests, they still offer a complement to the more impressionistic modeling suggestion of Amemiya who maintains that the multinomial logit works best when the alternatives are dissimilar (quoted in Freese and Long (ibid.)). This recommendation is certainly met by the alternatives in our model: office tenure, regular removal with the expectation of safe retirement, or forcible removal with the expectation of death, exile, or prison.

As we report in Tables B.1 and B.2, all but one of the Hausman tests fail to reject the IIA assumption. In the case of the Small–Hsiao tests, we fail to reject the IIA in all but a handful of tests.[3] Overall, these results give us sufficient confidence that, as required by the competing risks approach, each mode of exit is indeed independent of the other potential mode of exit.[4]

B.3 Missing data

As often the case with political science data, our data set is affected by the presence of missing values on some of the variables, which leads to the loss of valuable information and potentially biases estimates and inferences (King *et al.*, 2001). Specifically, we have missing data on the variable measuring the levels of ecomomic development and the variable measuring economic growth (see Figures 3.5, 3.6, 3.7, and 3.8). Missing data can be particularly pernicious when estimating hazard models if data on some variables is less likely to be recorded when an event terminates. Therefore, we use multiple imputation to fill in the missing values.

Following Schafer's (1997) approach, we use data augmentation under a multi-variate normal model based on the following variables:

[2] To ensure replicability, we set the seed of the random number generator, which will then generate the same sequence of random numbers every time.

[3] A few of the test statistics for the Hausman test are negative, a "very common" occurrence according to Freese and Long (2006, 244–5), who also add: "Hausman and McFadden (1984, 1226) *note* this possibility and conclude that a negative result is evidence that IIA has not been violated."

[4] The variables we use to estimate economic growth and levels of economic developments contain missing data. As we discuss in section B.3, we created five imputed datasets. We therefore report the tests for the IIA assumption on all the imputed datasets.

Table B.1: *Hausman tests of the IIA assumption*

Omitted	chi2	df	P > chi2	evidence	Omitted	chi2	df	P > chi2	evidence
	All Leaders								
1	−8.277	11	–	–					
2	12.323	11	0.340	for Ho					
	Autocracy					Mixed Regime			
1	9.131	11	0.610	for Ho	1	0.412	11	1.000	for Ho
2	1.603	11	0.999	for Ho	2	2.533	11	0.996	for Ho
	Parliamentary democracy					Presidential democracy			
1	0.000	2	1.000	for Ho	1	−0.000	3	–	–
2	−0.317	10	–	–	2	0.000	2	1.000	for Ho
	Civil war					No civil war			
1	−0.797	11	–	–	1	−2.889	11	–	–
2	4.255	11	0.962	for Ho	2	8.780	11	0.642	for Ho
	No growth-imputed data 1					Growth-imputed data 1			
1	−8.276	11	–	–	1	−4.394	11	–	–
2	3.388	11	0.985	for Ho	2	9.327	11	0.592	for Ho
	No growth-imputed data 2					Growth-imputed data 2			
1	−10.391	11	–	–	1	−4.394	11	–	–
2	4.212	11	0.963	for Ho	2	9.327	11	0.592	for Ho

	No growth-imputed data 3					Growth-imputed data 3			
1	0.380	11	1.000	for Ho	1	−4.394	11	–	–
2	4.594	11	0.949	for Ho	2	9.327	11	0.592	for Ho
	No growth-imputed data 4					Growth-imputed data 4			
1	−7.138	11	–	–	1	−4.394	11	–	–
2	4.311	11	0.960	for Ho	2	9.327	11	0.592	for Ho
	No growth-imputed data 5					Growth-imputed data 5			
1	−7.412	11	–	–	1	−4.394	11	–	–
2	4.357	11	0.958	for Ho	2	9.327	11	0.592	for Ho
	Poor-imputed data 1					Medium-imputed data 1			
1	21.017	11	0.033	against Ho	1	9.131	11	0.610	for Ho
2	−0.000	1	–	–	2	10.316	11	0.502	for Ho
	Poor-imputed data 2					Medium-imputed data 2			
1	26.763	11	0.005	against Ho	1	6.783	11	0.816	for Ho
2	−0.000	1	–	–	2	10.078	11	0.523	for Ho
	Poor-imputed data 3					Medium-imputed data 3			
1	1.126	11	1.000	for Ho	1	9.018	11	0.620	for Ho
2	0.000	1	1.000	for Ho	2	9.018	11	0.620	for Ho

(*cont.*)

Table B.1: (*cont.*)

Omitted	chi2	df	P > chi2	evidence	Omitted	chi2	df	P > chi2	evidence
	Poor-imputed data 4					Medium-imputed data 4			
1	−0.000	1	–	–	1	12.919	11	0.299	for Ho
2	−0.000	1	–	–	2	9.439	11	0.581	for Ho
	Poor-imputed data 5					Medium-imputed data 5			
1	19.933	11	0.046	against Ho	1	8.526	11	0.666	for Ho
2	0.000	1	1.000	for Ho	2	10.545	11	0.482	for Ho
	Rich-imputed data 1					Rich-imputed data 2			
1	0.000	2	1.000	for Ho	1	0.000	2	1.000	for Ho
2	0.274	11	1.000	for Ho	2	−0.226	11	–	–
	Rich-imputed data 3					Rich-imputed data 4			
1	0.000	2	1.000	for Ho	1	0.000	2	1.000	for Ho
2	−0.327	11	–	–	2	0.068	10	1.000	for Ho
	Rich-imputed data 5								
1	0.000	2	1.000	for Ho					
2	0.370	11	1.000	for Ho					

Table B.2: *Small–Hsiao tests of IIA assumption*

Omitted	lnL(full)	lnL(omit)	chi2	df	$P > \chi^2$	evidence	Omitted	lnL(full)	lnL(omit)	chi2	df	$P > \chi^2$	evidence
		All leaders											
1	−927.658	−920.856	13.603	11	0.256	for Ho							
2	−1871.148	−1869.053	4.189	11	0.964	for Ho							
		Autocracy							Mixed regime				
1	−526.054	−316.009	420.089	11	0.000	against Ho	1	−449.104	−443.394	11.420	11	0.409	for Ho
2	−170.071	−168.888	2.367	11	0.997	for Ho	2	−1275.416	−725.970	1098.892	11	0.000	against Ho
		Parliamentary democracy							Parliamentary democracy				
1	−76.195	−37.775	76.840	11	0.000	against Ho	1	−467.503	−59.611	815.785	11	0.000	against Ho
2	−610.579	−599.059	23.041	11	0.017	against Ho	2	−418.872	−254.056	329.633	11	0.000	against Ho
		Civil war							No civil war				
1	188.904	185.454	6.900	11	0.807	for Ho	1	−685.256	−679.770	10.973	11	0.445	for Ho
2	257.540	251.023	13.034	11	0.291	for Ho	2	−1617.986	−1610.824	14.325	11	0.216	for Ho
		No growth-imputed data 1							Growth-imputed data 1				
1	−410.125	−408.129	3.992	11	0.970	for Ho	1	−500.125	−497.152	5.947	11	0.877	for Ho
2	−587.774	−579.779	15.990	11	0.142	for Ho	2	−1267.304	−1261.355	11.898	11	0.371	for Ho
		No growth-imputed data 2							Growth-imputed data 2				
1	−365.436	−361.437	7.998	11	0.714	for Ho	1	−365.436	−361.437	7.998	11	0.714	for Ho
2	−974.532	−613.322	722.421	11	0.000	against Ho	2	−974.532	−613.322	722.421	11	0.000	against Ho

(*cont.*)

Table B.2: (*cont.*)

Omitted	lnL(full)	lnL(omit)	chi2	df	$P > \chi^2$	evidence	Omitted	lnL(full)	lnL(omit)	chi2	df	$P > \chi^2$	evidence
		No growth-imputed data 3							Growth-imputed data 3				
1	−439.692	−433.624	12.135	11	0.354	for Ho	1	−495.872	−492.594	6.555	11	0.834	for Ho
2	−1704.440	−592.205	2224.470	11	0.000	against Ho	2	−1282.782	−1277.481	10.602	11	0.477	for Ho
		No growth-imputed data 4							Growth-imputed data 4				
1	−449.753	−442.283	14.939	11	0.185	for Ho	1	−479.725	−474.963	9.524	11	0.574	for Ho
2	−614.298	−604.817	18.962	11	0.062	for Ho	2	−1301.078	−1291.323	19.510	11	0.053	for Ho
		No growth-imputed data 5							Growth-imputed data 5				
1	−1596.029	−386.972	2418.115	11	0.000	against Ho	1	−1021.736	−478.805	1085.862	11	0.000	against Ho
2	−602.894	−595.544	14.699	11	0.197	for Ho	2	−1305.789	−1302.419	6.740	11	0.820	for Ho
		Poor-imputed data 1							Medium-imputed data 1				
1	−246.391	−243.084	6.613	11	0.830	for Ho	1	−599.469	−591.926	15.086	11	0.179	for Ho
2	−262.379	−214.102	96.554	11	0.000	against Ho	2	−1193.297	−1188.017	10.560	11	0.481	
		Poor-imputed data 2							Medium-imputed data 2				
1	−273.579	−270.701	5.755	11	0.889	for Ho	1	−560.620	−557.047	7.145	11	0.787	for Ho
2	−216.167	−214.719	2.896	11	0.992	for Ho	2	−1106.131	−1099.069	14. 124	11	0.226	for Ho
		Poor-imputed data 3							Medium-imputed data 3				
1	−250.037	−247.645	4.784	11	0.941	for Ho	1	−531.973	−526.650	10.644	11	0.474	for Ho
2	−1432.427	−218.123	2428.608	11	0.000	against Ho	2	−1118.234	−1113.787	8.895	11	0.632	for Ho

		Poor-imputed data 4						Medium-imputed data 4					
1	−265.298	−261.184	8.230	11	0.693	for Ho	1	−525.486	−517.401	16.170	11	0.135	for Ho
2	−744.896	−232.658	1024.475	11	0.000	against Ho	2	−1156.963	−1152.183	9.559	11	0.570	for Ho
		Poor-imputed data 5						Medium-imputed data 4					
1	−250.041	−246.084	7.913	11	0.721	for Ho	1	−571.446	−566.751	9.389	11	0.586	for Ho
2	−227.850	−204.143	47.414	11	0.000	against Ho	2	−1099.897	−1093.478	12.838	11	0.304	for Ho
		Rich-imputed data 1						Rich-imputed data 2					
1	−80.428	−43.414	74.028	11	0.000	against Ho	1	−334.282	−68.939	530.685	11	0.000	against Ho
2	−3054.512	−459.930	5189.163	11	0.000	against Ho	2	−1721.747	−468.203	2507.088	11	0.000	against Ho
		Rich-imputed data 3						Rich-imputed data 4					
1	−172.989	−52.094	241.788	11	0.000	against Ho	1	−327.664	−61.367	532.594	11	0.000	against Ho
2	−462.909	−448.165	29.487	11	0.002	against Ho	2	−553.413	−469.391	168.043	11	0.000	against Ho
		Rich-imputed data 5											
1	−318.493	−44.334	548.317	11	0.000	against Ho							
2	−469.786	−459.624	20.323	11	0.041	against Ho							

We run five parallel chains of 500 steps each, and we set the starting values for each chain by using the Expectation–Maximization (EM) estimates of the model parameters computed on a bootstrap sample a quarter of the size of the whole data set (Allison, 2002, 38, fn. 11). This way, we create five imputed data sets with no missing records.[5]

We use the imputed data sets to select the samples for the models in which we evaluate the effects of the conflict variables under the conditions of different levels of economic development and the condition of economic growth or recession in Figures 3.5, 3.6, 3.7, and 3.8. We then estimate our models on each data set, we report the mean of the five estimates for each models' coefficients, and we compute the standard errors and significance levels using Rubin's formulas (Rubin, 1987, 76–9).

The standard errors are computed as the square root of the average of the within-samples variances plus the variance of the coefficient estimates across samples (multiplied by the correction factor, $1 + 1/M$, where M is the number of imputed data sets, in our case, 5). The parameter estimates from a multiple imputation procedure follow a $t-$ distribution with the degrees of freedom equal to $(M - 1)(1 + r^{-1})$,[2] where r is the ratio of the between-to-within variances (multiplied by the correction factor $(1 + 1/M)$). For the nuisance parameters, such as the variance of the random effect θ, whose significance levels are based upon χ^2 tests, we compute the repeated-imputation p-values using the approach of Li *et al.* (1991). For the tests of joint significance and the tests of linear hypotheses, we use the multivariate extension of the approach presented above as is described in Rubin and Schenker (1991).

B.4 Non-proportional hazards tests

In this section, we report the findings regarding the tests for the presence of non-proportional hazards in our competing-risks duration models (Box-Steffensmeier and Zorn, 2001; Box-Steffensmeier, Reiter and Zorn, 2003). The Cox hazard model is built on the key

[5] The number of iterative steps needed for the EM algorithm to reach convergence were 486, 1372, 249, 388, 224, respectively. The algorithm "declared" convergence when the maximum relative difference in all of the estimated means, variances, or covariances from one iteration to the next was less than or equal to 1e – 06 (1 over 1 million).

assumption of proportional hazards: regardless of when it occurs in the life history of a subject, a change in an explanatory variable has an effect on the hazard that is proportional and constant over time. This is a powerful assumption that might serve researchers well in a large range of instances, but it is an assumption that should not be taken for granted. Explanatory variables might have effects that either wax or wane as time goes by, thus altering the conditions under which a process or an event terminates. Failing to detect, and control for, time-varying effects, then, not only mischaracterizes the political dynamics that underlie leadership tenure, but also leads to biased and inefficient estimates.

To address this potential problem, we run the relevant specification checks based on the analysis of the scaled Schoenfeld residuals for all the models we estimate. We test both a linear and logarithmic effect of time.

As we report below, we fail to reject the hypothesis of non-proportional hazards. As a consequence, we do *not* have to re-estimate the models including an interaction effect between each variable that fails to meet the proportional-hazard assumption and the logarithm of time.

The tables are grouped according to the headers in section 3.3.

B.4.1 All leaders

Table B.3: ***Proportional hazard test: forcible exit***

	Linear			Logarithm		
	rho	chisq	p	rho	chisq	p
Challenger	0.009	0.052	0.820	0.023	0.333	0.564
Target	0.051	1.376	0.241	0.023	0.281	0.596
Inheritor	0.007	0.024	0.878	−0.013	0.084	0.773
Crisis victory	0.017	0.145	0.703	0.006	0.016	0.899
Crisis defeat	0.040	0.850	0.356	0.012	0.076	0.783
Crisis draw	0.003	0.006	0.939	0.007	0.026	0.871
War victory	−0.058	2.012	0.156	−0.029	0.482	0.488
War defeat	−0.034	0.654	0.419	−0.021	0.240	0.624
War draw	−0.031	0.299	0.585	0.011	0.034	0.853
GLOBAL		7.178	0.619		1.972	0.992

Table B.4: ***Proportional hazard test: regular exit***

	Linear			Logarithm		
	rho	chisq	p	rho	chisq	p
Challenger	−0.034	1.571	0.210	−0.032	1.374	0.241
Target	−0.020	0.605	0.437	−0.043	2.717	0.099
Inheritor	−0.006	0.047	0.828	−0.034	1.775	0.183
Crisis victory	−0.017	0.397	0.528	0.011	0.157	0.691
Crisis defeat	0.008	0.091	0.763	0.027	1.041	0.308
Crisis draw	0.030	1.298	0.255	0.049	3.426	0.064
War victory	0.001	0.002	0.965	0.020	0.529	0.467
War defeat	−0.016	0.321	0.571	0.030	1.182	0.277
War draw	−0.007	0.066	0.797	0.001	0.001	0.978
GLOBAL		4.894	0.843		6.845	0.653

B.4.2 Domestic political institutions

Table B.5: ***Proportional hazard test: forcible exit and autocracy***

	Linear			Logarithm		
	rho	chisq	p	rho	chisq	p
Challenger	0.050	0.425	0.514	0.051	0.446	0.504
Target	0.072	0.737	0.391	0.063	0.567	0.451
Inheritor	0.032	0.148	0.701	−0.015	0.034	0.854
Crisis victory	0.143	2.238	0.135	0.071	0.547	0.460
Crisis defeat	−0.044	0.330	0.566	−0.048	0.400	0.527
Crisis draw	0.021	0.041	0.840	0.025	0.059	0.809
War victory	−0.043	0.309	0.579	−0.037	0.227	0.633
War defeat	−0.067	0.591	0.442	−0.036	0.175	0.676
War draw	−0.063	0.546	0.460	−0.026	0.095	0.758
GLOBAL		4.991	0.835		2.369	0.984

Table B.6: ***Proportional hazard test: forcible exit and mixed regime***

	Linear			Logarithm		
	rho	chisq	p	rho	chisq	p
Challenger	−0.002	0.001	0.976	0.000	0.000	0.999
Target	−0.018	0.106	0.745	−0.023	0.164	0.686
Inheritor	−0.047	0.673	0.412	−0.094	2.716	0.099
Crisis victory	0.054	0.866	0.352	0.013	0.050	0.823
Crisis defeat	0.129	5.313	0.021	0.046	0.678	0.410
Crisis draw	0.094	2.993	0.084	0.060	1.201	0.273
War victory	−0.014	0.068	0.795	0.005	0.007	0.934
War defeat	0.035	0.429	0.512	0.055	1.051	0.305
War draw	0.018	0.060	0.807	0.038	0.278	0.598
GLOBAL		11.467	0.245		4.619	0.866

Table B.7: ***Proportional hazard test: forcible exit and parliamentary democracy***

	Linear			Logarithm		
	rho	chisq	p	rho	chisq	p
Challenger	−0.025	0.009	0.923	0.034	0.017	0.896
Target	−0.252	1.379	0.240	−0.094	0.193	0.661
Inheritor	0.054	0.116	0.734	0.211	1.751	0.186
Crisis victory	0.134	0.524	0.469	0.098	0.279	0.597
Crisis defeat	0.308	1.593	0.207	0.216	0.783	0.376
Crisis draw	0.012	0.001	0.970	0.009	0.001	0.977
War victory	0.059	0.003	0.953	0.000	0.000	1.000
War defeat	0.081	0.182	0.670	0.051	0.072	0.789
War draw	−0.036	0.000	0.988	0.008	0.000	0.997
GLOBAL		3.567	0.938		4.325	0.889

Table B.8: *Proportional hazard test: forcible exit and presidential democracy*

	Linear			Logarithm		
	rho	chisq	p	rho	chisq	p
Challenger	0.146	0.097	0.756	0.188	0.161	0.688
Target	0.063	0.122	0.727	0.102	0.317	0.573
Inheritor	−0.003	0.000	0.990	−0.090	0.170	0.680
Crisis victory	0.007	0.002	0.969	0.043	0.051	0.821
Crisis defeat	−0.001	0.000	0.997	−0.121	0.322	0.571
Crisis draw	−0.096	0.300	0.584	−0.121	0.478	0.489
War victory	0.006	0.000	0.994	−0.010	0.000	0.990
War defeat	−0.024	0.011	0.917	−0.017	0.006	0.941
War draw	−0.062	0.002	0.963	−0.273	0.041	0.839
GLOBAL		0.466	1.000		1.470	0.997

Table B.9: *Proportional hazard test: regular exit and autocracy*

	Linear			Logarithm		
	rho	chisq	p	rho	chisq	p
Challenger	0.012	0.009	0.924	−0.161	1.689	0.194
Target	0.057	0.596	0.440	−0.096	1.673	0.196
Inheritor	0.034	0.207	0.649	−0.098	1.774	0.183
Crisis victory	−0.086	1.098	0.295	−0.022	0.073	0.788
Crisis defeat	0.109	0.612	0.434	0.094	0.455	0.500
Crisis draw	−0.010	0.008	0.931	0.143	1.691	0.194
War victory	0.101	0.405	0.524	0.022	0.020	0.889
War defeat	−0.074	0.772	0.380	0.125	2.206	0.137
War draw	−0.026	0.074	0.785	0.087	0.835	0.361
GLOBAL		3.501	0.941		5.603	0.779

Table B.10: ***Proportional hazard test: regular exit and mixed regime***

	Linear			Logarithm		
	rho	chisq	p	rho	chisq	p
Challenger	−0.046	1.069	0.301	−0.015	0.116	0.733
Target	−0.037	0.880	0.348	−0.034	0.726	0.394
Inheritor	−0.021	0.276	0.599	−0.021	0.271	0.603
Crisis victory	0.011	0.063	0.801	0.029	0.467	0.495
Crisis defeat	0.033	0.645	0.422	0.027	0.424	0.515
Crisis draw	0.061	2.247	0.134	0.040	0.978	0.323
War victory	−0.028	0.312	0.576	−0.008	0.027	0.869
War defeat	0.022	0.250	0.617	0.042	0.906	0.341
War draw	−0.052	1.818	0.178	−0.064	2.791	0.095
GLOBAL		5.856	0.754		5.204	0.816

Table B.11: ***Proportional hazard test: regular exit and parliamentary democracy***

	Linear			Logarithm		
	rho	chisq	p	rho	chisq	p
Challenger	−0.011	0.062	0.804	−0.017	0.166	0.683
Target	−0.038	0.774	0.379	−0.029	0.438	0.508
Inheritor	−0.028	0.512	0.474	−0.054	1.849	0.174
Crisis victory	0.033	0.612	0.434	0.036	0.735	0.391
Crisis defeat	0.051	1.235	0.266	0.054	1.399	0.237
Crisis draw	0.024	0.299	0.585	0.045	1.094	0.296
War victory	0.014	0.124	0.725	0.017	0.194	0.660
War defeat	−0.058	1.058	0.304	−0.012	0.042	0.838
War draw	0.069	2.555	0.110	0.089	4.356	0.037
GLOBAL		5.930	0.747		7.992	0.535

Table B.12: ***Proportional hazard test: regular exit and presidential democracy***

