

# Web Appendix

## “Strange Bedfellows: The Strategic Dynamics of Major Power Military Interventions”

Stephen E. Gent

### Maximum Likelihood Function

Assume that the  $\alpha_j$  are distributed Type 1 Extreme Value. Therefore, the action probabilities are

$$\begin{aligned} p_4 &= 1 - p_3 = \frac{e^{X_{24}\beta_{24}}}{1 + e^{X_{24}\beta_{24}}}, \\ p_6 &= \frac{e^{X_{26}\beta_{26}}}{1 + e^{X_{26}\beta_{26}} + e^{X_{27}\beta_{27}}}, \\ p_7 &= \frac{e^{X_{27}\beta_{27}}}{1 + e^{X_{26}\beta_{26}} + e^{X_{27}\beta_{27}}}, \\ p_5 &= 1 - p_6 - p_7. \\ p_2 &= 1 - p_1 = \frac{e^{p_5 X_{15}\beta_{15} + p_6\beta_{16} + p_7\beta_{17} - p_4\beta_{14}}}{1 + e^{p_5 X_{15}\beta_{15} + p_6\beta_{16} + p_7\beta_{17} - p_4\beta_{14}}}. \end{aligned}$$

The outcome probabilities can then be constructed from the action probabilities:

$$p_{SQ} = p_1 p_3,$$

$$p_{I2} = p_1 p_4,$$

$$p_{I1} = p_2 p_5,$$

$$p_{JI} = p_2 p_6,$$

$$p_{CI} = p_2 p_7.$$

Let  $d_{i,j}$  be a dummy variable that equals 1 when the outcome of the game for observation  $i$  is  $j \in \{SQ, I_2, I_1, CI, JI\}$  and 0 otherwise. Then, the log-likelihood equation of the model

is

$$\ln(L) = \sum_{i=1}^n [d_{i,SQ} \ln(p_{SQ}) + d_{i,I2} \ln(p_{I2}) + d_{i,I1} \ln(p_{I1}) + d_{i,JI} \ln(p_{JI}) + d_{i,CI} \ln(p_{CI})]. \quad (1)$$

## Measurement of Variables

The data used in the analysis come from various sources. A number of the variables—including S-scores, contiguity, distance, and capabilities—were generated using the EUGene computer program (Bennett and Stam 2000).

**Dependent Variable.** This variable was coded using data from Regan (2002), who provides the date and target of military interventions in civil wars from 1944 to 1999. For each observation, Power 1 is coded as intervening if it pursued a military intervention at any time during the calendar year. In the cases where Power 1 intervened, it is determined whether Power 2 pursued a military intervention in the twelve months following Power 1's intervention.<sup>1</sup> If Power 2 intervenes on the same side of the civil conflict as Power 1, then the observation is coded as a joint intervention. On the other hand, if Power 2 intervenes on a different side than Power 1, the observation is coded as a counter-intervention. Finally, if there is no intervention by Power 2, the outcome is a unilateral intervention by Power 1. Alternatively, in the cases where Power 1 did not intervene, it is determined whether Power 2 intervened at any time during the year in question or the next calendar year. If so, the observation is coded as a unilateral intervention by Power 2. If not, the outcome is the status quo.

**Divisiveness.** The S scores used in this measure are calculated using the foreign policy similarity of states using alliance portfolios (Signorino and Ritter 1999). Unweighted S-scores used for this variable were generated using EUGene. As noted in the text, this variable is calculated as  $|S(\text{Power1}, \text{Target}) - S(\text{Power2}, \text{Target})|$ .

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<sup>1</sup>If Power 1 pursues more than one military intervention in a calendar year, the window of possible intervention extends from the date of the first intervention to twelve months following the last intervention of the calendar year.

**Contiguous Target.** This variable is coded as 1 if the target is contiguous by land to the potential intervener. The contiguity data is taken the Correlates of War data set (Singer and Small 1982).

**Former Colony.** This variable is coded as 1 if the target was a former colony of the potential intervener. The colony variable was coded using the ICOW Colonial History data set prepared by Paul Hensel (<http://garnet.acns.fsu.edu/~phensel/icow.html>)

**Deaths.** Regan (2002) provides the total number of deaths for an entire war. However, since some wars last less than a month while others persist for decades, this would not provide a usual measure for a country-year analysis. To calculate the measure used here, I first calculated the average number of deaths per month by dividing the total number of deaths by the total number of months that the war lasted. I then multiplied this number by the number of months that the war occurred during the year in question to get a measure of the expected number of death that year. Given the skewness of this variable, I use the natural log of deaths in the analysis.