	Linear			Logarithm		
	rho	chisq	p	rho	chisq	p
Challenger	0.023	0.131	0.717	−0.005	0.006	0.938
Target	−0.035	0.284	0.594	−0.019	0.084	0.772
Inheritor	−0.013	0.001	0.971	−0.003	0.000	0.992
Crisis victory	−0.027	0.154	0.694	−0.020	0.080	0.778
Crisis defeat	−0.014	0.056	0.813	0.018	0.092	0.762
Crisis draw	0.022	0.113	0.736	0.023	0.114	0.735
War victory	0.002	0.001	0.980	0.008	0.007	0.934
War defeat	−0.614	0.935	0.334	−0.387	0.373	0.541
War draw	0.056	0.328	0.567	0.031	0.099	0.754
GLOBAL		1.979	0.992		0.769	1.000

B.4.3 Domestic political unrest

Table B.13: ***Proportional hazard test: forcible exit and civil war***

	Linear			Logarithm		
	rho	chisq	p	rho	chisq	p
Challenger	0.007	0.010	0.921	0.038	0.264	0.608
Target	0.073	0.527	0.468	0.116	1.340	0.247
Inheritor	0.026	0.090	0.765	−0.057	0.417	0.518
Crisis victory	0.045	0.191	0.662	0.043	0.175	0.675
Crisis defeat	−0.030	0.132	0.716	−0.135	2.669	0.102
Crisis draw	−0.078	0.757	0.384	−0.048	0.288	0.592
War victory	−0.082	1.534	0.216	−0.076	1.332	0.248
War defeat	−0.055	0.477	0.490	−0.040	0.260	0.610
War draw	−0.050	0.259	0.611	0.004	0.002	0.964
GLOBAL		4.197	0.898		6.588	0.680

Table B.14: ***Proportional hazard test: regular exit and civil war***

	Linear			Logarithm		
	rho	chisq	p	rho	chisq	p
Challenger	−0.047	0.292	0.589	−0.052	0.357	0.550
Target	−0.053	0.520	0.471	−0.090	1.477	0.224
Inheritor	−0.029	0.177	0.674	−0.109	2.546	0.111
Crisis victory	−0.056	0.533	0.466	0.017	0.048	0.827
Crisis defeat	0.016	0.044	0.834	0.040	0.264	0.607
Crisis draw	0.110	2.011	0.156	0.125	2.604	0.107
War victory	0.016	0.063	0.802	0.041	0.402	0.526
War defeat	−0.054	0.052	0.820	−0.058	0.060	0.806
War draw	0.017	0.052	0.820	0.097	1.670	0.196
GLOBAL		3.444	0.944		6.008	0.739

Table B.15: ***Proportional hazard test: forcible exit and no civil war***

	Linear			Logarithm		
	rho	chisq	p	rho	chisq	p
Challenger	0.014	0.086	0.769	0.026	0.320	0.571
Target	0.037	0.577	0.448	−0.006	0.015	0.902
Inheritor	−0.006	0.014	0.907	−0.002	0.002	0.967
Crisis victory	0.021	0.164	0.686	0.004	0.005	0.943
Crisis defeat	0.036	0.543	0.461	0.036	0.536	0.464
Crisis draw	0.006	0.015	0.902	0.015	0.082	0.775
War victory	−0.028	0.328	0.567	0.001	0.000	0.983
War defeat	−0.011	0.056	0.813	−0.006	0.015	0.901
War draw	−0.035	0.262	0.609	−0.002	0.001	0.971
GLOBAL		3.347	0.949		1.821	0.994

Table B.16: ***Proportional hazard test: regular exit and no civil war***

	Linear			Logarithm		
	rho	chisq	p	rho	chisq	p
Challenger	−0.035	1.562	0.211	−0.035	1.527	0.217
Target	−0.015	0.305	0.581	−0.032	1.356	0.244
Inheritor	0.000	0.000	0.995	−0.012	0.183	0.669
Crisis victory	−0.010	0.128	0.720	0.009	0.109	0.741
Crisis defeat	0.000	0.000	0.992	0.017	0.368	0.544
Crisis draw	0.012	0.194	0.660	0.034	1.394	0.238
War victory	−0.014	0.220	0.639	0.008	0.065	0.799
War defeat	−0.011	0.154	0.695	0.031	1.169	0.280
War draw	−0.017	0.321	0.571	−0.026	0.763	0.382
GLOBAL		4.225	0.896		4.696	0.860

Table B.17: ***Proportional hazard test: forcible exit and civil war, non-democratic leaders***

	Linear			Logarithm		
	rho	chisq	p	rho	chisq	p
Challenger	0.007	0.009	0.923	0.044	0.317	0.573
Target	0.065	0.400	0.527	0.114	1.225	0.268
Inheritor	0.010	0.011	0.918	−0.180	3.218	0.073
Crisis victory	0.047	0.172	0.678	0.055	0.234	0.628
Crisis defeat	−0.018	0.040	0.841	−0.130	2.170	0.141
Crisis draw	−0.049	0.250	0.617	−0.045	0.209	0.647
War victory	−0.091	1.637	0.201	−0.060	0.715	0.398
War defeat	−0.045	0.273	0.601	−0.058	0.452	0.501
War draw	−0.047	0.200	0.655	0.010	0.010	0.921
GLOBAL		3.552	0.938		8.716	0.464

Table B.18: ***Proportional hazard test: regular exit and civil war, non-democratic leaders***

	Linear			Logarithm		
	rho	chisq	p	rho	chisq	p
Challenger	−0.046	0.138	0.710	−0.032	0.069	0.793
Target	0.063	0.386	0.534	0.036	0.124	0.725
Inheritor	−0.015	0.024	0.878	−0.063	0.401	0.526
Crisis victory	−0.127	1.443	0.230	−0.049	0.211	0.646
Crisis defeat	−0.033	0.112	0.738	0.026	0.071	0.789
Crisis draw	0.165	2.045	0.153	0.108	0.872	0.350
War victory	−0.387	0.331	0.565	−0.275	0.168	0.682
War defeat	−0.243	0.044	0.834	−0.149	0.016	0.898
War draw	−0.070	0.054	0.816	−0.014	0.002	0.962
GLOBAL		4.872	0.845		2.054	0.991

Table B.19: ***Proportional hazard test: forcible exit and civil war, democratic leaders***

	Linear			Logarithm		
	rho	chisq	p	rho	chisq	p
Challenger	0.394	0.024	0.877	0.667	0.069	0.793
Target	−0.866	0.137	0.711	−0.739	0.100	0.752
Inheritor	−0.142	0.210	0.647	−0.157	0.259	0.611
Crisis victory	−0.306	0.008	0.931	0.048	0.000	0.989
Crisis defeat	0.166	0.106	0.745	0.233	0.207	0.649
Crisis draw	−0.211	0.043	0.836	−0.055	0.003	0.957
War victory	−0.885	0.092	0.761	−0.684	0.055	0.814
War defeat	−0.442	1.265	0.261	−0.856	4.737	0.030
War draw	0.113	0.000	0.987	0.152	0.000	0.983
GLOBAL		2.002	0.991		5.641	0.775

Table B.20: ***Proportional hazard test: regular exit and civil war, democratic leaders***

	Linear			Logarithm		
	rho	chisq	p	rho	chisq	p
Challenger	−0.055	0.218	0.641	−0.085	0.529	0.467
Target	−0.265	6.754	0.009	−0.201	3.876	0.049
Inheritor	−0.080	0.555	0.456	−0.155	2.114	0.146
Crisis victory	0.033	0.103	0.748	0.067	0.431	0.511
Crisis defeat	0.021	0.023	0.878	−0.016	0.014	0.905
Crisis draw	0.154	1.615	0.204	0.135	1.254	0.263
War victory	0.044	0.098	0.754	0.015	0.011	0.917
War defeat	0.001	0.000	0.998	−0.008	0.000	0.985
War draw	0.124	1.115	0.291	0.200	2.890	0.089
GLOBAL		10.778	0.291		8.262	0.508

B.4.4 Economic development

Table B.21: ***Proportional hazard test: forcible exit and low development***

	Linear			Logarithm		
	rho	D.tilde	p-value	rho	D.tilde	p-value
Challenger	0.016	0.048	0.826	0.020	0.111	0.740
Target	0.065	0.671	0.413	0.062	0.610	0.435
Inheritor	0.085	0.074	0.786	0.081	0.078	0.779
Crisis victory	−0.035	0.187	0.666	−0.002	0.004	0.951
Crisis defeat	0.077	0.809	0.369	0.026	0.157	0.692
Crisis draw	0.060	0.519	0.472	0.047	0.355	0.551
War victory	−0.087	1.199	0.276	−0.062	0.577	0.451
War defeat	−0.111	1.780	0.184	−0.084	0.845	0.364
War draw	−0.056	0.334	0.563	−0.002	0.008	0.928
GLOBAL		0.653	0.421		0.174	0.684

Table B.22: ***Proportional hazard test: regular exit and low development***

	Linear			Logarithm		
	rho	D.tilde	p-value	rho	D.tilde	p-value
Challenger	−0.059	0.526	0.468	−0.034	0.170	0.680
Target	−0.005	0.236	0.628	0.009	0.086	0.769
Inheritor	−0.009	0.012	0.911	−0.096	1.162	0.281
Crisis victory	−0.014	0.039	0.843	0.011	0.033	0.856
Crisis defeat	0.222	1.629	0.204	0.077	0.245	0.621
Crisis draw	−0.001	0.026	0.872	0.010	0.023	0.879
War victory	0.201	1.353	0.245	0.096	0.306	0.580
War defeat	−0.392	0.435	0.510	−0.171	0.083	0.773
War draw	−0.031	0.127	0.721	−0.010	0.027	0.870
GLOBAL		0.531	0.467		0.256	0.613

Table B.23: ***Proportional hazard test: forcible exit and medium development***

	Linear			Logarithm		
	rho	D.tilde	p-value	rho	D.tilde	p-value
Challenger	0.034	0.390	0.532	0.042	0.603	0.438
Target	0.060	0.935	0.334	0.049	0.626	0.429
Inheritor	−0.007	0.017	0.896	−0.008	0.024	0.877
Crisis victory	0.034	0.381	0.537	−0.008	0.022	0.883
Crisis defeat	0.018	0.102	0.750	−0.009	0.069	0.792
Crisis draw	−0.021	0.131	0.718	−0.016	0.075	0.784
War victory	−0.012	0.200	0.655	−0.003	0.008	0.929
War defeat	0.011	0.040	0.841	0.013	0.064	0.801
War draw	−0.013	0.038	0.845	0.011	0.021	0.884
GLOBAL		0.421	0.517		0.227	0.634

Table B.24: ***Proportional hazard test: regular exit and medium development***

	Linear			Logarithm		
	rho	D.tilde	p-value	rho	D.tilde	p-value
Challenger	−0.062	3.396	0.065	−0.042	1.564	0.211
Target	−0.031	0.672	0.415	−0.028	0.714	0.401
Inheritor	−0.012	0.131	0.717	−0.019	0.362	0.547
Crisis victory	−0.035	1.040	0.308	−0.004	0.015	0.901
Crisis defeat	0.035	1.030	0.310	0.053	2.523	0.112
Crisis draw	0.054	2.509	0.113	0.051	2.345	0.126
War victory	−0.040	1.123	0.289	−0.020	0.281	0.596
War defeat	0.000	0.006	0.940	0.029	0.588	0.443
War draw	0.005	0.044	0.834	0.002	0.042	0.838
GLOBAL		1.173	0.279		0.654	0.419

Table B.25: ***Proportional hazard test: forcible exit and high development***

	Linear			Logarithm		
	rho	D.tilde	p-value	rho	D.tilde	p-value
Challenger	−0.019	0.016	0.900	−0.180	0.258	0.612
Target	−0.152	0.728	0.394	−0.498	7.792	0.005
Inheritor	0.331	0.040	0.841	0.408	0.061	0.805
Crisis victory	−0.077	0.111	0.739	0.073	0.095	0.757
Crisis defeat	0.010	0.014	0.906	0.253	0.681	0.410
Crisis draw	−0.110	0.144	0.704	0.152	0.271	0.603
War victory	−0.049	0.001	0.973	0.256	0.033	0.856
War defeat	0.019	0.020	0.889	0.170	0.480	0.489
War draw	0.264	0.241	0.623	0.279	0.272	0.602
GLOBAL		0.184	0.668		0.903	0.342

Table B.26: ***Proportional hazard test: regular exit and high development***

	Linear			Logarithm		
	rho	D.tilde	p-value	rho	D.tilde	p-value
Challenger	0.038	0.549	0.459	0.010	0.037	0.847
Target	−0.020	0.305	0.581	−0.086	3.669	0.056
Inheritor	−0.029	0.337	0.562	−0.093	3.544	0.060
Crisis victory	0.010	0.074	0.786	0.042	0.721	0.396
Crisis defeat	0.043	0.552	0.457	0.039	0.446	0.504
Crisis draw	0.029	0.303	0.582	0.071	1.912	0.167
War victory	0.017	0.123	0.725	0.054	1.299	0.254
War defeat	−0.016	0.106	0.745	0.027	0.296	0.586
War draw	0.010	0.035	0.851	0.034	0.378	0.539
GLOBAL		0.337	0.562		1.203	0.273

Table B.27: ***Proportional hazard test: forcible exit and medium development, non-democratic leaders***

	Linear			Logarithm		
	rho	D.tilde	p-value	rho	D.tilde	p-value
Challenger	0.040	0.521	0.471	0.031	0.317	0.573
Target	0.061	0.870	0.351	0.016	0.062	0.804
Inheritor	−0.011	0.044	0.833	−0.048	0.811	0.368
Crisis victory	0.055	0.889	0.346	−0.012	0.041	0.839
Crisis defeat	0.004	0.052	0.820	0.003	0.039	0.844
Crisis draw	−0.013	0.052	0.820	0.008	0.015	0.904
War victory	−0.024	0.161	0.689	−0.002	0.019	0.891
War defeat	0.017	0.093	0.761	0.027	0.227	0.634
War draw	−0.016	0.046	0.831	0.012	0.024	0.876
GLOBAL		0.459	0.498		0.249	0.618

Table B.28: ***Proportional hazard test: regular exit and medium development, non-democratic leaders***

	Linear			Logarithm		
	rho	D.tilde	p-value	rho	D.tilde	p-value
Challenger	−0.064	1.747	0.186	−0.041	0.736	0.391
Target	−0.010	0.152	0.697	−0.038	0.762	0.384
Inheritor	−0.014	0.112	0.738	−0.011	0.070	0.791
Crisis victory	−0.043	0.818	0.366	0.000	0.006	0.937
Crisis defeat	0.022	0.239	0.625	0.034	0.605	0.437
Crisis draw	0.056	1.578	0.209	0.046	1.090	0.296
War victory	−0.068	1.444	0.230	−0.024	0.183	0.669
War defeat	−0.002	0.022	0.882	0.041	0.689	0.406
War draw	0.023	0.260	0.610	0.007	0.177	0.674
GLOBAL		0.792	0.373		0.312	0.577

Table B.29: ***Proportional hazard test: forcible exit and medium development, democratic leaders***

	Linear			Logarithm		
	rho	D.tilde	p-value	rho	D.tilde	p-value
Challenger	0.059	0.086	0.769	0.176	0.759	0.384
Target	0.009	0.031	0.861	0.116	0.303	0.583
Inheritor	0.044	0.084	0.772	0.164	1.161	0.281
Crisis victory	0.187	1.124	0.289	0.086	0.210	0.647
Crisis defeat	0.206	0.837	0.364	0.003	0.660	0.417
Crisis draw	−0.150	0.608	0.436	−0.188	0.950	0.330
War victory	−0.094	0.006	0.939	−0.191	0.024	0.877
War defeat	−0.081	0.192	0.661	−0.114	0.316	0.575
War draw	0.012	0.000	0.982	−0.059	0.001	0.970
GLOBAL		0.276	0.602		0.342	0.560

Table B.30: ***Proportional hazard test: regular exit and medium development, democratic leaders***

	Linear			Logarithm		
	rho	D.tilde	p-value	rho	D.tilde	p-value
Challenger	−0.020	0.174	0.676	−0.015	0.102	0.750
Target	−0.021	0.177	0.674	0.015	0.084	0.772
Inheritor	−0.001	0.001	0.979	−0.029	0.372	0.542
Crisis victory	−0.057	1.359	0.244	−0.015	0.087	0.768
Crisis defeat	0.038	0.572	0.449	0.046	0.827	0.363
Crisis draw	0.022	0.198	0.656	0.018	0.130	0.718
War victory	−0.042	0.982	0.322	−0.029	0.480	0.488
War defeat	−0.079	3.139	0.076	−0.035	0.603	0.437
War draw	0.010	0.041	0.839	0.033	0.436	0.509
GLOBAL		0.789	0.374		0.393	0.531

B.4.5 Economic growth

Table B.31: ***Proportional hazard test: forcible exit and positive growth***

	Linear			Logarithm		
	rho	D.tilde	p-value	rho	D.tilde	p-value
Challenger	−0.070	1.487	0.223	−0.061	1.101	0.295
Target	−0.032	0.233	0.630	−0.079	1.427	0.233
Inheritor	−0.006	0.025	0.875	0.041	0.481	0.488
Crisis victory	0.020	0.099	0.753	0.003	0.025	0.874
Crisis defeat	0.063	0.871	0.352	0.105	2.292	0.134
Crisis draw	0.004	0.056	0.813	0.031	0.236	0.627
War victory	−0.141	0.858	0.354	−0.089	0.094	0.760
War defeat	−0.003	0.049	0.824	−0.027	0.211	0.646
War draw	0.005	0.044	0.834	0.025	0.076	0.782
GLOBAL		0.274	0.603		0.418	0.526

Table B.32: *Proportional hazard test: regular exit and positive growth*

	Linear			Logarithm		
	rho	D.tilde	p-value	rho	D.tilde	p-value
Challenger	−0.015	0.205	0.651	−0.029	0.777	0.378
Target	−0.013	0.156	0.693	−0.046	2.071	0.152
Inheritor	−0.001	0.004	0.949	−0.039	1.415	0.234
Crisis victory	−0.030	0.773	0.379	0.003	0.020	0.889
Crisis defeat	0.001	0.007	0.935	0.028	0.762	0.383
Crisis draw	0.004	0.012	0.912	0.033	1.076	0.300
War victory	−0.026	0.645	0.422	−0.002	0.006	0.938
War defeat	−0.026	0.555	0.456	0.014	0.167	0.683
War draw	−0.006	0.034	0.853	0.006	0.051	0.821
GLOBAL		0.433	0.511		0.470	0.493

Table B.33: *Proportional hazard test: forcible exit and negative growth*

	Linear			Logarithm		
	rho	D.tilde	p-value	rho	D.tilde	p-value
Challenger	0.074	1.480	0.225	0.091	2.411	0.120
Target	0.112	3.053	0.081	0.112	3.069	0.080
Inheritor	0.012	0.039	0.844	−0.053	0.695	0.405
Crisis victory	0.019	0.078	0.780	0.016	0.060	0.807
Crisis defeat	0.001	0.071	0.790	−0.081	1.680	0.196
Crisis draw	0.033	0.240	0.625	−0.003	0.013	0.910
War victory	−0.021	0.316	0.574	−0.007	0.070	0.792
War defeat	−0.050	0.636	0.425	−0.031	0.252	0.616
War draw	−0.068	0.649	0.421	−0.014	0.038	0.846
GLOBAL		0.762	0.384		0.782	0.377

Table B.34: ***Proportional hazard test: regular exit and negative growth***

	Linear			Logarithm		
	rho	D.tilde	p-value	rho	D.tilde	p-value
Challenger	−0.064	1.653	0.199	−0.042	0.725	0.395
Target	−0.028	0.490	0.484	−0.035	0.537	0.464
Inheritor	−0.014	0.108	0.742	−0.032	0.548	0.459
Crisis victory	0.003	0.038	0.846	0.025	0.306	0.580
Crisis defeat	0.018	0.133	0.715	0.020	0.168	0.682
Crisis draw	0.061	1.471	0.226	0.065	1.808	0.180
War victory	0.047	0.857	0.355	0.054	1.131	0.288
War defeat	−0.027	0.317	0.573	0.017	0.126	0.723
War draw	−0.010	0.050	0.824	0.002	0.118	0.731
GLOBAL		0.450	0.502		0.353	0.553

Table B.35: ***Proportional hazard test: forcible exit and positive growth, non-democratic leaders***

	Linear			Logarithm		
	rho	D.tilde	p-value	rho	D.tilde	p-value
Challenger	−0.072	1.584	0.208	−0.081	1.953	0.163
Target	−0.058	0.636	0.425	−0.106	2.170	0.141
Inheritor	−0.018	0.074	0.785	0.014	0.050	0.824
Crisis victory	0.065	0.852	0.356	0.011	0.051	0.821
Crisis defeat	0.048	0.464	0.497	0.104	2.289	0.131
Crisis draw	0.031	0.184	0.668	0.063	0.790	0.374
War victory	−0.153	1.005	0.316	−0.095	0.139	0.709
War defeat	0.026	0.250	0.617	0.016	0.079	0.779
War draw	0.008	0.049	0.825	0.038	0.168	0.682
GLOBAL		0.444	0.505		0.556	0.457

Table B.36: ***Proportional hazard test: regular exit and positive growth, non-democratic leaders***

	Linear			Logarithm		
	rho	D.tilde	p-value	rho	D.tilde	p-value
Challenger	−0.042	0.616	0.433	−0.081	2.322	0.128
Target	0.012	0.274	0.601	−0.078	2.831	0.093
Inheritor	0.001	0.018	0.894	−0.078	2.665	0.103
Crisis victory	−0.061	1.414	0.235	0.025	0.245	0.621
Crisis defeat	0.014	0.081	0.776	0.061	1.547	0.214
Crisis draw	−0.011	0.073	0.786	0.040	0.683	0.409
War victory	−0.669	1.921	0.166	−0.364	0.568	0.451
War defeat	−0.005	0.070	0.792	0.077	2.152	0.142
War draw	−0.017	0.122	0.727	−0.005	0.083	0.774
GLOBAL		0.622	0.431		0.765	0.382

Table B.37: ***Proportional hazard test: forcible exit and negative growth, non-democratic leaders***

	Linear			Logarithm		
	rho	D.tilde	p-value	rho	D.tilde	p-value
Challenger	0.075	1.401	0.237	0.081	1.825	0.177
Target	0.151	4.950	0.026	0.118	3.111	0.078
Inheritor	0.014	0.046	0.830	−0.059	0.809	0.368
Crisis victory	0.040	0.266	0.606	0.022	0.086	0.769
Crisis defeat	0.006	0.069	0.792	−0.061	0.901	0.343
Crisis draw	0.017	0.089	0.765	−0.005	0.017	0.898
War victory	−0.043	0.432	0.512	−0.017	0.072	0.789
War defeat	−0.048	0.531	0.466	−0.017	0.096	0.757
War draw	−0.071	0.684	0.408	−0.013	0.036	0.849
GLOBAL		0.994	0.321		0.748	0.387

Table B.38: ***Proportional hazard test: regular exit and negative growth, non-democratic leaders***

	Linear			Logarithm		
	rho	D.tilde	p-value	rho	D.tilde	p-value
Challenger	−0.070	1.036	0.309	−0.023	0.108	0.743
Target	−0.008	0.159	0.690	0.003	0.056	0.813
Inheritor	−0.003	0.006	0.938	0.028	0.238	0.625
Crisis victory	−0.038	0.382	0.537	−0.015	0.081	0.776
Crisis defeat	0.000	0.007	0.932	−0.020	0.114	0.736
Crisis draw	0.091	1.805	0.180	0.075	1.287	0.257
War victory	0.033	0.115	0.735	0.021	0.046	0.830
War defeat	−0.038	0.376	0.540	0.005	0.023	0.878
War draw	−0.146	0.178	0.673	−0.178	0.284	0.594
GLOBAL		0.492	0.483		0.263	0.608

Table B.39: ***Proportional hazard test: forcible exit and positive growth, medium development***

	Linear			Logarithm		
	rho	D.tilde	p-value	rho	D.tilde	p-value
Challenger	−0.046	0.381	0.537	0.008	0.066	0.797
Target	0.037	0.176	0.675	0.019	0.054	0.816
Inheritor	−0.002	0.027	0.869	0.090	1.759	0.185
Crisis victory	−0.007	0.019	0.890	−0.062	0.815	0.367
Crisis defeat	0.021	0.132	0.717	0.050	0.421	0.517
Crisis draw	−0.004	0.017	0.896	−0.012	0.029	0.865
War victory	−0.224	0.580	0.446	−0.145	0.108	0.743
War defeat	0.012	0.047	0.828	−0.078	1.099	0.296
War draw	0.004	0.051	0.822	0.010	0.027	0.870
GLOBAL		0.222	0.637		0.476	0.492

Table B.40: ***Proportional hazard test: regular exit and positive growth, medium development***

	Linear			Logarithm		
	rho	D.tilde	p-value	rho	D.tilde	p-value
Challenger	−0.048	1.376	0.241	−0.044	1.210	0.272
Target	−0.018	0.439	0.509	−0.022	0.283	0.595
Inheritor	−0.006	0.022	0.881	−0.011	0.070	0.791
Crisis victory	−0.043	0.870	0.354	−0.013	0.097	0.756
Crisis defeat	0.028	0.444	0.506	0.047	1.333	0.249
Crisis draw	0.008	0.057	0.811	0.025	0.370	0.543
War victory	−0.060	2.548	0.110	−0.026	0.486	0.486
War defeat	0.002	0.037	0.847	0.010	0.055	0.815
War draw	0.018	0.177	0.674	0.012	0.092	0.762
GLOBAL		1.007	0.316		0.433	0.511

Table B.41: ***Proportional hazard test: forcible exit and negative growth, medium development***

	Linear			Logarithm		
	rho	D.tilde	p-value	rho	D.tilde	p-value
Challenger	0.128	2.352	0.126	0.088	1.132	0.288
Target	0.072	0.659	0.417	0.067	0.552	0.458
Inheritor	0.000	0.010	0.919	−0.084	1.110	0.292
Crisis victory	0.035	0.173	0.678	0.029	0.121	0.728
Crisis defeat	−0.001	0.132	0.717	−0.076	0.765	0.384
Crisis draw	0.021	0.076	0.783	−0.015	0.024	0.878
War victory	0.161	0.652	0.421	0.064	0.180	0.672
War defeat	−0.010	0.037	0.848	0.052	0.402	0.526
War draw	−0.073	0.272	0.603	−0.018	0.020	0.887
GLOBAL		0.611	0.437		0.587	0.445

Table B.42: ***Proportional hazard test: regular exit and negative growth, medium development***

	Linear			Logarithm		
	rho	D.tilde	p-value	rho	D.tilde	p-value
Challenger	−0.065	1.242	0.265	−0.024	0.171	0.679
Target	−0.043	0.728	0.394	−0.035	0.327	0.568
Inheritor	−0.025	0.238	0.625	−0.036	0.463	0.496
Crisis victory	−0.027	0.200	0.655	0.011	0.034	0.855
Crisis defeat	0.032	0.282	0.595	0.040	0.454	0.501
Crisis draw	0.103	2.875	0.091	0.079	1.864	0.173
War victory	0.001	0.028	0.867	0.007	0.008	0.929
War defeat	−0.049	0.497	0.481	0.009	0.017	0.898
War draw	−0.254	0.209	0.648	−0.266	0.180	0.672
GLOBAL		0.592	0.442		0.255	0.614

B.5 The "empty cell" problem

The "empty cell" problem occurs whenever there are no instances in the data such that a subject experiences failure (i.e. office removal) for a given value of one of the explanatory variables. For example, no leaders that won a war and presided over a period of economic growth suffered a forcible removal. War victory, therefore, is a perfect predictor of office survival under the condition of economic growth. If we were to tabulate this scenario using a 2×2 table with war victory (yes/no) on one axis and forcible removal (yes/no) on the other axis, we would have an empty cell when both variables are coded "yes."[6] When the cells in a 2×2 are empty or sparse (conventionally when the expected frequency given the marginals is less than 5), statistical tests, such as the χ^2 test, yield inaccurate inferences, unless a correction such as the Yates correction is applied.

[6] This problem is also called separation. For an example in the International Relations literature, see Goemans (2000a).

In more general terms, the "empty cell" problem described above also arises when estimating Cox proportional hazard models in small datasets with highly censored data and highly predictive explanatory variables (Heinze and Schemper, 2005; Zorn, 2005; Heinze and Dunkler, 2008). Under this condition, the likelihood converges to a finite value, while the estimate of the coefficient associated with the "incriminated" variable diverges to $\pm\infty$ (Therneau and Grambsch, 2000, 58–61).[7]

We address this problem by using a "shrinkage estimator," that is, a Cox hazard model with a penalized likelihood (Therneau and Grambsch, 2000, 120–4; Harrell, 2001, 207–10). We can start from a Cox hazard model with constrained and unconstrained parameters (Therneau and Grambsch, 2000, 120):

$$\lambda_i(t) = \lambda_0(t)e^{X_i\beta + Z_i w} \tag{B.1}$$

where X and Z are explanatory variables and β and ω are the unconstrained and constrained coefficients. Estimates are obtained by maximizing the likelihood function for the Cox model with an additional function that penalizes, i.e. gives large values to, "bad" values of ω, i.e. the coefficient associated with the variables that generate the empty cell problem.[8] The penalized likelihood takes the following form, where L stands for the usual likelihood function:

$$\text{penalized } L = \ln(L) - f(\omega;\theta) \tag{B.2}$$

where θ is a tuning parameter. A common specification for the f function is:

$$f(\omega;\theta) = \frac{1}{2}\theta\sum_{i=1}^{p}\omega_j^2 \tag{B.3}$$

[7] For a discussion of this problem, see Heinze and Schemper (2005); Heinze and Dunkler (2008). For an example of a hazard model with a very large estimate of the risk of failure (in the order of magnitude of about 71,000) due to the "empty/sparse" cell problem, see Fortna (2004, 187).

[8] We follow the discussion in a typescript by Terry Therneau and Patricia Grambsch available from the Mayo Clinic website at http://mayoresearch.mayo.edu/mayo/research/biostat/upload/.

That is also known as the ridge regression estimator. The effect of the ridge estimator on the parameter ω is to shrink it towards zero, thus correcting the divergence towards $\pm\infty$ that would occur in the usual likelihood estimation of the Cox model parameters.

We fixed the θ parameter to 10. We estimated models with a penalized likelihood in the following instances: (*a*) for the coefficients on war victory, war defeat, and war draw in the model predicting forcible removal for parliamentary democracies; (*b*) for the coefficients on challenger, war victory, war defeat, and war draw in the model predicting forcible removal for presidential democracies; (*c*) for the coefficients on inheritor, war victory, war defeat, and war draw in the model predicting regular removal for presidential democracies; (*d*) for the coefficient on war defeat in the model predicting regular removal for the civil war observations; (*e*) for the coefficient on war victory in the model predicting forcible removal for the positive growth observations; (*f*) for the coefficient on war defeat in the model predicting regular removal in poor countries; (*g*) for the coefficients on challenger, defender, inheritor, war victory, war defeat, and war draw in the model predicting forcible removal in rich countries.

B.6 Descriptive statistics: conflict and fate

Table B.43: *The fate of leaders and the outcomes of conflict*

	International crises							Wars						
After victory	In power	Natural death	OK	Exile	Jail	Killed	Total	In power	Natural death	OK	Exile	Jail	Killed	Total
1 yr.	133	2	13	1	2	1	152	40	0	2	2	1	0	45
2 yrs.	110	5	17	3	0	3	138	44	2	1	0	0	0	47
3 yrs.	90	4	12	0	1	2	109	36	2	3	0	0	0	41
4 yrs.	73	4	10	3	0	0	90	32	1	2	1	0	0	36
Defeat														
1 yr.	103	1	10	6	5	2	127	25	2	3	12	7	0	49
2 yrs.	79	3	13	4	6	4	109	18	2	4	1	0	0	25
3 yrs.	64	3	5	3	1	4	80	15	0	1	0	0	1	17
4 yrs.	49	1	8	2	1	2	63	12	0	0	1	0	1	14
Draw														
1 yr.	168	3	14	3	0	1	189	49	2	4	0	0	0	55
2 yrs.	134	3	25	5	2	2	171	41	1	3	3	1	0	49
3 yrs.	110	4	10	2	1	2	129	32	0	3	2	0	0	37
4 yrs.	95	1	9	1	0	2	108	23	1	4	1	0	0	29

Note: Entries are the number of leaders experiencing a given fate given the outcome of conflict over time.

B.7 Tables with regression coefficients

Table B.44: ***Summary results: all leaders***

	Forcible removal			Regular removal		
	b	std.err	p-value	b	std.err	p-value
Challenger	−1.224	0.343	0.000	−0.628	0.259	0.015
Target	0.368	0.238	0.123	−0.016	0.167	0.925
Inheritor	0.317	0.354	0.370	0.444	0.226	0.049
Crisis victory	−0.908	0.465	0.051	−0.465	0.247	0.060
Crisis defeat	1.327	0.309	0.000	−0.573	0.297	0.054
Crisis draw	−0.615	0.394	0.119	−0.644	0.238	0.007
War victory	−0.309	0.772	0.689	−1.035	0.537	0.054
War defeat	2.915	0.320	0.000	−0.406	0.486	0.403
War draw	−0.689	0.709	0.331	−0.312	0.452	0.489
No. obs.	10959			10959		
Log-Likelihood	−2913.447			−8799.937		
θ	0.770		0.000	0.646		0.000

B.7.1 Domestic political institutions

Table B.45: ***Summary results: autocracy***

	Forcible removal			Regular removal		
	b	std.err	p-value	b	std.err	p-value
Challenger	−1.873	0.607	0.002	−2.175	1.231	0.077
Target	1.011	0.398	0.011	0.364	0.727	0.617
Inheritor	−1.038	0.909	0.253	−0.797	1.284	0.535
Crisis victory	−2.100	1.008	0.037	−0.583	1.178	0.621
Crisis defeat	1.915	0.532	0.000	−1.860	1.976	0.347
Crisis draw	−1.522	0.752	0.043	−1.088	1.097	0.322
War victory	−1.277	1.074	0.234	−2.748	4.455	0.537
War defeat	3.659	0.573	0.000	2.394	1.205	0.047
War draw	−1.450	1.626	0.373	0.947	1.340	0.480
No. obs.	3530			3530		
Log-Likelihood	−662.921			−458.722		
θ	0.529		0.005	0.650		0.016

Table B.46: *Summary results: mixed regime*

	Forcible removal			Regular removal		
	b	std.err	p-value	b	std.err	p-value
Challenger	−0.792	0.457	0.083	−0.612	0.387	0.114
Target	−0.350	0.378	0.354	−0.062	0.285	0.828
Inheritor	−0.097	0.465	0.834	−0.075	0.380	0.844
Crisis victory	−0.787	0.725	0.277	−0.193	0.447	0.665
Crisis defeat	0.847	0.481	0.078	−0.142	0.430	0.741
Crisis draw	−0.130	0.530	0.806	−0.669	0.428	0.118
War victory	1.340	1.090	0.219	−0.759	1.495	0.612
War defeat	2.461	0.509	0.000	−0.007	0.627	0.991
War draw	−0.706	0.860	0.412	−1.567	0.938	0.095
No. obs.	3969			3969		
Log-Likelihood	−1569.407			−2989.290		
θ	0.513		0.000	0.607		0.000

Table B.47: *Summary results: parliamentary democracy*

	Forcible removal			Regular removal		
	b	std.err	p-value	b	std.err	p-value
Challenger	0.029	1.499	0.985	−0.303	0.487	0.534
Target	1.653	0.810	0.041	0.198	0.244	0.418
Inheritor	2.461	1.361	0.071	0.626	0.308	0.042
Crisis victory	−1.208	1.373	0.379	−0.608	0.370	0.100
Crisis defeat	0.691	1.245	0.579	−0.921	0.478	0.054
Crisis draw	−1.865	1.548	0.228	−0.506	0.356	0.155
War victory	−1.644	2.222	0.459	−1.043	0.704	0.138
War defeat	3.769	1.308	0.004	−1.779	1.454	0.221
War draw	−0.967	4.304	0.822	1.098	0.655	0.094
No. obs.	2249			2249		
Log-Likelihood	−81.683			−2785.795		
θ	2.245		0.015	0.358		0.000

Table B.48: ***Summary results: presidential democracy***

	Forcible removal			Regular removal		
	b	std.err	p-value	b	std.err	p-value
Challenger	−1.621	1.136	0.154	−0.379	0.673	0.573
Target	0.148	0.882	0.867	−0.907	0.552	0.100
Inheritor	1.901	1.054	0.071	−1.764	2.017	0.382
Crisis victory	0.687	1.178	0.560	−0.492	0.668	0.461
Crisis defeat	2.610	0.882	0.003	−0.365	0.973	0.707
Crisis draw	−0.306	1.315	0.816	−0.086	0.675	0.898
War victory	−1.671	2.475	0.499	−0.904	1.461	0.536
War defeat	2.821	1.425	0.048	−1.808	2.033	0.374
War draw	−1.722	3.271	0.599	1.053	1.254	0.401
No. obs.	1211			1211		
Log-Likelihood	−97.112			−750.072		
θ	0.000		0.950	0.714		0.000

B.7.2 Domestic political unrest

Table B.49: ***Summary results: civil war***

	Forcible removal			Regular removal		
	b	std.err	p-value	b	std.err	p-value
Challenger	−1.426	0.644	0.027	−0.819	0.529	0.121
Target	−0.486	0.423	0.250	−0.045	0.333	0.893
Inheritor	0.320	0.551	0.561	0.305	0.455	0.503
Crisis victory	−1.608	0.980	0.101	−0.474	0.564	0.400
Crisis defeat	1.221	0.567	0.031	−0.015	0.601	0.981
Crisis draw	−2.810	1.091	0.010	−0.395	0.452	0.381
War victory	−0.951	1.339	0.478	−1.663	1.254	0.185
War defeat	2.593	0.616	0.000	−2.271	2.312	0.326
War draw	−1.586	1.360	0.244	0.306	0.674	0.650
No. obs.	1448			1448		
Log-Likelihood	−497.195			−755.350		
θ	0.416		0.025	0.498		0.000

Table B.50: *Summary results: no civil war*

	Forcible removal			Regular removal		
	b	std.err	p-value	b	std.err	p-value
Challenger	−1.373	0.423	0.001	−0.678	0.302	0.025
Target	0.549	0.290	0.058	−0.024	0.197	0.904
Inheritor	−0.169	0.474	0.721	0.404	0.269	0.134
Crisis victory	−0.633	0.536	0.238	−0.504	0.279	0.070
Crisis defeat	1.572	0.391	0.000	−0.701	0.349	0.045
Crisis draw	−0.260	0.441	0.555	−0.646	0.285	0.023
War victory	−0.223	1.068	0.835	−0.889	0.600	0.139
War defeat	3.213	0.402	0.000	−0.231	0.495	0.641
War draw	−0.473	0.861	0.583	−0.764	0.634	0.228
No. obs.	9511			9511		
Log-Likelihood	−2093.751			−7518.770		
θ	0.865		0.000	0.704		0.000

Table B.51: *Summary results: civil war and non-democratic leaders*

	Forcible removal			Regular removal		
	b	std.err	p-value	b	std.err	p-value
Challenger	−1.483	0.647	0.022	−1.941	1.097	0.077
Target	−0.369	0.429	0.390	−0.231	0.580	0.690
Inheritor	−0.040	0.629	0.950	0.174	0.646	0.787
Crisis victory	−1.102	0.928	0.235	−4.312	2.704	0.111
Crisis defeat	1.224	0.567	0.031	1.073	0.810	0.185
Crisis draw	−2.587	1.121	0.021	−1.373	1.017	0.177
War victory	−0.564	1.309	0.667	−2.627	2.211	0.235
War defeat	2.592	0.662	0.000	−1.281	3.007	0.670
War draw	−1.426	1.343	0.288	−1.104	1.375	0.422
No. obs.	1075			1075		
Log-Likelihood	−437.134			−352.180		
θ	0.094		0.260	0.429		0.024

Table B.52: ***Summary results: civil war and democratic leaders***

	Forcible removal			Regular removal		
	b	std.err	p-value	b	std.err	p-value
Challenger	−0.603	1.047	0.564	−0.083	0.687	0.903
Target	−0.602	0.717	0.401	−0.014	0.424	0.974
Inheritor	1.912	1.104	0.083	0.542	0.604	0.370
Crisis victory	−0.847	1.176	0.471	−0.098	0.651	0.880
Crisis defeat	−0.084	1.462	0.954	−1.804	1.284	0.160
Crisis draw	−0.761	0.905	0.401	−0.451	0.533	0.397
War victory	−0.870	1.725	0.614	−1.626	0.989	0.100
War defeat	2.360	1.480	0.111	−1.442	2.256	0.523
War draw	−0.427	2.320	0.854	1.236	0.744	0.097
No. obs.	373			373		
Log-Likelihood	−31.825			−286.015		
θ	0.880		0.160	0.000		0.930

B.7.3 Economic development

Table B.53: ***Summary results: low economic development***

	Forcible			Regular		
	b	std.err	p-value	b	std.err	p-value
Challenger	−0.850	0.520	0.103	−1.132	1.052	0.282
Target	0.215	0.432	0.619	−0.619	1.072	0.568
Inheritor	−0.645	1.376	0.643	−0.189	0.872	0.828
Crisis victory	−0.331	0.732	0.651	−1.072	1.638	0.514
Crisis defeat	1.027	0.564	0.070	−2.938	2.728	0.282
Crisis draw	−0.338	0.687	0.623	−1.169	1.433	0.418
War victory	−1.053	2.694	0.703	−0.900	2.574	0.727
War defeat	2.603	0.644	0.000	−1.454	3.018	0.630
War draw	−0.559	1.131	0.622	0.167	1.626	0.919
Log-likelihood	−696.361			−643.968		
θ	0.267	1.332	0.207	0.430	0.989	0.570

Table B.54: *Summary results: medium economic development*

	Forcible removal			Regular removal		
	b	std.err	p-value	b	std.err	p-value
Challenger	−1.428	0.499	0.004	−0.639	0.324	0.049
Target	0.282	0.332	0.395	0.114	0.216	0.598
Inheritor	0.333	0.430	0.438	0.409	0.255	0.109
Crisis victory	−0.957	0.682	0.161	−0.600	0.349	0.085
Crisis defeat	1.388	0.412	0.001	−0.265	0.321	0.410
Crisis draw	−0.691	0.559	0.218	−0.638	0.306	0.037
War victory	−0.114	1.798	0.950	−0.811	0.794	0.307
War defeat	2.732	0.444	0.000	−0.968	0.613	0.114
War draw	−1.073	1.272	0.401	−0.751	0.760	0.324
Log-likelihood	−1730.256			−5277.900		
θ	0.606	2.467	0.000	0.638	5.077	0.000

Table B.55: *Summary results: high economic development*

	Forcible removal			Regular removal		
	b	std.err	p-value	b	std.err	p-value
Challenger	−0.620	1.294	0.633	−0.868	0.599	0.147
Target	0.469	0.787	0.551	−0.391	0.336	0.246
Inheritor	−0.988	2.348	0.674	0.546	0.637	0.392
Crisis victory	−1.691	1.893	0.371	0.173	0.409	0.673
Crisis defeat	1.563	1.451	0.281	−2.319	1.159	0.045
Crisis draw	−1.039	1.693	0.539	−0.052	0.449	0.909
War victory	−1.198	2.114	0.571	−1.395	0.814	0.086
War defeat	3.625	1.583	0.023	2.451	0.882	0.005
War draw	−0.309	2.479	0.901	0.666	0.744	0.371
Log-likelihood	−91.639			−1655.531		
θ	1.629	1.558	0.053	0.672	2.960	0.000

Table B.56: ***Summary results: medium economic development and non-democratic leaders***

	Forcible removal			Regular removal		
	b	std.err	p-value	b	std.err	p-value
Challenger	−1.535	0.553	0.006	−0.800	0.423	0.058
Target	−0.028	0.386	0.943	0.071	0.298	0.811
Inheritor	−0.094	0.497	0.850	0.014	0.408	0.973
Crisis victory	−1.256	0.859	0.144	−0.403	0.466	0.387
Crisis defeat	1.418	0.455	0.002	0.138	0.444	0.756
Crisis draw	−0.716	0.649	0.271	−0.771	0.441	0.081
War victory	0.338	1.661	0.840	−1.406	1.406	0.317
War defeat	2.526	0.510	0.000	−0.264	0.677	0.696
War draw	−0.944	1.276	0.461	−1.037	1.083	0.339
Log-likelihood	−1503.358			−2672.785		
θ	0.413	2.087	0.000	0.487	2.825	0.000

Table B.57: ***Summary results: medium economic development and democratic leaders***

	Forcible removal			Regular removal		
	b	std.err	p-value	b	std.err	p-value
Challenger	−0.376	1.367	0.783	−0.241	0.519	0.643
Target	1.773	0.765	0.021	0.312	0.330	0.344
Inheritor	2.469	1.097	0.025	0.479	0.351	0.172
Crisis victory	−0.802	1.264	0.526	−1.111	0.541	0.040
Crisis defeat	0.776	1.095	0.480	−0.762	0.487	0.118
Crisis draw	−0.694	1.136	0.541	−0.589	0.443	0.184
War victory	−2.255	4.117	0.584	−0.628	1.228	0.609
War defeat	3.014	1.002	0.003	−2.640	2.192	0.228
War draw	−2.219	4.417	0.615	0.142	1.029	0.890
Log-likelihood	−112.915			−1946.816		
θ	0.859	1.232	0.288	0.739	5.199	0.000

B.7.4 Economic growth

Table B.58: ***Summary results: positive economic growth***

	Forcible removal			Regular removal		
	b	std.err	p-value	b	std.err	p-value
Challenger	−1.471	0.652	0.025	−0.421	0.307	0.170
Target	0.216	0.386	0.575	0.044	0.208	0.834
Inheritor	0.022	0.666	0.974	0.325	0.320	0.310
Crisis victory	−0.623	0.700	0.373	−0.369	0.291	0.204
Crisis defeat	1.311	0.510	0.010	−0.662	0.376	0.078
Crisis draw	−0.430	0.582	0.460	−0.838	0.297	0.005
War victory	−0.844	2.905	0.777	−0.905	0.707	0.201
War defeat	2.798	0.651	0.000	0.673	0.625	0.282
War draw	−0.363	1.151	0.753	−0.105	0.500	0.834
Log-likelihood	−1307.093			−5548.682		
θ	0.857	1.910	0.002	0.664	3.946	0.014

Table B.59: ***Summary results: negative economic growth***

	Forcible removal			Regular removal		
	b	std.err	p-value	b	std.err	p-value
Challenger	−1.076	0.430	0.012	−1.218	0.524	0.020
Target	0.335	0.316	0.289	−0.133	0.334	0.691
Inheritor	0.213	0.456	0.640	0.438	0.327	0.181
Crisis victory	−1.205	0.681	0.077	−0.586	0.562	0.298
Crisis defeat	1.392	0.427	0.001	−0.263	0.535	0.623
Crisis draw	−0.696	0.610	0.255	−0.205	0.433	0.636
War victory	−0.821	1.171	0.485	−0.943	0.836	0.259
War defeat	2.774	0.412	0.000	−1.234	0.886	0.164
War draw	−0.935	1.043	0.370	−1.838	1.865	0.327
Log-likelihood	−1233.297			−2360.514		
θ	0.566	1.808	0.001	0.615	2.200	0.013

Table B.60: ***Summary results: positive economic growth, non-democratic leaders***

	Forcible removal			Regular removal		
	b	std.err	p-value	b	std.err	p-value
Challenger	−1.379	0.764	0.075	−0.732	0.496	0.140
Target	0.212	0.464	0.647	−0.057	0.412	0.890
Inheritor	−1.122	1.085	0.301	−0.064	0.536	0.904
Crisis victory	−1.027	0.943	0.277	−0.117	0.558	0.834
Crisis defeat	0.738	0.652	0.259	−0.433	0.597	0.468
Crisis draw	−0.715	0.713	0.317	−0.969	0.544	0.075
War victory	−0.232	3.145	0.943	−4.187	3.256	0.198
War defeat	2.552	0.742	0.001	0.943	0.723	0.194
War draw	−0.375	1.174	0.750	−0.359	0.837	0.668
Log-likelihood	−1090.599			−2171.288		
θ	0.415	1.481	0.083	0.629	2.017	0.196

Table B.61: ***Summary results: negative economic growth, non-democratic leaders***

	Forcible removal			Regular removal		
	b	std.err	p-value	b	std.err	p-value
Challenger	−1.090	0.440	0.013	−0.900	0.545	0.099
Target	0.104	0.336	0.756	0.034	0.409	0.934
Inheritor	0.005	0.467	0.992	0.108	0.509	0.832
Crisis victory	−1.382	0.810	0.088	−0.820	0.893	0.362
Crisis defeat	1.339	0.435	0.002	−0.066	0.643	0.918
Crisis draw	−0.562	0.604	0.353	−0.489	0.587	0.405
War victory	−0.374	1.121	0.739	−0.454	1.186	0.702
War defeat	2.547	0.431	0.000	−0.310	0.895	0.729
War draw	−0.974	1.062	0.360	−2.496	2.131	0.245
Log-likelihood	−1114.682			−1204.246		
θ	0.343	1.389	0.271	0.550	1.524	0.147

Table B.62: ***Summary results: positive economic growth, medium development***

	Forcible removal			Regular removal		
	b	std.err	p-value	b	std.err	p-value
Challenger	−1.269	0.885	0.157	−0.562	0.402	0.162
Target	0.143	0.548	0.795	0.025	0.282	0.931
Inheritor	0.253	0.774	0.744	0.087	0.394	0.824
Crisis victory	−1.249	1.087	0.250	−0.297	0.407	0.466
Crisis defeat	1.222	0.665	0.068	−0.193	0.422	0.647
Crisis draw	−0.262	0.699	0.708	−0.856	0.401	0.033
War victory	−0.854	4.476	0.852	−0.413	1.168	0.724
War defeat	2.310	0.842	0.008	0.501	0.748	0.503
War draw	−0.864	1.856	0.643	−0.217	0.752	0.773
Log-likelihood	−843.081			−3199.462		
θ	0.534	1.389	0.271	0.630	1.524	0.147

Table B.63: ***Summary results: negative economic growth, medium development***

	Forcible removal			Regular removal		
	b	std.err	p-value	b	std.err	p-value
Challenger	−1.727	0.650	0.008	−1.095	0.600	0.068
Target	0.156	0.450	0.729	0.243	0.353	0.491
Inheritor	0.219	0.568	0.700	0.601	0.351	0.086
Crisis victory	−0.718	0.969	0.459	−1.494	1.148	0.204
Crisis defeat	1.720	0.599	0.005	−0.212	0.530	0.690
Crisis draw	−1.478	1.068	0.167	−0.351	0.503	0.485
War victory	0.109	1.521	0.943	−0.278	1.146	0.808
War defeat	2.788	0.587	0.000	−2.448	1.388	0.078
War draw	−1.470	1.759	0.404	−2.729	2.085	0.191
Log-likelihood	−661.179			−1496.646		
θ	0.587	1.389	0.271	0.507	1.524	0.147

Appendix C: Online Appendix to Chapter 4

C.1 Description of the statistical model

In Chapter 4, we model the reciprocal relation between the manner of losing office and conflict initiation. We estimate a simultaneous equation system with three endogenous dichotomous variables: (*a*) regular removal; (*b*) forcible removal; (*c*) conflict initiation. This class of models can be estimated using a two-stage probit model. This procedure, analogous to a two-stage least squares model but for dichotomous variables, yields consistent estimates (see Mallar, 1977; Maddala, 1983, 246–7; Alvarez and Butterfield, 2000; Greene, 2002, E17–28–E17–32). Estimation is conducted in two steps. We first estimate the reduced-form equations, that is, two probit equations for loss of office and one for conflict initiation, including on the right-hand side all the exogenous variables that are theoretically argued to affect either the probability of conflict initiation or the probability of losing office by either regular or forcible means. Then, from the reduced-form estimates, we compute the linear predictors for the three dependent variables and substitute these values for the endogenous regressors in the second-stage (structural) probit equations. Thus, the reduced-form equations generate an estimate of the unobservable propensity to initiate an international conflict and the unobservable risk of losing office by either regular or forcible means, which then become our key explanatory variables in the structural equations.

The estimation of a simultaneous equation model requires that the endogenous predictors adequately capture the underlying risks of losing office and of initiating a crisis. To this end, we include in the specification of our models several explanatory variables that have been shown to be valid predictors of conflict and office tenure in previous research. For the equation measuring conflict initiation, we include: (*a*) regime type; (*b*) economic development; (*c*) economic growth; (*d*) trade openness; (*e*) change in trade openness; (*f*) population size; (*g*)

major power status; (*h*) military mobilization; (*i*) the number of borders; (*j*) the number of days since the last crisis initiation. For the equations measuring the manner and timing of leadership removal from office, we cull our variables from the literature on the tenure of leaders (Bienen and van de Walle, 1991; Bueno de Mesquita *et al.*, 2003; Chiozza and Goemans, 2004b), thus including (*a*) the leader's personal characteristics; (*b*) salient domestic economic and political features of the country; (*c*) political experience; and (*d*) the outcomes of international conflict.[1]

At the same time, we need to ensure that the system is properly identified. From a substantive viewpoint, there should be at least one exogenous variable that predicts the probability of initiating a crisis that is not a predictor in the structural equation on the probability of losing office, and vice versa (Mallar, 1977, 1719; Gujarati, 1995, 664–5). We report the the specification of the three equations, and the exclusion rules, in Table C.1.

C.1.1 Goodness-of-fit

Given that in nonlinear regression models such as probit, there is no definitive equivalent measure to the R^2 of linear regression, we report several alternative measures of goodness-of-fit: McKelvey and Zavoina's, Efron's, McFadden's, Cragg-Uhler's likelihood ratio-based pseudo-R^2 measures; Hosmer and Lemeshow's χ^2 measure, which assesses the match between actual and predicted values; the area under the ROC curve; and the percentage of events correctly predict while fixing the probability threshold to identify an event at 0.5.[2] Overall, the battery of tests we computed confirms the conclusion we reached from the McKelvey and Zavoina measure, which is well above the conventional 0.1 threshold conventionally used to discriminate between weak and valid measures (Bollen, Guilkey and Mroz, 1995, 119; Bound, Jaeger and Baker, 1995, 444). We can, therefore, have confidence that

[1] As we discuss in Chapter 4, the selection of variables is not exclusively aimed at controlling for confounding factors, as recommended by Ray (2003), but is also aimed at reaching an adequate model-fit.

[2] A low χ^2 and a correspondingly high p-value for the Hosmer and Lemeshow measure indicate good fit. For the ROC curve and the percentage correctly predicted values closer to the maximum value of 1 indicate good fit (Freese and Long, 2006).

Table C.1: ***Model Specification***

	Equation 1	Equation 2	Equation 3
	Conflict initiation	Regular removal	Forcible removal
Regime type	✔	✔	✔
Civil war	✖	✔	✔
Economic development	✔	✔	✔
Economic growth	✔	✔	✔
Trade openness	✔	✔	✔
Change in trade openness	✔	✔	✔
Population size	✔	✖	✖
Military mobilization	✔	✖	✖
Number of borders	✔	✖	✖
Major power	✔	✖	✖
Days since last crisis	✖	✔	✔
Age	✖	✔	✔
Times in office	✖	✔	✔
Entry	✖	✔	✔
Days in office (log)	✖	✔	✔
Entry days in office	✖	✔	✔
Days since last elections	✖	✔	✔
Target onset	✖	✔	✔
Ongoing challenge	✖	✔	✔
Conflict outcomes	✖	✔	✔

Note: The symbol ✔ indicates that a variable is included in an equation; the symbol ✖ indicates exclusion of a variable from an equation.

our measures capture the fluctuations in the underlying propensities to lose office by either forcible or regular means.

C.2 Inference and bootstrapping

The use of the three imputed regressors in the second-stage (structural) equations in our simultaneous-equation probit model biases the estimation of the standard errors (Maddala, 1983, 246–7). We correct for this bias using bootstrapping, an approach to statistical inference that is based on resampling (Efron and Tibshirani, 1993; Mooney and

Table C.2: *Goodness of fit statistics*

	Forcible removal	Regular removal
McKelvey & Zavoina pseudo-R^2	0.217	0.258
Efron pseudo-R^2	0.078	0.086
McFadden pseudo-R^2	0.144	0.122
Cragg-Uhler pseudo-R^2	0.167	0.166
Hosmer-Lemeshow χ^2	9.912	8.766
Prob > χ^2(d.f.=8)	0.271	0.362
Area under the ROC curve	0.787	0.748
Proportion correctly predicted (threshold p=0.5)	0.956	0.879

Note: Quantities are averages from the 5 data sets obtained from the Multiple Imputation of missing values as described in fn. 9 on p. 97.

Duval, 1993).[3] The use of bootstrapping generates a more conservative assessment of the significance levels in our estimates, which accounts for the fact that our measures for the risks of losing office and the risk of conflict initiation are also estimates from a statistical model.[4]

We proceed as follows. First, we draw a sample (with replacement) from the original data set. The size of the sample is the same as the original data set. We then estimate the simultaneous-equation probit model first by estimating the reduced-form equations and generating the linear predictors from each equation; second, by estimating the structural equations which include the linear predictors from the reduced-form equations. We save the results, and repeat the procedure $K = 1000$ times. This generates K estimates for each parameter in the model. The fundamental claim of bootstrapping as an approach to statistical inference is that the frequency distribution of the parameters obtained from the resamples is an estimate of their sampling distribution (Mooney and Duval, 1993, 10). We can then use the bootstrap distribution to compute confidence intervals and make inferences.[5]

[3] We implement this procedure in a STATA program written with the collaboration of Muhammet Bas. We report the code in Appendix C.3.

[4] For an example of the use of bootstrapping in a situation similar to ours, see Slantchev (2004).

[5] The two-stage regression, i.e. the estimation of both the reduced-form and the structural equations, is performed on the same bootstrap samples (Guan, 2003, 78).

In the tables in section C.4, we report the estimate of the observed parameter (i.e. the regression coefficient), the bias, and the bias-corrected confidence intervals. The estimate of the observed regression coefficient (to fix ideas, $\hat{\theta}$) is the estimate obtained on the data independent of any resampling. As Mooney and Duval (1993, 33) explain, bootstrapping is an approach to inference about parameters; it is not necessarily an approach to obtain point estimates of parameters. The bias is the difference between the analytic estimate from the data and the average from the bootstrap samples:

$$\text{Bias}\,(\widehat{\theta}) = \widehat{\theta} - \bar{\theta},\ \text{where}\ \bar{\theta} = \sum_{i=1}^{K} \widehat{\theta}_i / K \tag{C.1}$$

The estimate of the bias is therefore the difference between the analytic point estimate from the data and the average of the estimates from the bootstrap samples. In our estimates, reported in Section C.4, the ratio of the estimated bias to the bootstrap standard error exceeds for many coefficients the .25 threshold that is used as a conventional rule of thumb to ignore the presence of bias (Efron and Tibshirani, 1993, 128). As a consequence, we rely upon bias-corrected (BC) standard errors to make inferences about model parameters (ibid., 184–8; Mooney and Duval, 1993, 3740). The BC standard errors adjust the bootstrap sampling distribution such that it is centered on the parameter $\hat{\theta}$. It has the property of being "second-order accurate," that is, the probability that the confidence interval does not cover the true value θ in each tail approached $(1 - \alpha)$ at the $\frac{1}{n}$ rate, where n is the sample size. In other words, bias-corrected standard errors have a coverage level closer to the nominal. As Efron and Tibshirani (1993, 188) conclude, "At the present level of development, the BC_α intervals are recommended for general use, especially for non-parametric problems." We use the approach detailed in section B.3 to impute missing values. We report the estimates obtained on each of the 5 imputed data sets.[6]

[6] Rubin's rules are not defined in the case of bootstrapped bias-corrected confidence intervals. In the case of the reduced-form equations, we report the estimates, standard errors, and significance levels obtained by applying Rubin's rules to the 5 multiple imputation data sets. Statistical inferences for the reduced-form equations do not require bootstrapping, given that the reduced-form do not contain any imputed regressors.

C.3 STATA code

A simultaneous-equation probit model with bootstrapping

```
clear
set mem 5m
************************************************
************************
************************************************
************************
* We thank Muhammet Bas for invaluable research
assistance in writing the code for this program.*
* Note that this estimates a PARTIAL triple
endogeneous relationship. *
* Two dichotomous variables are both endogenous
to the third, but not to each other. *
************************************************
************************
************************************************
************************
capture program drop dddseq
program define dddseq, eclass
version 7.0
set more off
syntax varlist
marksample touse
local ny = "in y"
local nr = "in r"
*    parse the equations in order to obtain exogenous
gettoken equ1 equ2: 0, parse (") ") match(paren)
gettoken equ2 equ3: equ2, parse (") ") match(paren)
gettoken equ3: equ3, parse (") ") match(paren)
Xtractequ1 `equ1'
Xtractequ2 `equ2'
Xtractequ3 `equ3'
*    establish that dichotomous variables are
really dichotomous
capture tab `dichotomous1_depvar'
local rc = _rc
```

```
if 'rc' ~= 0{
display 'nr' "Dichotomous variable 1 may have more
than two unique values."
}
else{
if (r(r))~= 2{
display 'nr" Dichotomous variable 1 has more than
two unique values."
exit
}
capture tab 'dichotomous2_depvar'
local rc = _rc
if 'rc' ~= 0{
display 'nr' "Dichotomous variable 2 may have more
than two unique values."
}
else{
if (r(r))~= 2{
display 'nr' "Dichotomous variable 2 has more than
two unique values."
exit
}
capture tab 'dichotomous3_depvar'
local rc = _rc
if 'rc' ~= 0{
display 'nr' "Dichotomous variable 3 may have more
than two unique values."
}
else{
if (r(r))~= 2{
display 'nr' "Dichotomous variable 3 has more than
two unique values."
exit
}
*    put all ivvar in one place
local all_ivvar 'dichotomous1_ivvar'
'dichotomous2_ivvar' 'dichotomous3_ivvar'
*    get rid of duplicate ivs so that exogenous list
does not
```

```
Getexoglist "'all_ivvar'"
local exogenous_list 'list'
local dichotomous1_ivvar_count: word count
'dichotomous1_ivvar'
local dichotomous2_ivvar_count: word count
'dichotomous2_ivvar'
local dichotomous3_ivvar_count: word count
'dichotomous3_ivvar'
local number_of_exogenous: word count
'exogenous_list'
global number_of_exogenous = 'number_of_exogenous' +
1 /* adding the constant */
display _newline(1)
display 'ny' _col(25) "NOW THE FIRST STAGE
REGRESSIONS"
*creating dichotomous instrument 1
probit 'dichotomous1_depvar' 'exogenous_list' if
'touse'
if e(df_m) ~= 'number_of_exogenous'{
display _newline (2)
display 'nr' _col(10) "Variable(s) have been dropped
during the Probit estimation.
display 'nr' _col(20) "This is probably due
to collinearity."
display 'nr' _col(14) "CHECK IDENTIFICATION
(I.E., EXCLUSION CRITERIA)"
display 'nr' _col(24) "Estimation cannot continue."
qui capture drop I_'continous_depvar'
I_'dichotomous1_depvar' I_'dichotomous2_depvar'
exit
}
/* get matrix of coefficients */
matrix define pie_21 = e(b)
qui predict double I_'dichotomous1_depvar' if
'touse', xb /* dichotomous 1 linear perdictor */
qui label var I_'dichotomous1_depvar'
"Dichotomous 1 first stage instrumental variable.
Linear Index
*creating dichotomous instrument 2
```

```
probit ‘dichotomous2_depvar’ ‘exogenous_list’
if ‘touse’
if e(df_m) ~= ‘number_of_exogenous’{
display _newline (2)
display ‘nr’ _col(10) “Variable(s) have been dropped
during the Probit estimation.
display ‘nr’ _col(20) “This is probably due to
collinearity.”
display ‘nr’ _col(14) “CHECK IDENTIFICATION
(I.E., EXCLUSION CRITERIA)”
display ‘nr’ _col(24) ‘Estimation cannot continue.”
qui capture drop I_‘continous_depvar’
I_‘dichotomous1_depvar’ I_‘dichotomous2_depvar’
exit
}
/* get matrix of coefficients */
matrix define pie_22 = e(b)
qui predict double I_‘dichotomous2_depvar’ if
‘touse’, xb /* dichotomous 2 linear perdictor */
qui label var I_‘dichotomous2_depvar’
“Dichotomous 2 first stage instrumental variable.
Linear Index
*creating dichotomous instrument 3
probit ‘dichotomous3_depvar’ ‘exogenous_list’
if ‘touse’
if e(df_m) ~= ‘number_of_exogenous’ {
display _newline (2)
display ‘nr’ _col(10) “Variable(s) have been dropped
during the Probit estimation.
display ‘nr’ _col(20) “This is probably due to
collinearity.”
display ‘nr’ _col(14) “CHECK IDENTIFICATION
(I.E., EXCLUSION CRITERIA)”
display ‘nr’ _col(24) ‘Estimation cannot continue.”
qui capture drop I_‘dichotomous1_depvar’
I_‘dichotomous2_depvar’ I_‘dichotomous3_depvar’
exit
}
/* get matrix of coefficients */
```

```
matrix define pie_23 = e(b)
qui predict double I_‘dichotomous3_depvar’ if
‘touse’, xb /* dichotomous 3 linear perdictor */
qui label var I_‘dichotomous3_depvar’
“Dichotomous 3 first stage instrumental variable.
Linear Index
*    Now running the second stage with the
instruments
display _newline(1)
display ‘ny’ _col(25) “NOW THE SECOND STAGE
REGRESSIONS”
*    dichotomous 1 model
probit ‘dichotomous1_depvar’ I_‘dichotomous2_depvar’
I_‘dichotomous3_depvar’ ‘dichotomous1_ivvar’ if
if e(df_m) ~= (‘dichotomous1_ivvar_count’+2){
display _newline(2)
display ‘nr’ _col(10) “Variable(s) have been dropped
during the Probit estimation.
display ‘nr’ _col(20) “This is probably due to
collinearity.”
display ‘nr’ _col(14) “CHECK IDENTIFICATION
(I.E., EXCLUSION CRITERIA)”
display ‘nr’ _col(24) “Estimation cannot continue.”
qui capture drop I_‘continous_depvar’
I_‘dichotomous1_depvar’ I_‘dichotomous2_depvar’
exit
}
matrix alpha_1 = e(b)
scalar gamma_11 = _b[I_‘dichotomous2_depvar’]
scalar gamma_12 = _b[I_‘dichotomous3_depvar’]
* dichotomous 2 model
probit ‘dichotomous2_depvar’ I_‘dichotomous1_depvar’
‘dichotomous2_ivvar’ if ‘touse’
if e(df_m) ~= (‘dichotomous2_ivvar_count’+1){
display _newline(2)
display ‘nr’ _col(10) “Variable(s) have been dropped
during the Probit estimation.
display ‘nr’ _col(20) “This is probably due to
collinearity.”
```

```
display ‘nr’ _col(14) “CHECK IDENTIFICATION
(I.E., EXCLUSION CRITERIA)”
display ‘nr’ _col(24) “Estimation cannot continue.”
qui capture drop I_‘continous_depvar’
I_‘dichotomous1_depvar’ I_‘dichotomous2_depvar’
exit
}
matrix alpha_2 = e(b)
scalar gamma_2 = _b[I_‘dichotomous1_depvar’]
* dichotomous 3 model
probit ‘dichotomous3_depvar’ I_‘dichotomous1_depvar’
‘dichotomous3_ivvar’ if ‘touse’
if e(df_m) ~= (‘dichotomous3_ivvar_count’+1){
display _newline(2)
display ‘nr’ _col(10) “Variable(s) have been dropped
during the Probit estimation.
display ‘nr’ _col(20) “This is probably due to
collinearity.”
display ‘nr’ _col(14) “CHECK IDENTIFICATION
(I.E., EXCLUSION CRITERIA)”
display ‘nr’ _col(24) “Estimation cannot continue.”
qui capture drop I_‘continous_depvar’
I_‘dichotomous1_depvar’ I_‘dichotomous2_depvar’
exit
}
matrix alpha_3 = e(b)
scalar gamma_3 = _b[I_‘dichotomous1_depvar’]
local co=l
foreach x of varlist I_‘dichotomous2_depvar’
I_‘dichotomous3_depvar’ ‘dichotomousl_ivvar’ {
est scalar Dl_‘x’ = alpha_l[1, ‘co’]
local co = ‘co’+l
}
est scalar Dl_cons = alpha_l[1,‘co’]
local co=l
foreach x of varlist I_‘dichotomousl_depvar’
‘dichotomous2_ivvar’ {
est scalar D2_‘x’ = alpha_2[l,‘co’]
local co = ‘co’+l
```

```
}
est scalar D2_cons = alpha_2[1,‘co’]
local co=1
foreach x of varlist I_‘dichotomous1_depvar’
‘dichotomous3_ivvar’ {
est scalar D3_‘x’ = alpha_3[1,‘co’]
local co = ‘co’+1
}
est scalar D3_cons = alpha_3[1,‘co’]
drop I_*
end
capture program drop Xtractequ1
program define Xtractequ1
syntax varlist
gettoken dichotomous1_depvar dichotomous1_ivvar:
varlist
c_local dichotomous1_depvar “‘dichotomous1_depvar’”
c_local dichotomous1_ivvar “‘dichotomous1_ivvar’”
end /* end for extractequ1*/
capture program drop Xtractequ2
program define Xtractequ2
syntax varlist
gettoken dichotomous2_depvar dichotomous2_ivvar:
varlist
c_local dichotomous2_depvar “‘dichotomous2_depvar’”
c_local dichotomous2_ivvar “‘dichotomous2_ivvar’”
end /* end for extractequ2*/
capture program drop Xtractequ3
program define Xtractequ3
syntax varlist
gettoken dichotomous3_depvar dichotomous3_ivvar:
varlist
c_local dichotomous3_depvar “‘dichotomous3_depvar’”
c_local dichotomous3_ivvar “‘dichotomous3_ivvar’”
end /* end for extractequ3*/
capture program drop Getexoglist
program define Getexoglist /* Taken from N.J. Cox’s
uniqlist.ado program*/
args varlist
```

```
tokenize ‘varlist’
local newlist “‘1’”
mac shift
while “‘1’” != “”{
local list_count: word count ‘newlist’
local i = 1
local putin = 1
while ‘i’<=‘list_count’’{
local word: word ‘i’ of ‘newlist’
if “‘word’” == “‘1’”{
local putin = 0
local i = ‘list_count’
}
local i = ‘i’ + 1
}
if ‘putin’ != 0{
local newlist “‘newlist’ ‘1’”
}
mac shift
}
c_local list “‘newlist’”
end /* for Getexoglist */
use C:\Users\Giacomo
Chiozza\leaders\book\analysis\ch4\norm-imp1.dta”,
clear
rename reg_fail Rfail
rename irreg_fail Ifail
gen lnten=log(t)
gen entry1lnten=entry1*lnten
#delimit;
dddseq (onset mixed demparl dempres lngdpcap
growth tropen4 dopen4 lntpop mm numbord majpow
tonset t (Rfail mixed demparl dempres civwar
lngdpcap growth tropen4 dopen4 lntpop age powtimes
entry1 entry1 (Ifail mixed demparl dempres civwar
lngdpcap growth tropen4 dopen4 lntpop age powtimes
entry1 entry1
* capture erase C:\Users\Giacomo
Chiozza\leaders\book\analysis\ch4\est95-1.dta”;
```

```
#delimit;
set seed 411939;
/*First for the 95% CI*/
#delimit;
bs dddseq
(onset mixed demparl dempres lngdpcap growth
tropen4 dopen4 lntpop mm numbord majpow
tonset tonset2 tonset3)
(Rfail mixed demparl dempres civwar lngdpcap growth
tropen4 dopen4 lntpop age powtimes
entry1 entry1lnten lnten lneldays target ong dwinsh
dlosesh ddrawsh dwinwar dlosewar ddrawwar)
(Ifail mixed demparl dempres civwar lngdpcap growth
tropen4 dopen4 lntpop age powtimes entryl
entryllnten lnten lneldays target ong dwinsh
dlosesh ddrawsh dwinwar dlosewar ddrawwar)
estl = e(Dl_I_Rfail)
est2 = e(Dl_I_Ifail)
est3 = e(Dl_mixed)
est4 = e(Dl_demparl)
est5 = e(Dl_dempres)
est6 = e(Dl_lngdpcap)
est7 = e(Dl_growth)
est8 = e(Dl_tropen4)
est9 = e(Dl_dopen4)
estlO = e(Dl_lntpop)
estll = e(Dl_mm)
estl2 = e(Dl_numbord)
estl3 = e(Dl_majpow)
estl4 = e(Dl_tonset)
estl5 = e(Dl_tonset2)
estl6 = e(Dl_tonset3)
estl7 = e(Dl_cons)
estl8 = e(D2_I_onset)
estl9 = e(D2_mixed)
est20 = e(D2_demparl)
est21 = e(D2_dempres)
est22 = e(D2_lngdpcap)
est23 = e(D2_growth)
```

```
est24 = e(D2_tropen4)
est25 = e(D2_dopen4)
est26 = e(D2_lntpop)
est27 = e(D2_age)
est28 = e(D2_powtimes)
est29 = e(D2_entryl)
est30 = e(D2_entryllnten)
est31 = e(D2_lnten)
est32 = e(D2_lneldays)
est33 = e(D2_target)
est34 = e(D2_ong)
est35 = e(D2_dwinsh)
est36 = e(D2_dlosesh)
est37 = e(D2_ddrawsh)
est38 = e(D2_dwinwar)
est39 = e(D2_dlosewar)
est40 = e(D2_ddrawwar)
est41 = e(D2_cons)
est42 = e(D3_I_onset)
est43 = e(D3_mixed)
est44 = e(D3_demparl)
est45 = e(D3_dempres)
est46 = e(D3_lngdpcap)
est47 = e(D3_growth)
est48 = e(D3_tropen4)
est49 = e(D3_dopen4)
est50 = e(D3_lntpop)
est51 = e(D3_age)
est52 = e(D3_powtimes)
est53 = e(D3_entryl)
est54 = e(D3_entryllnten)
est55 = e(D3_lnten)
est56 = e(D3_lneldays)
est57 = e(D3_target)
est58 = e(D3_ong)
est59 = e(D3_dwinsh)
est60 = e(D3_dlosesh)
est61 = e(D3_ddrawsh)
est62 = e(D3_dwinwar)
```

```
est63 = e(D3_dlosewar)
est64 = e(D3_ddrawwar)
est65 = e(D3_cons)
, reps(lOOO) dots level(95) saving(C:\Users\Giacomo
Chiozza\leaders\book\analysis\ch4\est95-l.dta)
replace
```

C.4 Tables with regression results

C.4.1 Structural equations: 95% confidence intervals

Table C.3: ***Summary results: conflict initiation, Data 1***

	Observed coefficient	Bias	Bootstrap std. err.	95% confidence interval	
Regular removal	−2.102	0.355	0.322	−2.832	−1.810
Forcible removal	0.407	−0.190	0.291	0.024	1.211
Mixed regime	1.532	−0.256	0.273	1.263	2.286
Parliamentary democracy	2.120	−0.477	0.465	1.695	3.231
Presidential democracy	1.783	−0.367	0.363	1.440	2.782
Economic development	0.267	−0.052	0.079	0.170	0.518
Economic growth	−1.049	−0.006	0.788	−2.482	0.682
Trade openness	−0.764	0.046	0.268	−1.380	−0.304
Change in trade openness	−0.006	−0.020	0.091	−0.158	0.222
Population size	0.026	0.008	0.036	−0.070	0.081
Military mobilizations	0.059	0.000	0.054	−0.037	0.174
Number of borders	0.084	−0.007	0.021	0.051	0.145
Major power	1.058	−0.219	0.266	0.761	1.946
Time since last crisis (t)	−0.436	−0.015	0.117	−0.649	−0.173
Time since last crisis (t^2)	0.871	0.038	0.276	0.311	1.415
Time since last crisis (t^3)	−0.478	−0.035	0.185	−0.854	−0.144
Constant	−5.578	0.440	0.720	−7.444	−4.554

Note: Bootstrap estimates; bias-corrected confidence intervals; K = 1000 replications.

Table C.4: ***Summary results: regular removal, Data 1***

	Observed coefficient	Bias	Bootstrap std. err.	95% confidence interval	
Conflict initiation	−0.325	0.104	0.257	−1.817	−0.086
Mixed regime	0.646	0.009	0.061	0.526	0.757
Parliamentary democracy	0.787	0.050	0.147	0.030	0.957
Presidential democracy	0.670	0.014	0.091	0.444	0.817
Economic development	0.068	0.008	0.030	−0.002	0.116
Economic growth	−0.738	−0.038	0.307	−1.254	−0.016
Trade openness	−0.343	0.004	0.096	−0.550	−0.187
Change in trade openness	−0.004	0.005	0.049	−0.140	0.076
Population size	0.038	−0.007	0.022	0.011	0.130
Age	0.007	0.001	0.003	−0.007	0.011
Times in office	−0.060	0.012	0.051	−0.267	0.000
Entry	0.425	0.029	0.195	−0.046	0.743
Entry × Days in office (log)	−0.073	−0.004	0.028	−0.124	−0.011
Days in office	−0.148	0.007	0.020	−0.260	−0.121
Days since last elections (log)	0.005	0.000	0.018	−0.032	0.040
Target event	−0.236	0.058	0.205	−1.199	0.009
Ongoing crisis	−0.065	−0.031	0.161	−0.364	0.264
Win crisis	0.307	−0.150	0.380	−0.114	2.099
Lose crisis	0.485	−0.217	0.555	−0.065	3.585
Draw crisis	0.376	−0.200	0.504	−0.118	3.335
Win war	−0.288	−0.185	0.459	−0.920	1.140
Lose war	0.246	−0.222	0.486	−0.320	2.995
Draw war	0.158	−0.096	0.291	−0.282	0.984
Constant	−2.049	0.145	0.442	−4.278	−1.615

Note: Bootstrap estimates; bias-corrected confidence intervals; K = 1000 replications.

Table C.5: ***Summary results: forcible removal, Data 1***

	Observed coefficient	Bias	Bootstrap std. err.	95% confidence interval	
Conflict initiation	0.416	−0.135	0.269	0.128	1.660
Mixed regime	0.193	−0.006	0.068	0.079	0.356
Parlamentary democracy	−0.303	−0.067	0.185	−0.540	0.525
Presidential democracy	−0.215	−0.027	0.130	−0.433	0.114
Economic development	−0.083	−0.007	0.039	−0.146	0.012
Economic growth	−1.664	0.015	0.385	−2.781	−1.096
Trade openness	−0.472	−0.037	0.174	−0.809	−0.139
Change in trade openness	−0.004	−0.013	0.052	−0.083	0.135
Population size	−0.072	0.008	0.028	−0.160	−0.033
Age	0.010	−0.001	0.004	0.005	0.027
Times in office	0.145	−0.016	0.061	0.060	0.362
Entry	1.317	−0.012	0.224	0.923	1.808
Entry × Days in office (log)	−0.154	0.001	0.032	−0.223	−0.096
Days in office	−0.022	−0.005	0.027	−0.067	0.045
Days since last elections (log)	−0.016	−0.001	0.022	−0.056	0.032
Target event	0.482	−0.090	0.227	0.190	1.333
Ongoing crisis	−0.387	−0.010	0.228	−0.986	−0.035
Win crisis	−0.863	0.157	0.449	−2.603	−0.261
Lose crisis	−0.424	0.268	0.569	−2.819	0.225
Draw crisis	−1.047	0.225	0.543	−3.171	−0.384
Win war	−0.887	−0.027	0.768	−3.356	0.028
Lose war	0.746	0.204	0.438	−1.644	1.246
Draw war	−0.695	0.032	0.364	−1.707	−0.146
Constant	−0.935	−0.220	0.479	−1.462	1.302

Note: Bootstrap estimates; bias-corrected confidence intervals; K = 1000 replications.

Table C.6: ***Summary results: conflict initiation, Data 2***

	Observed coefficient	Bias	Bootstrap std. err.	95% confidence interval	
Regular removal	−2.067	0.326	0.339	−2.816	−1.772
Forcible removal	0.410	−0.171	0.287	0.025	1.070
Mixed regime	1.504	−0.235	0.293	1.191	2.306
Parliamentary democracy	2.120	−0.451	0.497	1.619	3.309
Presidential democracy	1.779	−0.350	0.384	1.425	2.712
Economic development	0.236	−0.046	0.080	0.138	0.518
Economic growth	−1.052	−0.016	0.757	−2.370	0.628
Trade openness	−0.792	0.067	0.269	−1.508	−0.379
Change in trade openness	−0.108	−0.012	0.089	−0.331	0.019
Population size	0.024	0.008	0.036	−0.064	0.081
Military mobilizations	0.081	0.001	0.056	−0.026	0.196
Number of borders	0.084	−0.006	0.022	0.047	0.139
Major power	1.079	−0.196	0.258	0.782	1.750
Time since last crisis (t)	−0.437	−0.019	0.111	−0.621	−0.190
Time since last crisis (t^2)	0.879	0.053	0.252	0.363	1.310
Time since last crisis (t^3)	−0.482	−0.046	0.168	−0.785	−0.191
Constant	−5.478	0.405	0.751	−7.936	−4.465

Note: Bootstrap estimates; bias-corrected confidence intervals; K = 999 replications.

Table C.7: ***Summary results: regular removal, Data 2***

	Observed coefficient	Bias	Bootstrap std. err.	95% confidence interval	
Conflict initiation	−0.269	0.097	0.233	−2.213	−0.052
Mixed regime	0.651	0.007	0.059	0.525	0.764
Parliamentary democracy	0.826	0.041	0.127	0.318	0.972
Presidential democracy	0.686	0.007	0.082	0.509	0.832
Economic development	0.062	0.010	0.033	−0.034	0.112
Economic growth	−0.725	−0.034	0.273	−1.202	−0.057
Trade openness	−0.349	−0.010	0.094	−0.544	−0.174
Change in trade openness	−0.045	0.000	0.043	−0.159	0.017
Population size	0.034	−0.006	0.022	0.007	0.132
Age	0.008	0.001	0.003	−0.007	0.011
Times in office	−0.056	0.010	0.043	−0.180	0.004
Entry	0.440	0.024	0.191	0.041	0.771
Entry × Days in office (log)	−0.075	−0.003	0.028	−0.126	−0.020
Days in office	−0.145	0.007	0.020	−0.204	−0.117
Days since last elections (log)	0.005	0.000	0.018	−0.030	0.040
Target event	−0.208	0.055	0.200	−0.910	0.031
Ongoing crisis	−0.072	−0.027	0.162	−0.379	0.255
Win crisis	0.239	−0.146	0.360	−0.171	1.727
Lose crisis	0.374	−0.202	0.512	−0.145	4.756
Draw crisis	0.271	−0.191	0.470	−0.227	2.040
Win war	−0.370	−0.172	0.428	−1.037	0.589
Lose war	0.178	−0.168	0.446	−0.429	1.488
Draw war	0.113	−0.093	0.289	−0.328	0.752
Constant	−1.959	0.135	0.411	−3.854	−1.512

Note: Bootstrap estimates; bias-corrected confidence intervals; K = 999 replications.

Table C.8: ***Summary Results: Forcible Removal, Data 2***

	Observed coefficient	Bias	Bootstrap std. err.	95% confidence interval	
Conflict initiation	0.322	−0.102	0.256	0.023	1.109
Mixed regime	0.187	−0.004	0.065	0.073	0.329
Parliamentary democracy	−0.364	−0.047	0.164	−0.618	0.057
Presidential democracy	−0.231	−0.008	0.123	−0.453	0.022
Economic development	−0.084	−0.009	0.040	−0.149	0.011
Economic growth	−1.377	−0.001	0.331	−2.036	−0.734
Trade openness	−0.375	−0.006	0.131	−0.656	−0.145
Change in trade openness	−0.002	−0.008	0.046	−0.078	0.099
Population size	−0.062	0.007	0.027	−0.147	−0.026
Age	0.009	−0.001	0.004	0.003	0.020
Times in office	0.137	−0.011	0.057	0.046	0.280
Entry					
Entry × Days in	1.273	−0.003	0.228	0.877	1.812
office (log)	−0.148	0.000	0.033	−0.220	−0.088
Days in office	−0.029	−0.005	0.026	−0.067	0.037
Days since last elections (log)	−0.017	−0.001	0.021	−0.058	0.027
Target event	0.425	−0.069	0.218	0.129	1.275
Ongoing crisis	−0.356	−0.017	0.223	−0.838	0.018
Win crisis	−0.738	0.117	0.431	−1.925	−0.111
Lose crisis	−0.236	0.200	0.548	−1.999	0.401
Draw crisis	−0.878	0.149	0.518	−2.432	−0.170
Win war	−0.754	−0.117	0.758	−2.903	0.134
Lose war	0.928	0.143	0.420	−0.647	1.445
Draw war	−0.637	0.046	0.344	−1.821	−0.136
Constant	−1.033	−0.156	0.470	−1.617	0.805

Note: Bootstrap estimates; bias-corrected confidence intervals; K = 999 replications.

Table C.9: ***Summary results: conflict initiation, Data 3***

	Observed coefficient	Bias	Bootstrap std. err.	95% confidence interval	
Regular removal	−2.073	0.346	0.323	−2.766	−1.776
Forcible removal	0.397	−0.183	0.288	0.018	1.184
Mixed regime	1.507	−0.248	0.274	1.214	2.239
Parliamentary democracy	2.097	−0.465	0.467	1.668	3.256
Presidential democracy	1.767	−0.357	0.364	1.421	2.759
Economic development	0.251	−0.052	0.080	0.153	0.548
Economic growth	−1.282	0.064	0.762	−2.830	0.249
Trade openness	−0.777	0.060	0.245	−1.333	−0.379
Change in trade openness	−0.061	−0.008	0.105	−0.256	0.159
Population size	0.024	0.008	0.036	−0.066	0.080
Military mobilizations	0.073	0.000	0.055	−0.032	0.181
Number of borders	0.084	−0.007	0.021	0.050	0.144
Major power	1.062	−0.212	0.264	0.753	1.969
Time since last crisis (t)	−0.432	−0.015	0.117	−0.647	−0.162
Time since last crisis (t^2)	0.862	0.040	0.277	0.318	1.410
Time since last crisis (t^3)	−0.473	−0.036	0.186	−0.847	−0.124
Constant	−5.517	0.428	0.722	−7.161	−4.477

Note: Bootstrap estimates; bias-corrected confidence intervals; K = 1000 replications.

Table C.10: ***Summary results: regular removal, Data 3***

	Observed coefficient	Bias	Bootstrap std. err.	95% confidence interval	
Conflict initiation	−0.284	0.099	0.247	−1.732	−0.057
Mixed regime	0.647	0.009	0.060	0.529	0.756
Parliamentary democracy	0.807	0.046	0.139	0.072	0.969
Presidential democracy	0.677	0.013	0.087	0.478	0.827
Economic development	0.068	0.009	0.030	−0.001	0.114
Economic growth	−0.818	−0.026	0.299	−1.346	−0.215
Trade openness	−0.315	0.010	0.098	−0.546	−0.160
Change in trade openness	−0.047	−0.001	0.049	−0.155	0.044
Population size	0.035	−0.006	0.021	0.008	0.119
Age	0.007	0.001	0.003	−0.004	0.012
Times in office	−0.057	0.012	0.049	−0.212	0.005
Entry	0.424	0.029	0.191	−0.051	0.750
Entry × Days in office (log)	−0.072	−0.004	0.027	−0.124	−0.013
Days in office	−0.147	0.006	0.019	−0.207	−0.120
Days since last elections (log)	0.005	0.000	0.018	−0.029	0.042
Target event	−0.217	0.054	0.197	−0.891	0.045
Ongoing crisis	−0.073	−0.032	0.158	−0.378	0.250
Win crisis	0.255	−0.143	0.366	−0.137	2.010
Lose crisis	0.415	−0.208	0.535	−0.135	3.224
Draw crisis	0.302	−0.191	0.483	−0.161	3.051
Win war	−0.348	−0.178	0.451	−0.994	1.168
Lose war	0.181	−0.214	0.479	−0.386	1.772
Draw war	0.137	−0.093	0.283	−0.298	0.858
Constant	−1.980	0.139	0.429	−4.347	−1.529

Note: Bootstrap estimates; bias-corrected confidence intervals; K = 1000 replications.

Table C.11: ***Summary Results: Forcible Removal, Data 3***

	Observed coefficient	Bias	Bootstrap std. err.	95% confidence interval	
Conflict initiation	0.372	−0.119	0.260	0.094	1.530
Mixed regime	0.195	−0.005	0.068	0.083	0.361
Parliamentary democracy	−0.332	−0.058	0.180	−0.572	0.330
Presidential democracy	−0.221	−0.025	0.127	−0.437	0.105
Economic development	−0.089	−0.007	0.038	−0.152	−0.003
Economic growth	−1.470	0.021	0.367	−2.357	−0.886
Trade openness	−0.306	−0.037	0.150	−0.575	0.047
Change in trade openness	−0.097	−0.015	0.058	−0.210	0.009
Population size	−0.065	0.006	0.027	−0.142	−0.026
Age	0.009	−0.001	0.004	0.004	0.024
Times in office	0.143	−0.014	0.060	0.056	0.315
Entry	1.306	−0.013	0.219	0.910	1.765
Entry × Days in office (log)	−0.151	0.001	0.031	−0.216	−0.094
Days in office	−0.027	−0.005	0.026	−0.071	0.035
Days since last elections (log)	−0.017	−0.001	0.021	−0.057	0.028
Target event	0.454	−0.079	0.221	0.184	1.409
Ongoing crisis	−0.378	−0.011	0.226	−0.909	−0.015
Win crisis	−0.804	0.133	0.439	−2.263	−0.206
Lose crisis	−0.324	0.235	0.551	−2.532	0.292
Draw crisis	−0.970	0.193	0.526	−2.811	−0.318
Win war	−0.832	−0.043	0.747	−3.374	0.071
Lose war	0.820	0.180	0.425	−1.425	1.317
Draw war	−0.673	0.021	0.363	−1.691	−0.121
Constant	−0.973	−0.195	0.462	−1.477	0.900

Note: Bootstrap estimates; bias-corrected confidence intervals; K = 1000 replications.

Table C.12: ***Summary results: conflict initiation, Data 4***

	Observed coefficient	Bias	Bootstrap std. err.	95% confidence interval	
Regular removal	−2.068	0.328	0.333	−2.877	−1.744
Forcible removal	0.390	−0.165	0.276	0.032	1.226
Mixed regime	1.503	−0.237	0.282	1.198	2.245
Parliamentary democracy	2.107	−0.438	0.477	1.591	3.199
Presidential democracy	1.781	−0.329	0.367	1.391	2.600
Economic development	0.233	−0.047	0.075	0.140	0.508
Economic growth	−1.442	0.066	0.761	−3.067	−0.023
Trade openness	−0.754	0.030	0.268	−1.378	−0.284
Change in trade openness	−0.109	−0.015	0.098	−0.341	0.052
Population size	0.021	0.007	0.036	−0.064	0.081
Military mobilizations	0.011	0.006	0.051	−0.114	0.105
Number of borders	0.085	−0.006	0.020	0.053	0.137
Major power	1.077	−0.188	0.273	0.763	2.237
Time since last crisis (t)	−0.429	−0.026	0.114	−0.628	−0.180
Time since last crisis (t^2)	0.853	0.065	0.266	0.292	1.353
Time since last crisis (t^3)	−0.465	−0.052	0.177	−0.794	−0.141
Constant	−5.507	0.430	0.737	−7.194	−4.471

Note: Bootstrap estimates; bias-corrected confidence intervals; K = 1000 replications.

Table C.13: ***Summary results: regular removal, Data 4***

	Observed coefficient	Bias	Bootstrap std. err.	95% confidence interval	
Conflict initiation	−0.311	0.108	0.271	−1.962	−0.044
Mixed regime	0.647	0.008	0.061	0.512	0.759
Parliamentary democracy	0.807	0.047	0.140	0.252	0.967
Presidential democracy	0.685	0.017	0.084	0.470	0.820
Economic development	0.059	0.009	0.035	−0.035	0.112
Economic growth	−0.940	−0.019	0.293	−1.480	−0.378
Trade openness	−0.342	0.015	0.113	−0.652	−0.172
Change in trade openness	−0.046	0.004	0.050	−0.189	0.027
Population size	0.036	−0.006	0.022	0.006	0.118
Age	0.007	0.001	0.003	−0.007	0.011
Times in office	−0.060	0.013	0.049	−0.263	0.007
Entry	0.406	0.029	0.202	−0.086	0.760
Entry × Days in office (log)	−0.070	−0.004	0.029	−0.122	−0.005
Days in office	−0.148	0.006	0.021	−0.222	−0.115
Days since last elections (log)	0.007	0.000	0.018	−0.027	0.044
Target event	−0.234	0.062	0.213	−0.962	0.035
Ongoing crisis	−0.068	−0.017	0.156	−0.396	0.225
Win crisis	0.297	−0.160	0.410	−0.164	1.994
Lose crisis	0.461	−0.227	0.571	−0.212	2.909
Draw crisis	0.360	−0.210	0.538	−0.234	2.681
Win war	−0.318	−0.188	0.476	−0.941	1.719
Lose war	0.213	−0.200	0.483	−0.370	2.281
Draw war	0.142	−0.108	0.288	−0.298	0.815
Constant	−2.023	0.154	0.461	−4.063	−1.496

Note: Bootstrap estimates; bias-corrected confidence intervals; K = 1000 replications.

Table C.14: ***Summary results: forcible removal, Data 4***

	Observed coefficient	Bias	Bootstrap std. err.	95% confidence interval	
Conflict initiation	0.415	−0.135	0.288	0.069	2.468
Mixed regime	0.198	−0.007	0.067	0.089	0.359
Parliamentary democracy	−0.316	−0.062	0.178	−0.573	0.273
Presidential democracy	−0.226	−0.017	0.127	−0.475	0.054
Economic development	−0.073	−0.011	0.040	−0.133	0.029
Economic growth	−1.479	−0.009	0.361	−2.289	−0.850
Trade openness	−0.410	−0.040	0.176	−0.712	−0.010
Change in trade openness	−0.010	−0.014	0.053	−0.086	0.154
Population size	−0.070	0.009	0.028	−0.154	−0.031
Age	0.010	−0.001	0.004	0.005	0.030
Times in office	0.147	−0.019	0.064	0.063	0.360
Entry	1.315	−0.025	0.236	0.920	1.867
Entry × Days in office (log)	−0.153	0.004	0.033	−0.229	−0.098
Days in office	−0.023	−0.007	0.027	−0.066	0.055
Days since last elections (log)	−0.014	0.000	0.021	−0.055	0.032
Target event	0.488	−0.086	0.240	0.190	1.409
Ongoing crisis	−0.376	−0.015	0.221	−0.865	−0.002
Win crisis	−0.864	0.152	0.482	−2.450	−0.215
Lose crisis	−0.424	0.276	0.613	−4.577	0.306
Draw crisis	−1.052	0.219	0.571	−3.091	−0.332
Win war	−0.884	−0.066	0.812	−4.003	0.042
Lose war	0.765	0.201	0.448	−0.625	1.342
Draw war	−0.748	0.048	0.340	−1.668	−0.228
Constant	−0.945	−0.210	0.507	−1.534	1.036

Note: Bootstrap estimates; bias-corrected confidence intervals; K = 1000 replications.

Table C.15: ***Summary results: conflict initiation, Data 5***

	Observed coefficient	Bias	Bootstrap std. err.	95% confidence interval	
Regular removal	−2.055	0.323	0.332	−2.769	−1.752
Forcible removal	0.382	−0.152	0.293	0.021	1.434
Mixed regime	1.495	−0.233	0.281	1.191	2.099
Parliamentary democracy	2.097	−0.438	0.491	1.618	3.257
Presidential democracy	1.766	−0.341	0.376	1.402	2.869
Economic development	0.226	−0.041	0.082	0.114	0.520
Economic growth	−1.135	−0.015	0.717	−2.320	0.331
Trade openness	−0.800	0.063	0.248	−1.372	−0.390
Change in trade openness	−0.054	−0.013	0.089	−0.236	0.118
Population size	0.024	0.009	0.035	−0.064	0.082
Military mobilizations	0.049	0.001	0.052	−0.047	0.154
Number of borders	0.084	−0.007	0.021	0.052	0.142
Major power	1.056	−0.176	0.267	0.728	1.779
Time since last crisis (t)	−0.431	−0.024	0.117	−0.612	−0.130
Time since last crisis (t^2)	0.859	0.066	0.280	0.235	1.304
Time since last crisis (t^3)	−0.470	−0.056	0.193	−0.796	−0.125
Constant	−5.493	0.438	0.741	−7.246	−4.441

Note: Bootstrap estimates; bias-corrected confidence intervals; K = 1000 replications.

Table C.16: ***Summary results: regular removal, Data 5***

	Observed coefficient	Bias	Bootstrap std. err.	95% confidence interval	
Conflict initiation	−0.318	0.106	0.229	−1.582	−0.087
Mixed regime	0.646	0.010	0.061	0.511	0.751
Parliamentary democracy	0.805	0.050	0.131	0.199	0.960
Presidential democracy	0.683	0.014	0.085	0.468	0.822
Economic development	0.050	0.008	0.032	−0.058	0.096
Economic growth	−0.696	−0.016	0.285	−1.222	−0.066
Trade openness	−0.314	0.003	0.093	−0.511	−0.155
Change in trade openness	−0.027	0.006	0.043	−0.139	0.038
Population size	0.038	−0.006	0.022	0.009	0.113
Age	0.007	0.001	0.003	−0.004	0.011
Times in office	−0.062	0.012	0.048	−0.257	−0.003
Entry					
Entry × Days in	0.417	0.036	0.198	0.012	0.773
office (log)	−0.072	−0.005	0.029	−0.124	−0.014
Days in office	−0.149	0.007	0.020	−0.237	−0.123
Days since last	0.005	0.000	0.018	−0.029	0.042
elections (log)					
Target event	−0.230	0.060	0.184	−0.764	0.016
Ongoing crisis	−0.069	−0.031	0.152	−0.342	0.256
Win crisis	0.298	−0.160	0.351	−0.114	2.246
Lose crisis	0.477	−0.219	0.491	−0.078	2.921
Draw crisis	0.365	−0.200	0.455	−0.128	3.019
Win war	−0.292	−0.198	0.443	−0.896	1.104
Lose war	0.242	−0.181	0.458	−0.333	1.819
Draw war	0.152	−0.093	0.283	−0.294	0.927
Constant	−2.026	0.143	0.401	−3.537	−1.589

Note: Bootstrap estimates; bias-corrected confidence intervals; K = 1000 replications.

Table C.17: ***Summary results: forcible removal, Data 5***

	Observed coefficient	Bias	Bootstrap std. err.	95% confidence interval	
Conflict initiation	0.446	−0.146	0.273	0.154	1.567
Mixed regime	0.199	−0.009	0.068	0.086	0.373
Parliamentary democracy	−0.309	−0.061	0.181	−0.542	0.490
Presidential democracy	−0.224	−0.020	0.130	−0.456	0.086
Economic development	−0.084	−0.011	0.043	−0.154	0.040
Economic growth	−1.228	−0.025	0.343	−1.990	−0.620
Trade openness	−0.267	−0.020	0.138	−0.537	0.012
Change in trade openness	−0.030	−0.015	0.047	−0.095	0.114
Population size	−0.068	0.010	0.029	−0.176	−0.032
Age	0.010	−0.001	0.004	0.005	0.024
Times in office	0.153	−0.016	0.063	0.069	0.377
Entry					1.829
Entry × Days in	1.310	−0.018	0.234	0.882	
office (log)	−0.152	0.002	0.034	−0.227	−0.091
Days in office	−0.024	−0.005	0.027	−0.066	0.049
Days since last	−0.018	−0.001	0.021	−0.055	0.030
elections (log)					
Target event	0.513	−0.099	0.229	0.229	1.363
Ongoing crisis	−0.391	−0.006	0.220	−0.937	−0.047
Win crisis	−0.911	0.176	0.459	−2.748	−0.315
Lose crisis	−0.476	0.278	0.579	−2.710	0.179
Draw crisis	−1.118	0.240	0.553	−3.134	−0.450
Win war	−0.838	−0.050	0.818	−4.045	0.009
Lose war	0.743	0.202	0.448	−1.885	1.262
Draw war	−0.713	0.052	0.347	−1.730	−0.207
Constant	−0.841	−0.237	0.477	−1.340	1.641

Note: Bootstrap estimates; bias-corrected confidence intervals; K = 1000 replications.

C.4.2 Structural equations: 90% confidence intervals

Table C.18: ***Summary results: conflict initiation (90% CI), Data 1***

	Observed coefficient	Bias	Bootstrap std. err.	90% confidence interval	
Regular removal	−2.102	0.355	0.322	−2.832	−1.901
Forcible removal	0.407	−0.190	0.291	0.122	1.197
Mixed regime	1.532	−0.256	0.273	1.354	2.286
Parliamentary democracy	2.120	−0.477	0.465	1.834	3.231
Presidential democracy	1.783	−0.367	0.363	1.555	2.782
Economic development	0.267	−0.052	0.079	0.193	0.500
Economic growth	−1.049	−0.006	0.788	−2.216	0.353
Trade openness	−0.764	0.046	0.268	−1.283	−0.390
Change in trade openness	−0.006	−0.020	0.091	−0.123	0.165
Population size	0.026	0.008	0.036	−0.050	0.071
Military mobilizations	0.059	0.000	0.054	−0.021	0.156
Number of borders	0.084	−0.007	0.021	0.057	0.132
Major power	1.058	−0.219	0.266	0.839	1.946
Time since last crisis (t)	−0.436	−0.015	0.117	−0.604	−0.225
Time since last crisis (t^2)	0.871	0.038	0.276	0.424	1.306
Time since last crisis (t^3)	−0.478	−0.035	0.185	−0.776	−0.222
Constant	−5.578	0.440	0.720	−7.203	−4.818

Note: Bootstrap estimates; bias-corrected confidence intervals; K = 1000 replications.

Table C.19: ***Summary results: regular removal (90% CI), Data 1***

	Observed coefficient	Bias	Bootstrap std. err.	90% confidence interval	
Conflict initiation	−0.325	0.104	0.257	−1.756	−0.136
Mixed regime	0.646	0.009	0.061	0.542	0.739
Parliamentary democracy	0.787	0.050	0.147	0.123	0.918
Presidential democracy	0.670	0.014	0.091	0.492	0.789
Economic development	0.068	0.008	0.030	0.009	0.105
Economic growth	−0.738	−0.038	0.307	−1.128	−0.138
Trade openness	−0.343	0.004	0.096	−0.520	−0.207
Change in trade openness	−0.004	0.005	0.049	−0.095	0.059
Population size	0.038	−0.007	0.022	0.017	0.114
Age	0.007	0.001	0.003	−0.003	0.010
Times in office	−0.060	0.012	0.051	−0.225	−0.010
Entry	0.425	0.029	0.195	0.031	0.687
Entry × Days in office (log)	−0.073	−0.004	0.028	−0.113	−0.023
Days in office	−0.148	0.007	0.020	−0.199	−0.126
Days since last elections (log)	0.005	0.000	0.018	−0.024	0.035
Target event	−0.236	0.058	0.205	−0.854	−0.043
Ongoing crisis	−0.065	−0.031	0.161	−0.293	0.202
Win crisis	0.307	−0.150	0.380	−0.021	2.029
Lose crisis	0.485	−0.217	0.555	0.072	3.243
Draw crisis	0.376	−0.200	0.504	−0.002	3.107
Win war	−0.288	−0.185	0.459	−0.771	0.875
Lose war	0.246	−0.222	0.486	−0.177	1.833
Draw war	0.158	−0.096	0.291	−0.184	0.836
Constant	−2.049	0.145	0.442	−3.986	−1.697

Note: Bootstrap estimates; bias-corrected confidence intervals; K = 1000 replications.

Table C.20: ***Summary results: forcible removal (90% CI), Data 1***

	Observed coefficient	Bias	Bootstrap std. err.	90% confidence interval	
Conflict initiation	0.416	−0.135	0.269	0.204	1.500
Mixed regime	0.193	−0.006	0.068	0.096	0.319
Parliamentary democracy	−0.303	−0.067	0.185	−0.494	0.227
Presidential democracy	−0.215	−0.027	0.130	−0.387	0.062
Economic development	−0.083	−0.007	0.039	−0.136	−0.004
Economic growth	−1.664	0.015	0.385	−2.459	−1.188
Trade openness	−0.472	−0.037	0.174	−0.742	−0.188
Change in trade openness	−0.004	−0.013	0.052	−0.070	0.099
Population size	−0.072	0.008	0.028	−0.148	−0.040
Age	0.010	−0.001	0.004	0.006	0.022
Times in office	0.145	−0.016	0.061	0.075	0.313
Entry	1.317	−0.012	0.224	0.988	1.732
Entry × Days in office (log)	−0.154	0.001	0.032	−0.211	−0.104
Days in office	−0.022	−0.005	0.027	−0.060	0.036
Days since last elections (log)	−0.016	−0.001	0.022	−0.048	0.023
Target event	0.482	−0.090	0.227	0.256	1.253
Ongoing crisis	−0.387	−0.010	0.228	−0.837	−0.080
Win crisis	−0.863	0.157	0.449	−2.333	−0.387
Lose crisis	−0.424	0.268	0.569	−2.755	0.076
Draw crisis	−1.047	0.225	0.543	−3.043	−0.533
Win war	−0.887	−0.027	0.768	−2.904	−0.106
Lose war	0.746	0.204	0.438	−0.968	1.126
Draw war	−0.695	0.032	0.364	−1.518	−0.229
Constant	−0.935	−0.220	0.479	−1.336	1.020

Note: Bootstrap estimates; bias-corrected confidence intervals; K = 1000 replications.

Table C.21: ***Summary results: conflict initiation (90% CI), Data 2***

	Observed coefficient	Bias	Bootstrap std. err.	90% confidence interval	
Regular removal	−2.067	0.326	0.339	−2.816	−1.868
Forcible removal	0.410	−0.171	0.287	0.106	1.030
Mixed regime	1.504	−0.235	0.293	1.276	2.306
Parliamentary democracy	2.120	−0.451	0.497	1.785	3.309
Presidential democracy	1.779	−0.350	0.384	1.531	2.712
Economic development	0.236	−0.046	0.080	0.163	0.482
Economic growth	−1.052	−0.016	0.757	−2.216	0.264
Trade openness	−0.792	0.067	0.269	−1.435	−0.451
Change in trade openness	−0.108	−0.012	0.089	−0.283	−0.005
Population size	0.024	0.008	0.036	−0.050	0.073
Military mobilizations	0.081	0.001	0.056	−0.008	0.173
Number of borders	0.084	−0.006	0.022	0.054	0.130
Major power	1.079	−0.196	0.258	0.868	1.750
Time since last crisis (t)	−0.437	−0.019	0.111	−0.596	−0.226
Time since last crisis (t^2)	0.879	0.053	0.252	0.438	1.241
Time since last crisis (t^3)	−0.482	−0.046	0.168	−0.722	−0.229
Constant	−5.478	0.405	0.751	−7.089	−4.682

Note: Bootstrap estimates; bias-corrected confidence intervals; K = 999 replications.

Table C.22: ***Summary results: regular removal (90% CI), Data 2***

	Observed coefficient	Bias	Bootstrap std. err.	90% confidence interval	
Conflict initiation	−0.269	0.097	0.233	−1.168	−0.098
Mixed regime	0.651	0.007	0.059	0.548	0.739
Parliamentary democracy	0.826	0.041	0.127	0.437	0.938
Presidential democracy	0.686	0.007	0.082	0.543	0.808
Economic development	0.062	0.010	0.033	−0.005	0.101
Economic growth	−0.725	−0.034	0.273	−1.119	−0.207
Trade openness	−0.349	−0.010	0.094	−0.507	−0.202
Change in trade openness	−0.045	0.000	0.043	−0.142	0.006
Population size	0.034	−0.006	0.022	0.012	0.097
Age	0.008	0.001	0.003	−0.005	0.010
Times in office	−0.056	0.010	0.043	−0.160	−0.004
Entry	0.440	0.024	0.191	0.099	0.714
Entry × Days in office (log)	−0.075	−0.003	0.028	−0.117	−0.026
Days in office	−0.145	0.007	0.020	−0.197	−0.123
Days since last elections (log)	0.005	0.000	0.018	−0.024	0.035
Target event	−0.208	0.055	0.200	−0.754	−0.026
Ongoing crisis	−0.072	−0.027	0.162	−0.314	0.221
Win crisis	0.239	−0.146	0.360	−0.082	1.490
Lose crisis	0.374	−0.202	0.512	−0.007	2.252
Draw crisis	0.271	−0.191	0.470	−0.110	1.918
Win war	−0.370	−0.172	0.428	−0.867	0.428
Lose war	0.178	−0.168	0.446	−0.286	1.257
Draw war	0.113	−0.093	0.289	−0.225	0.630
Constant	−1.959	0.135	0.411	−3.349	−1.610

Note: Bootstrap estimates; bias-corrected confidence intervals; K = 999 replications.

Table C.23: ***Summary results: forcible removal (90% CI), Data 2***

	Observed coefficient	Bias	Bootstrap std. err.	90% confidence interval	
Conflict initiation	0.322	−0.102	0.256	0.098	1.103
Mixed regime	0.187	−0.004	0.065	0.097	0.304
Parliamentary democracy	−0.364	−0.047	0.164	−0.567	−0.017
Presidential democracy	−0.231	−0.008	0.123	−0.412	−0.007
Economic development	−0.084	−0.009	0.040	−0.136	0.000
Economic growth	−1.377	−0.001	0.331	−1.910	−0.857
Trade openness	−0.375	−0.006	0.131	−0.609	−0.183
Change in trade openness	−0.002	−0.008	0.046	−0.060	0.084
Population size	−0.062	0.007	0.027	−0.133	−0.033
Age	0.009	−0.001	0.004	0.004	0.018
Times in office	0.137	−0.011	0.057	0.060	0.255
Entry	1.273	−0.003	0.228	0.933	1.704
Entry × Days in office (log)	−0.148	0.000	0.033	−0.209	−0.097
Days in office	−0.029	−0.005	0.026	−0.058	0.034
Days since last elections (log)	−0.017	−0.001	0.021	−0.048	0.020
Target event	0.425	−0.069	0.218	0.193	1.098
Ongoing crisis	−0.356	−0.017	0.223	−0.758	−0.027
Win crisis	−0.738	0.117	0.431	−1.818	−0.217
Lose crisis	−0.236	0.200	0.548	−1.910	0.270
Draw crisis	−0.878	0.149	0.518	−2.307	−0.326
Win war	−0.754	−0.117	0.758	−2.324	0.006
Lose war	0.928	0.143	0.420	−0.445	1.325
Draw war	−0.637	0.046	0.344	−1.474	−0.239
Constant	−1.033	−0.156	0.470	−1.502	0.486

Note: Bootstrap estimates; bias-corrected confidence intervals; K = 999 replications.

Table C.24: ***Summary results: conflict initiation (90% CI), Data 3***

	Observed coefficient	Bias	Bootstrap std. err.	90% confidence interval	
Regular removal	−2.073	0.346	0.323	−2.766	−1.864
Forcible removal	0.397	−0.183	0.288	0.106	1.181
Mixed regime	1.507	−0.248	0.274	1.313	2.239
Parliamentary democracy	2.097	−0.465	0.467	1.810	3.256
Presidential democracy	1.767	−0.357	0.364	1.529	2.759
Economic development	0.251	−0.052	0.080	0.177	0.489
Economic growth	−1.282	0.064	0.762	−2.491	−0.019
Trade openness	−0.777	0.060	0.245	−1.269	−0.457
Change in trade openness	−0.061	−0.008	0.105	−0.221	0.123
Population size	0.024	0.008	0.036	−0.052	0.070
Military mobilizations	0.073	0.000	0.055	−0.014	0.163
Number of borders	0.084	−0.007	0.021	0.057	0.133
Major power	1.062	−0.212	0.264	0.832	1.969
Time since last crisis (t)	−0.432	−0.015	0.117	−0.600	−0.215
Time since last crisis (t^2)	0.862	0.040	0.277	0.438	1.314
Time since last crisis (t^3)	−0.473	−0.036	0.186	−0.764	−0.223
Constant	−5.517	0.428	0.722	−7.136	−4.717

Note: Bootstrap estimates; bias-corrected confidence intervals; K = 1000 replications.

Table C.25: ***Summary results: regular removal (90% CI), Data 3***

	Observed coefficient	Bias	Bootstrap std. err.	90% confidence interval	
Conflict initiation	−0.284	0.099	0.247	−1.670	−0.109
Mixed regime	0.647	0.009	0.060	0.543	0.737
Parliamentary democracy	0.807	0.046	0.139	0.211	0.937
Presidential democracy	0.677	0.013	0.087	0.520	0.799
Economic development	0.068	0.009	0.030	0.008	0.106
Economic growth	−0.818	−0.026	0.299	−1.246	−0.318
Trade openness	−0.315	0.010	0.098	−0.501	−0.192
Change in trade openness	−0.047	−0.001	0.049	−0.134	0.030
Population size	0.035	−0.006	0.021	0.013	0.101
Age	0.007	0.001	0.003	−0.001	0.011
Times in office	−0.057	0.012	0.049	−0.182	−0.008
Entry	0.424	0.029	0.191	0.048	0.695
Entry × Days in office (log)	−0.072	−0.004	0.027	−0.115	−0.025
Days in office	−0.147	0.006	0.019	−0.188	−0.126
Days since last elections (log)	0.005	0.000	0.018	−0.023	0.036
Target event	−0.217	0.054	0.197	−0.748	−0.012
Ongoing crisis	−0.073	−0.032	0.158	−0.303	0.190
Win crisis	0.255	−0.143	0.366	−0.047	1.931
Lose crisis	0.415	−0.208	0.535	−0.026	2.987
Draw crisis	0.302	−0.191	0.483	−0.060	2.356
Win war	−0.348	−0.178	0.451	−0.847	0.607
Lose war	0.181	−0.214	0.479	−0.238	1.700
Draw war	0.137	−0.093	0.283	−0.213	0.715
Constant	−1.980	0.139	0.429	−3.691	−1.610

Note: Bootstrap estimates; bias-corrected confidence intervals; K = 1000 replications.

Table C.26: ***Summary results: forcible removal (90% CI), Data 3***

	Observed coefficient	Bias	Bootstrap std. err.	90% confidence interval	
Conflict initiation	0.372	−0.119	0.260	0.162	1.327
Mixed regime	0.195	−0.005	0.068	0.100	0.319
Parliamentary democracy	−0.332	−0.058	0.180	−0.518	0.225
Presidential democracy	−0.221	−0.025	0.127	−0.393	0.028
Economic development	−0.089	−0.007	0.038	−0.143	−0.014
Economic growth	−1.470	0.021	0.367	−2.158	−0.981
Trade openness	−0.306	−0.037	0.150	−0.520	−0.042
Change in trade openness	−0.097	−0.015	0.058	−0.183	−0.002
Population size	−0.065	0.006	0.027	−0.133	−0.033
Age	0.009	−0.001	0.004	0.005	0.020
Times in office	0.143	−0.014	0.060	0.072	0.286
Entry	1.306	−0.013	0.219	0.974	1.697
Entry × Days in office (log)	−0.151	0.001	0.031	−0.206	−0.103
Days in office	−0.027	−0.005	0.026	−0.064	0.024
Days since last elections (log)	−0.017	−0.001	0.021	−0.049	0.022
Target event	0.454	−0.079	0.221	0.244	1.303
Ongoing crisis	−0.378	−0.011	0.226	−0.815	−0.074
Win crisis	−0.804	0.133	0.439	−2.098	−0.333
Lose crisis	−0.324	0.235	0.551	−2.216	0.154
Draw crisis	−0.970	0.193	0.526	−2.509	−0.453
Win war	−0.832	−0.043	0.747	−2.736	−0.088
Lose war	0.820	0.180	0.425	−0.999	1.216
Draw war	−0.673	0.021	0.363	−1.474	−0.217
Constant	−0.973	−0.195	0.462	−1.362	0.668

Note: Bootstrap estimates; bias-corrected confidence intervals; K = 1000 replications.

Table C.27: ***Summary results: conflict initiation (90% CI), Data 4***

	Observed coefficient	Bias	Bootstrap std. err.	90% confidence interval	
Regular removal	−2.068	0.328	0.333	−2.877	−1.847
Forcible removal	0.390	−0.165	0.276	0.116	1.166
Mixed regime	1.503	−0.237	0.282	1.288	2.245
Parliamentary democracy	2.107	−0.438	0.477	1.739	3.199
Presidential democracy	1.781	−0.329	0.367	1.505	2.600
Economic development	0.233	−0.047	0.075	0.164	0.439
Economic growth	−1.442	0.066	0.761	−2.755	−0.260
Trade openness	−0.754	0.030	0.268	−1.247	−0.376
Change in trade openness	−0.109	−0.015	0.098	−0.280	0.025
Population size	0.021	0.007	0.036	−0.049	0.071
Military mobilizations	0.011	0.006	0.051	−0.082	0.087
Number of borders	0.085	−0.006	0.020	0.059	0.132
Major power	1.077	−0.188	0.273	0.844	2.237
Time since last crisis (t)	−0.429	−0.026	0.114	−0.590	−0.222
Time since last crisis (t^2)	0.853	0.065	0.266	0.412	1.262
Time since last crisis (t^3)	−0.465	−0.052	0.177	−0.731	−0.196
Constant	−5.507	0.430	0.737	−7.009	−4.685

Note: Bootstrap estimates; bias-corrected confidence intervals; K = 1000 replications.

Table C.28: ***Summary results: regular removal (90% CI), Data 4***

	Observed coefficient	Bias	Bootstrap std. err.	90% confidence interval	
Conflict initiation	−0.311	0.108	0.271	−1.394	−0.097
Mixed regime	0.647	0.008	0.061	0.531	0.741
Parliamentary democracy	0.807	0.047	0.140	0.325	0.933
Presidential democracy	0.685	0.017	0.084	0.518	0.794
Economic development	0.059	0.009	0.035	−0.016	0.103
Economic growth	−0.940	−0.019	0.293	−1.387	−0.447
Trade openness	−0.342	0.015	0.113	−0.581	−0.202
Change in trade openness	−0.046	0.004	0.050	−0.159	0.015
Population size	0.036	−0.006	0.022	0.013	0.100
Age	0.007	0.001	0.003	−0.005	0.010
Times in office	−0.060	0.013	0.049	−0.202	−0.007
Entry	0.406	0.029	0.202	0.029	0.694
Entry × Days in office (log)	−0.070	−0.004	0.029	−0.114	−0.019
Days in office	−0.148	0.006	0.021	−0.192	−0.120
Days since last elections (log)	0.007	0.000	0.018	−0.022	0.037
Target event	−0.234	0.062	0.213	−0.838	−0.012
Ongoing crisis	−0.068	−0.017	0.156	−0.322	0.188
Win crisis	0.297	−0.160	0.410	−0.079	1.730
Lose crisis	0.461	−0.227	0.571	−0.059	2.643
Draw crisis	0.360	−0.210	0.538	−0.114	2.332
Win war	−0.318	−0.188	0.476	−0.775	1.045
Lose war	0.213	−0.200	0.483	−0.229	1.672
Draw war	0.142	−0.108	0.288	−0.190	0.713
Constant	−2.023	0.154	0.461	−3.894	−1.605

Note: Bootstrap estimates; bias-corrected confidence intervals; K = 1000 replications.

Table C.29: ***Summary results: forcible removal (90% CI), Data 4***

	Observed coefficient	Bias	Bootstrap std. err.	90% confidence interval	
Conflict initiation	0.415	−0.135	0.288	0.142	1.397
Mixed regime	0.198	−0.007	0.067	0.106	0.341
Parliamentary democracy	−0.316	−0.062	0.178	−0.522	0.168
Presidential democracy	−0.226	−0.017	0.127	−0.422	0.008
Economic development	−0.073	−0.011	0.040	−0.121	0.013
Economic growth	−1.479	−0.009	0.361	−2.132	−0.960
Trade openness	−0.410	−0.040	0.176	−0.653	−0.068
Change in trade openness	−0.010	−0.014	0.053	−0.067	0.123
Population size	−0.070	0.009	0.028	−0.141	−0.038
Age	0.010	−0.001	0.004	0.006	0.021
Times in office	0.147	−0.019	0.064	0.081	0.340
Entry	1.315	−0.025	0.236	0.985	1.761
Entry × Days in office (log)	−0.153	0.004	0.033	−0.215	−0.105
Days in office	−0.023	−0.007	0.027	−0.056	0.042
Days since last elections (log)	−0.014	0.000	0.021	−0.047	0.023
Target event	0.488	−0.086	0.240	0.249	1.217
Ongoing crisis	−0.376	−0.015	0.221	−0.762	−0.063
Win crisis	−0.864	0.152	0.482	−2.072	−0.345
Lose crisis	−0.424	0.276	0.613	−2.403	0.155
Draw crisis	−1.052	0.219	0.571	−2.860	−0.470
Win war	−0.884	−0.066	0.812	−3.103	−0.085
Lose war	0.765	0.201	0.448	−0.486	1.226
Draw war	−0.748	0.048	0.340	−1.491	−0.321
Constant	−0.945	−0.210	0.507	−1.411	0.888

Note: Bootstrap estimates; bias-corrected confidence intervals; K = 1000 replications.

Table C.30: ***Summary results: conflict initiation (90% CI), Data 5***

	Observed coefficient	Bias	Bootstrap std. err.	90% confidence interval	
Regular removal	−2.055	0.323	0.332	−2.769	−1.854
Forcible removal	0.382	−0.152	0.293	0.095	1.152
Mixed regime	1.495	−0.233	0.281	1.277	2.099
Parliamentary democracy	2.097	−0.438	0.491	1.782	3.257
Presidential democracy	1.766	−0.341	0.376	1.526	2.869
Economic development	0.226	−0.041	0.082	0.139	0.483
Economic growth	−1.135	−0.015	0.717	−2.169	0.159
Trade openness	−0.800	0.063	0.248	−1.295	−0.458
Change in trade openness	−0.054	−0.013	0.089	−0.197	0.093
Population size	0.024	0.009	0.035	−0.054	0.070
Military mobilizations	0.049	0.001	0.052	−0.032	0.135
Number of borders	0.084	−0.007	0.021	0.058	0.130
Major power	1.056	−0.176	0.267	0.810	1.645
Time since last crisis (t)	−0.431	−0.024	0.117	−0.582	−0.191
Time since last crisis (t^2)	0.859	0.066	0.280	0.331	1.222
Time since last crisis (t^3)	−0.470	−0.056	0.193	−0.715	−0.154
Constant	−5.493	0.438	0.741	−7.189	−4.687

Note: Bootstrap estimates; bias-corrected confidence intervals; K = 1000 replications.

Table C.31: ***Summary results: regular removal (90% CI), Data 5***

	Observed coefficient	Bias	Bootstrap std. err.	90% confidence interval	
Conflict initiation	−0.318	0.106	0.229	−1.206	−0.135
Mixed regime	0.646	0.01	0.061	0.54	0.735
Parliamentary democracy	0.805	0.050	0.131	0.285	0.931
Presidential democracy	0.683	0.014	0.085	0.511	0.797
Economic development	0.050	0.008	0.032	−0.033	0.090
Economic growth	−0.696	−0.016	0.285	−1.131	−0.227
Trade openness	−0.314	0.003	0.093	−0.481	−0.185
Change in trade openness	−0.027	0.006	0.043	−0.126	0.026
Population size	0.038	−0.006	0.022	0.015	0.105
Age	0.007	0.001	0.003	−0.002	0.010
Times in office	−0.062	0.012	0.048	−0.232	−0.014
Entry	0.417	0.036	0.198	0.062	0.703
Entry × Days in office (log)	−0.072	−0.005	0.029	−0.116	−0.022
Days in office	−0.149	0.007	0.020	−0.219	−0.129
Days since last elections (log)	0.005	0.000	0.018	−0.023	0.034
Target event	−0.230	0.060	0.184	−0.726	−0.024
Ongoing crisis	−0.069	−0.031	0.152	−0.285	0.208
Win crisis	0.298	−0.160	0.351	−0.016	1.607
Lose crisis	0.477	−0.219	0.491	0.042	2.272
Draw crisis	0.365	−0.200	0.455	−0.016	2.087
Win war	−0.292	−0.198	0.443	−0.758	0.818
Lose war	0.242	−0.181	0.458	−0.204	1.553
Draw war	0.152	−0.093	0.283	−0.203	0.740
Constant	−2.026	0.143	0.401	−3.468	−1.681

Note: Bootstrap estimates; bias-corrected confidence intervals; K = 1000 replications.

Table C.32: ***Summary results: forcible removal (90% CI), Data 5***

	Observed coefficient	Bias	Bootstrap std. err.	90% confidence interval	
Conflict initiation	0.446	−0.146	0.273	0.209	1.459
Mixed regime	0.199	−0.009	0.068	0.103	0.332
Parliamentary democracy	−0.309	−0.061	0.181	−0.492	0.296
Presidential democracy	−0.224	−0.020	0.130	−0.424	0.007
Economic development	−0.084	−0.011	0.043	−0.141	0.006
Economic growth	−1.228	−0.025	0.343	−1.786	−0.720
Trade openness	−0.267	−0.020	0.138	−0.491	−0.038
Change in trade openness	−0.030	−0.015	0.047	−0.079	0.075
Population size	−0.068	0.010	0.029	−0.156	−0.038
Age	0.010	−0.001	0.004	0.006	0.021
Times in office	0.153	−0.016	0.063	0.087	0.354
Entry	1.310	−0.018	0.234	0.954	1.748
Entry × Days in office (log)	−0.152	0.002	0.034	−0.217	−0.103
Days in office	−0.024	−0.005	0.027	−0.059	0.039
Days since last elections (log)	−0.018	−0.001	0.021	−0.049	0.019
Target event	0.513	−0.099	0.229	0.291	1.303
Ongoing crisis	−0.391	−0.006	0.220	−0.811	−0.091
Win crisis	−0.911	0.176	0.459	−2.224	−0.425
Lose crisis	−0.476	0.278	0.579	−2.707	0.016
Draw crisis	−1.118	0.240	0.553	−3.086	−0.586
Win war	−0.838	−0.050	0.818	−3.436	−0.143
Lose war	0.743	0.202	0.448	−1.300	1.155
Draw war	−0.713	0.052	0.347	−1.564	−0.280
Constant	−0.841	−0.237	0.477	−1.225	1.330

Note: Bootstrap estimates; bias-corrected confidence intervals; K = 1000 replications.

C.4.3 Reduced-form equations

Table C.33: ***Summary results: conflict initiation, reduced-form***

	Coefficient	Standard error	p-value	95% confidence interval	
Mixed regime	−0.038	0.080	0.636	−0.195	0.119
Parliamentary democracy	−0.408	0.141	0.004	−0.685	−0.131
Presidential democracy	−0.069	0.130	0.597	−0.323	0.186
Civil war	−0.047	0.086	0.587	−0.215	0.122
Economic development	−0.058	0.045	0.192	−0.146	0.029
Economic growth	0.255	0.467	0.586	−0.661	1.170
Trade openness	−0.099	0.175	0.571	−0.442	0.243
Change in trade openness	−0.063	0.067	0.349	−0.194	0.068
Population size	0.070	0.027	0.010	0.017	0.124
Age	−0.010	0.003	0.001	−0.016	−0.004
Times in office	−0.126	0.088	0.153	−0.299	0.047
entry1lnten	−0.261	0.359	0.468	−0.965	0.444
Entry × Days in office	0.032	0.049	0.507	−0.063	0.127
Days in office (log)	−0.055	0.031	0.078	−0.116	0.006
Days since last elections (log)	0.000	0.027	0.996	−0.053	0.052
Target event	−0.617	0.119	0.000	−0.851	−0.383
Ongoing crisis	0.180	0.113	0.111	−0.041	0.402
Win crisis	1.387	0.133	0.000	1.127	1.647
Lose crisis	1.981	0.119	0.000	1.749	2.214
Draw crisis	1.850	0.104	0.000	1.646	2.054
Win war	1.188	0.201	0.000	0.794	1.582
Lose war	1.345	0.203	0.000	0.946	1.744
Draw war	0.541	0.201	0.007	0.148	0.934
Military mobilization	0.012	0.039	0.755	−0.064	0.088
Number of borders	0.017	0.014	0.215	−0.010	0.045
Major power	−0.123	0.134	0.361	−0.386	0.140
Days since last crisis (t)	−0.005	0.075	0.952	−0.152	0.143
Days since last crisis (t^2)	0.014	0.173	0.934	−0.325	0.354
Days since last crisis (t^3)	−0.031	0.104	0.766	−0.235	0.173
Constant	−1.587	0.303	0.000	−2.180	−0.993

Note: Reduced-form equations; estimates and significance level computed using Rubin's rules for multiple imputation.

Table C.34: ***Summary results: regular removal, reduced-form***

	Coefficient	Standard error	p-value	95% confidence interval	
Mixed regime	0.683	0.056	0.000	0.573	0.794
Parliamentary democracy	0.983	0.069	0.000	0.848	1.118
Presidential democracy	0.720	0.071	0.000	0.580	0.859
Civil war	−0.006	0.054	0.910	−0.111	0.099
Economic development	0.061	0.025	0.014	0.012	0.110
Economic growth	−0.854	0.267	0.001	−1.378	−0.330
Trade openness	−0.300	0.079	0.000	−0.455	−0.145
Change in trade openness	−0.013	0.055	0.808	−0.122	0.095
Population size	−0.026	0.014	0.071	−0.054	0.002
Age	0.011	0.002	0.000	0.007	0.014
Times in office	−0.036	0.031	0.241	−0.096	0.024
entry1lnten	0.529	0.167	0.002	0.201	0.857
Entry × Days in office	−0.085	0.025	0.001	−0.134	−0.035
Days in office (log)	−0.125	0.013	0.000	−0.151	−0.098
Days since last elections (log)	0.001	0.014	0.927	−0.026	0.029
Target event	−0.050	0.106	0.640	−0.258	0.158
Ongoing crisis	−0.132	0.149	0.376	−0.424	0.160
Win crisis	−0.185	0.137	0.178	−0.453	0.084
Lose crisis	−0.207	0.158	0.189	−0.517	0.102
Draw crisis	−0.276	0.126	0.029	−0.523	−0.029
Win war	−0.745	0.288	0.010	−1.309	−0.182
Lose war	−0.178	0.266	0.503	−0.699	0.343
Draw war	−0.033	0.234	0.887	−0.492	0.426
Military mobilization	0.013	0.021	0.536	−0.029	0.055
Number of borders	0.027	0.008	0.001	0.011	0.042
Major power	0.355	0.075	0.000	0.208	0.501
Days since last crisis (t)	0.014	0.033	0.682	−0.051	0.078
Days since last crisis (t^2)	−0.012	0.062	0.850	−0.132	0.109
Days since last crisis (t^3)	0.012	0.031	0.697	−0.048	0.072
Constant	−1.640	0.158	0.000	−1.950	−1.330

Note: Reduced-form equations; estimates and significance level computed using Rubin's rules for multiple imputation.

Table C.35: ***Summary results: forcible removal, reduced-form***

	Coefficient	Standard error	p-value	95% confidence interval	
Mixed regime	0.173	0.056	0.002	0.063	0.283
Parliamentary democracy	−0.494	0.110	0.000	−0.711	−0.278
Presidential democracy	−0.255	0.107	0.017	−0.464	−0.046
Civil war	0.333	0.062	0.000	0.212	0.454
Economic development	−0.110	0.032	0.001	−0.173	−0.048
Economic growth	−1.332	0.301	0.000	−1.922	−0.741
Trade openness	−0.381	0.151	0.012	−0.676	−0.085
Change in trade openness	−0.054	0.062	0.391	−0.176	0.069
Population size	−0.034	0.020	0.084	−0.073	0.005
Age	0.006	0.002	0.010	0.001	0.010
Times in office	0.103	0.040	0.010	0.024	0.181
entry1lnten	1.189	0.192	0.000	0.813	1.565
Entry × Days in office	−0.138	0.028	0.000	−0.192	−0.083
Days in office (log)	−0.048	0.020	0.019	−0.088	−0.008
Days since last elections (log)	−0.016	0.019	0.406	−0.053	0.022
Target event	0.231	0.125	0.064	−0.014	0.475
Ongoing crisis	−0.300	0.178	0.092	−0.649	0.049
Win crisis	−0.269	0.199	0.175	−0.659	0.120
Lose crisis	0.410	0.147	0.005	0.122	0.698
Draw crisis	−0.269	0.169	0.110	−0.599	0.061
Win war	−0.350	0.401	0.383	−1.136	0.436
Lose war	1.336	0.199	0.000	0.946	1.726
Draw war	−0.464	0.340	0.171	−1.130	0.201
Military mobilization	−0.007	0.020	0.720	−0.046	0.032
Number of borders	0.008	0.012	0.515	−0.016	0.031
Major power	−0.219	0.165	0.185	−0.544	0.105
Days since last crisis (t)	−0.052	0.051	0.310	−0.152	0.048
Days since last crisis (t^2)	0.155	0.107	0.147	−0.055	0.364
Days since last crisis (t^3)	−0.104	0.060	0.083	−0.221	0.014
Constant	−1.568	0.215	0.000	−1.990	−1.147

Note: Reduced-form equations; estimates and significance level computed using Rubin's rules for multiple imputation.

Appendix D: Online Appendix to Chapter 6

D.1 Description of the statistical model

In Chapter 6, we evaluated how each of the classic levels of analysis in international relations contributes to account for the variation in international conflict (Singer, 1961; Ray, 2001). Our analysis is straightforwardly empirical. We seek to discover the explanatory leverage of three alternative ways of looking at conflict processes in the international arena. Despite all the ink devoted to the levels of analysis in International Relations, to our knowledge, there is no answer in the literature to the question of their relative contribution to the explanation of the variation in international conflict.

We address this question by estimating a Bayesian hierarchical model with random intercepts, and a probit link. The dependent variable is the involvement in international conflict, coded 1 for all the years a leaders has been involved in an international crisis, as defined in the International Crisis Behavior data (Brecher and Wilkenfeld, 1997), and 0 otherwise.[1] In the analyses in Chapter 4, we studied conflict initiation because we were interested in isolating the effects of the manner of losing office on the decisions to resort to international conflict. In Chapter 6, we analyzed conflict involvement, that is, how often and how long a leader finds himself engaged in an international crisis or war because we are interested in evaluating how the variation in the frequency and persistence of conflict (i.e. *how much* conflict there is) can be traced back to the three classic levels of analysis. To this effect, our statistical model partitions the total variability in international conflict among systems, countries, and leaders. A fourth category – the

[1] Data for this variable is obtained from Grieco's (2001) and Gelpi and Grieco's (2001) revised version of the International Crisis Behavior (ICB) project data (Brecher and Wilkenfeld, 1997). We updated the conflict data series using version 7.0 of the ICB data (International Crisis Behavior Project, 2007).

residual category – represents the variation that occurs over time for each given leader.[2]

We identify the three levels of analysis on the basis of the leaders coded in the *Archigos* dataset of Goemans, Gleditsch and Chiozza (2009); the states coded in the Polity IV data set (Polity IV Project, 2004); and the international systems classified by Schweller (1998), which distinguishes four different configurations: the period from 1919 to 1938 (multipolarity); World War II (tripolarity); the Cold War from 1946 to 1990 (bipolarity); and the post-Cold War period from 1991 to 2003 (unipolarity).

D.1.1 The model

The Bayesian hierarchical probit model with random intercepts model takes the following form. We posit that leaders, who are embedded in states, which are embedded in international systems, have an underlying latent propensity to get involved in international conflict, Y^*_{ijkt}, which takes on values between $+\infty$ and $-\infty$. In our data, we have $i = 4$ international systems; $j = 163$ states; $k = 2{,}151$ leaders for a total of $ijkt = 10{,}959$ observations over time.

We, of course, cannot measure Y^*_{ijkt}: given the bluntness of our measurement tools, we can only measure whether a leader is actually involved in an international conflict or not at a given point in time. That is, Y^*_{ijkt} is a latent variable that can only be measured when it crosses a given threshold:

$$Y_{ijkt} = \begin{cases} 1 & \text{if } Y^*_{ijkt} > 0 \\ 0 & \text{if } Y^*_{ijkt} \leq 0 \end{cases} \tag{D.1}$$

Given this measurement issue, our model specification needs to account for two elements: (*a*) the hierarchical model to measure the mean of Y^*_{ijkt}; and (*b*) the measurement model for Y^*_{ijkt}. We begin with the hierarchical model. We posit Y^*_{ijkt} is a function of the following parameters:

$$Y^*_{ijkt} = \eta_{ijk} + \varepsilon^{(1)}_{ijkt} \tag{D.2}$$

$$\eta_{ijk} = \zeta_{ij} + \varepsilon^{(2)}_{ijk} \tag{D.3}$$

[2] Because our unit of analysis is the leader, who is embedded in a political regime, which is in turn embedded in an international system, we use what in the jargon of quantitative international relations is known as a monadic data set (Bennett and Stam, 2004).

$$\zeta_{ij} = \gamma_i + \varepsilon_{ij}^{(3)} \tag{D.4}$$

$$\gamma_i = \pi + \varepsilon_i^{(4)} \tag{D.5}$$

That is,

$$Y_{ijkt}^{*} = \pi + \gamma_i + \zeta_{ij} + \eta_{ijk} + \varepsilon_i^{(4)} + \varepsilon_{ij}^{(3)} + \varepsilon_{ijk}^{(2)} + \varepsilon_{ijkt}^{(1)} \tag{D.6}$$

Y_{ijkt}^{*} is a function of eight parameters: (*a*) a grand intercept, π; (*b*) three sets of random intercepts, one per level of analysis, i.e. international systems (γ_i), states (ζ_{ij}), and leaders (η_{ijk}); (*c*) four error terms. For each of the error components in the model, we posit that:

$$\varepsilon_i^{(4)} \sim N(0, \psi^{(4)});\ \varepsilon_{ij}^{(3)} \sim N(0, \psi^{(3)});\ \varepsilon_{ijk}^{(2)} \sim N(0, \psi^{(2)});\ \text{and}$$
$$\varepsilon_{ijkt}^{(1)} \sim N(0, \psi^{(1)}) \tag{D.7}$$

That is, the error components follow a Normal distribution with mean 0 and variance $\psi^{(k)}$, where $k = 1, \ldots, 4$.

In terms of the measurement model for Y_{ijkt}^{*}, we estimate the probability that a leader is involved in conflict:

$$\Pr(Y_{ijkt} = 1) = \Pr(Y_{ijkt}^{*} > 0) = \Pr\left(\eta_{ijk} + \varepsilon_{ijkt}^{(1)} > 0\right) \tag{D.8}$$

We posit that $\varepsilon_{ijkt}^{(1)}$ has a normal distribution with mean zero and variance $\psi^{(1)} = 1$. This leads to a probit regression model (Albert and Chib, 1993):

$$\Pr(Y_{ijkt} = 1) = \Phi(\eta_{ijk}) \tag{D.9}$$

The key parameters to evaluate the relative contribution of the three levels of analysis are the intraclass correlation parameters (reported in Figure 6.1 in Chapter 6). These parameters are defined as ratios of the variances at each of the data clusters (i.e. the three levels of analysis and the residual variation over time) to the total variance (TV) in the data:

$$\text{TV} = \psi^{(1)} + \psi^{(2)} + \psi^{(3)} + 1 \tag{D.10}$$

Specifically:

$$\rho(\text{Leaders}) = \frac{\psi^{(3)}}{\text{TV}} \tag{D.11}$$

$$\rho\,(\text{States}) = \frac{\psi^{(2)}}{\text{TV}} \tag{D.12}$$

$$\rho(\text{Int'l systems}) = \frac{\psi^{(1)}}{\text{TV}} \tag{D.13}$$

D.1.2 Bayesian inference

We use Bayesian inference to estimate the model parameters. Thus, inferences about the parameters in the model are based on the posterior distribution, which is derived via Bayes' theorem from the likelihood and the prior distributions. Estimation proceeds through the Gibbs sampler, an algorithm that decomposes the joint distribution into a series of conditional densities and iteratively samples from each of them. Under minimal conditions, the samples from the conditional distribution converge to the posterior distribution, and can be used for inferential purposes.

As Albert and Chib (1993) show, a probit model implies two truncated Normal distributions for Y^*_{ijkt}, as follows:

$$Y^*_{ijkt} \sim N(\eta_{ijk}, 1)|(0, +\infty) \text{ if } y_i = 1 \tag{D.14}$$

$$Y^*_{ijkt} \sim N(\eta_{ijk}, 1)|(-\infty, 0) \text{ if } y_i = 0 \tag{D.15}$$

These distributions can then be used to estimate the model parameters using the Gibbs sampler (Albert and Chib, 1993; Congdon, 2006). We ran two parallel chains of 200,000 iterations with a burn-in period of 50,000 iterations; we recorded every 300th iteration (i.e. chain thinning is equal to 300). This generated two chains of 500 iterations each. We report the results in Table D.1 and Figures D.1, D.2, and D.3. We evaluated the convergence of the chains using three batteries of tests – the Geweke test, the Heidelberger and Welch convergence diagnostic, and the Gelman and Rubin convergence diagnostic (Gill, 2002, 398–408) – which are reported in Tables D.2, D.3, and D.4.

In sections D.1.3 and D.1.4, we present the model notation and the OpenBUGS code we used to estimate it. We follow the OpenBUGS convention, and write the specifications for the Normal distribution in terms of mean and precision (i.e. 1 over the variance). We use largely non-informative priors on the π, the overall mean, parameter and the variance components. Specifically, we place a Normal prior with mean 0 and variance 100 on π (see Equation D.22). In line with Gelman's (2006) recommendation, we place half-Normal (hyper)-priors on the standard deviations for the precision parameters associated with the

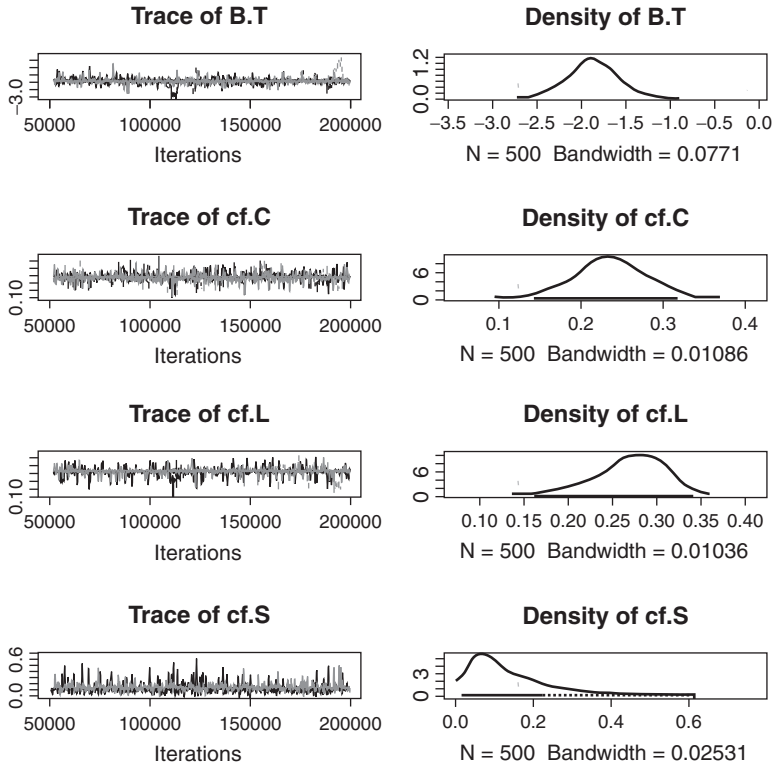

Figure D.1: Chains (Part 1)

Normal distributions for the leader-, country-, and system-level means (see Equations D.24, D.26, and D.28).

D.1.3 The model notation

$$y^*_{lcst} \sim N(\mu_{lcst}, 1)|(0, +\infty) \text{ if } y = 1 \tag{D.16}$$

$$y^*_{lcst} \sim N(\mu_{lcst}, 1)|(-\infty, 0) \text{ if } y = 0 \tag{D.17}$$

$$\mu_{lcst} = B_T + B_{L,l} + B_{C,c} + B_{S,s} \tag{D.18}$$

Priors:

$$B_{L,l} \sim N(0, \tau_L) \tag{D.19}$$

$$B_{C,c} \sim N(0, \tau_C) \tag{D.20}$$

$$B_{S,s} \sim N(0, \tau_S) \tag{D.21}$$

$$B_T \sim N(0, 0.01) \tag{D.22}$$

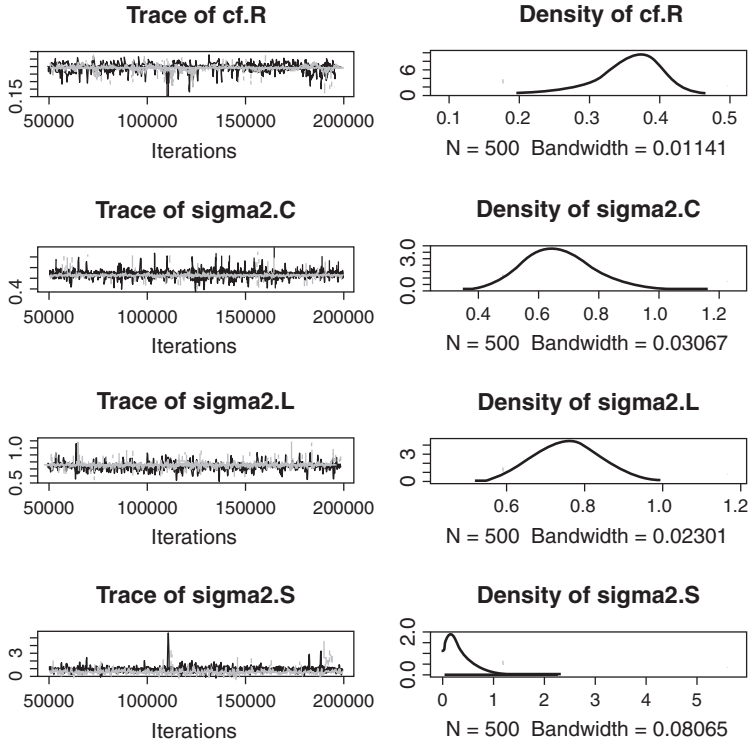

Figure D.2: Chains (Part 2)

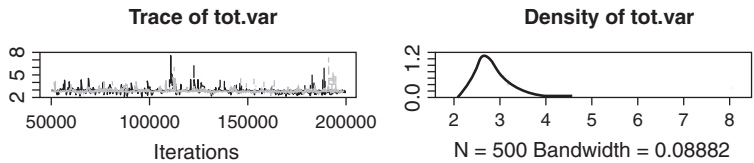

Figure D.3: Chains (Part 3)

Hyper-priors:

$$\tau_L = 1/\sigma_L^2 \tag{D.23}$$

$$\sigma_L \sim N(0, 0.04) \,|\, (0,) \tag{D.24}$$

$$\tau_C = 1/\sigma_C^2 \tag{D.25}$$

$$\sigma_C \sim N(0, 0.04)|(0,) \tag{D.26}$$

$$\tau_S = 1/\sigma_S^2 \tag{D.27}$$

$$\sigma_S \sim N(0, 1)|(0,) \tag{D.28}$$

Variance partitions:

$$\text{TotVar} = 1 + \sigma_L^2 + \sigma_C^2 + \sigma_S^2 \tag{D.29}$$

$$\text{cf}_L = \sigma_L^2/\text{TotVar} \tag{D.30}$$

$$\text{cf}_C = \sigma_C^2/\text{TotVar} \tag{D.31}$$

$$\text{cf}_S = \sigma_S^2/\text{TotVar} \tag{D.32}$$

$$\text{cf}_{Res} = 1/\text{TotVar} \tag{D.33}$$

D.1.4 OpenBUGS code

```
model {
for (i in 1:N) {
ystarl[i] ~ dnorm(eta[i],1)I(lo[yl[i]+l],up[yl[i]+1])
eta[i] <- B.T + B.L[lid[i]] + B.C[cid[i]] + B.S[sid[i]]
}
for (1 in 1:L) {B.L[1] ~ dnorm(0,tau.L)}
for (c in 1:C) {B.C[c] ~ dnorm(0,tau.C)}
for (s in 1:S) {B.S[s] ~ dnorm(0,tau.S)}
B.T ~ dnorm(0,.01)
tau.L <- l/sigma2.L
sigma2.L <- pow(sigma.L,2)
sigma.L ~ dnorm(0,.04)1(0,)
tau.C <- l/sigma2.C
sigma2.C <- pow(sigma.C,2)
sigma.C ~ dnorm(0,.04)1(0,)
tau.S <- l/sigma2.S
sigma2.S <- pow(sigma.S,2)
sigma.S ~ dnorm(0,1)1(0,)
tot.var <- 1 + sigma2.L + sigma2.C + sigma2.S
cf.L <- sigma2.L/tot.var
cf.C <- sigma2.C/tot.var
cf.S <- sigma2.S/tot.var
lo[l] <- -50
lo[2] <- 0
up[l] <- 0
up[2] <- 50
}
```

D.2 Results

Table D.1: *Bayesian hierarchical probit model*

	Mean	SD	Naive SE	Time-series SE
B.T	−1.858	0.348	0.011	0.032
cf.C	0.235	0.043	0.001	0.001
cf.L	0.268	0.041	0.001	0.002
cf.S	0.143	0.109	0.003	0.005
cf.R	0.354	0.051	0.002	0.002
sigma2.C	0.671	0.121	0.004	0.003
sigma2.L	0.760	0.087	0.003	0.003
sigma2.S	0.469	0.517	0.016	0.024
tot.var	2.900	0.552	0.017	0.025

Quantiles

	2.5%	25%	50%	75%	97.5%
B.T	−2.489	−2.060	−1.872	−1.672	−1.098
cf.C	0.151	0.209	0.235	0.264	0.314
cf.L	0.173	0.245	0.273	0.297	0.333
cf.S	0.027	0.064	0.110	0.191	0.435
cf.R	0.230	0.331	0.362	0.388	0.432
sigma2.C	0.464	0.588	0.661	0.742	0.952
sigma2.L	0.598	0.700	0.759	0.816	0.936
sigma2.S	0.067	0.165	0.292	0.571	1.883
tot.var	2.315	2.577	2.759	3.024	4.340

Note: Iterations = 50001:199701; thinning interval = 300; number of chains = 2; sample size per chain = 500.

D.2.1 Tests of convergence

Table D.2: *Geweke test of convergence*

	Chain 1		Chain 2	
	z	p-value	z	p-value
B.T	2.077	0.038	−1.042	0.297
cf.C	−1.179	0.239	1.793	0.073
cf.L	1.379	0.168	1.669	0.095
cf.S	−0.263	0.793	−1.883	0.060
cf.R	0.067	0.947	0.653	0.514
sigma2.C	−0.938	0.348	1.479	0.139
sigma2.L	1.144	0.253	1.169	0.242
sigma2.S	−0.242	0.809	−1.792	0.073
tot.var	−0.111	0.911	−0.948	0.343

Note: Fraction in 1st window = 0.1; Fraction in 2nd window = 0.5.

Table D.3: ***Heidelberger and Welch's convergence diagnostic***

	Stationarity			Halfwidth		
	test	Start	p-value	test	Mean	Halfwidth
Chain 1						
B.T	1	51	0.107	1	−1.921	0.075
cf.C	1	1	0.703	1	0.238	0.003
cf.L	1	1	0.554	1	0.268	0.004
cf.S	1	1	0.273	1	0.137	0.011
cf.R	1	1	0.076	1	0.357	0.006
sigma2.C	1	1	0.074	1	0.674	0.009
sigma2.L	1	1	0.101	1	0.755	0.009
sigma2.S	1	1	0.185	0	0.443	0.054
tot.var	1	1	0.087	1	2.871	0.062
Chain 2						
B.T	1	1	0.562	1	−1.809	0.104
cf.C	1	1	0.336	1	0.232	0.005
cf.L	1	1	0.727	1	0.267	0.005
cf.S	1	1	0.722	0	0.150	0.016
cf.R	1	1	0.837	1	0.351	0.007
sigma2.C	1	1	0.111	1	0.668	0.010
sigma2.L	1	1	0.905	1	0.765	0.008
sigma2.S	1	1	0.652	0	0.496	0.075
tot.var	1	1	0.785	1	2.928	0.076

Table D.4: ***Gelman and Rubin's convergence diagnostic***

	Point est.	97.5% quantile
B.T	1.129	1.466
cf.C	1.011	1.055
cf.L	1.002	1.002
cf.S	1.010	1.036
cf.R	1.006	1.029
sigma2.C	1.006	1.017
sigma2.L	1.004	1.024
sigma2.S	1.007	1.026
tot.var	1.005	1.022
Multivariate psrf	1.082	