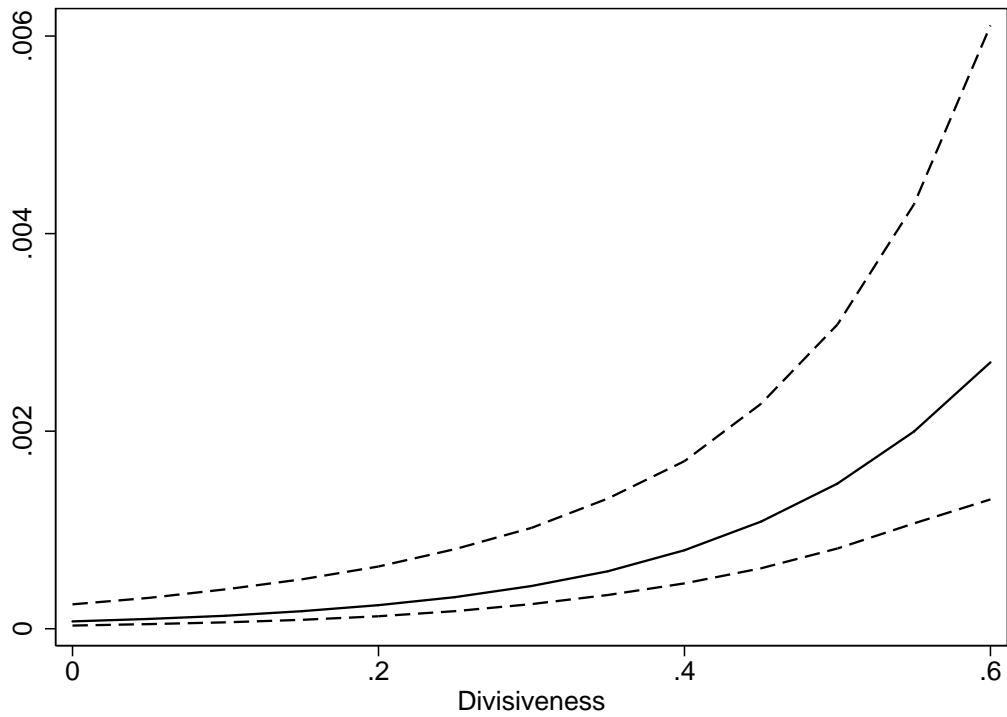
**Relative Capabilities.** This variable is measured using the COW Composite Index of National Capabilities (CINC) (Singer, Bremer and Stuckey 1972). The relative capability of  $i$  versus  $j$  is calculated as  $i$ 's share of the total capabilities of  $i$  and  $j$ .

**Distance.** This variable is coded as the distance between the capital cities of the major power and the target. Given the skewness of this variable, I use the natural log of distance in the analysis.

## Predicted Probability of Joint Intervention

As noted in the text, a graphical representation of the effect of divisiveness on the predicted probability can be found in Figure 1. All other continuous variables are held at their means, while dichotomous variables are held at their modal values. Simulated 95% confidence intervals are also provided.

Figure 1: Probability of Joint Intervention



Predicted probability of joint intervention with simulated 95% confidence interval. Other variables held at mean (continuous) or mode (dichotomous).

## **Additional Statistical Analyses**

### **Robustness Check**

As noted in the text, the analysis reported in “Strange Bedfellows” was based upon a “directed major power dyad”-target-year data structure. To account for possible correlation between cases involving the same target in the same year, robust standard errors clustered on the target-year were reported. An additional robustness check was made to address this issue. With the directed dyad research design, the same major power dyad is included twice in the data set for each target-year. For each major power dyad-target-year, one of the observations was randomly selected. This random sampling in effect partitions the original data into two subsamples, each containing one observation from each major power dyad-target-year. The model was then estimated on each of these two subsamples. The results of these estimations can be found in Tables 1–4. While there are some minor differences between the three estimations (the full sample and the two subsamples), the effect of the divisiveness variable is consistent. In all models, divisiveness has a positive and statistically significant impact on the conditional probability that the Power 2 joins or counters an intervention by Power 1. Concerning Power 1’s utilities, divisiveness only has a statistically significant (and negative) impact on Power 1’s utility for counter-intervention relative to the status quo. Although in the subsample estimation, this coefficient would only be significant at the .10 level.

### **Multinomial Logit**

As a comparison to the estimated strategic choice model in the text, the results of a multinomial logit analysis that might be typically done are also presented below. The dependent variable is the observed outcome of the game: status quo, unilateral intervention by Power 1, unilateral intervention by Power 2, joint intervention, and counter intervention. The first estimation, presented in Table 5, assumed a naive model in which all potential independent

variables are included. The second estimation, presented in Table 6, takes into the consideration the fact that some variables may impact the probability of some outcomes occurring and not others. This assumption is closer to that of the strategic choice model in which some variables affect the relative utility of some outcomes and not others. In this estimation, then, of the coefficients in this model were constrained to be zero. In both cases, divisiveness has a positive and statistically significant impact on the likelihood of joint and counter intervention. While these results here are similar to those of the strategic choice model in the text, the latter is more appropriate to test the theoretical model.

## **Other Specifications**

A previous specification of the statistical model included an independent variable indicating whether an intervention decision was made during the cold war. One of the weaknesses of this specification was that only constants were able to be estimated for some of Power 1's utilities. This was partly due to the fact that joint and counter-intervention are rare events. However, estimation problems were also due to the fact that only one instance of counter-intervention occurred in the post-cold war era. Moreover, this one case, the US and USSR in Angola in 1990, was only coded as such because 1989 was used as a cutoff for the end of the cold war. Given the small number of counter-interventions and the fact that the cold war variable almost completely determines the occurrence of this outcome, I decided to reestimate the model without the cold war variable. By doing this, I was able to include a few variables as regressors to estimate Power 1's utility for joint intervention, counter intervention, and unilateral intervention by Power 2. Because this estimation provides a better empirical examination of both players decisions, it is presented in the main text of the article.

Table 1: Strategic Model Estimation (Power 2's Utilities), Subsample 1

	<i>Unilateral Intervention by 2</i> $\hat{\beta}_{24}$	<i>Joint Intervention</i> $\hat{\beta}_{26}$	<i>Counter Intervention</i> $\hat{\beta}_{27}$
Divisiveness	—	3.009* (.838)	3.515* (1.098)
Relative Capability (2 vs. Target)	12.401* (4.259)	—	—
Relative Capability (2 vs. 1)	—	1.231 (1.666)	-0.369 (0.851)
Former Colony	0.876* (.255)	0.772 (.987)	—
Contiguous Target	0.985* (.400)	1.753 (1.205)	1.269 (.650)
Log(Deaths)	0.228* (.069)	-0.027 (.102)	0.135* (.063)
Log(Distance)	-0.236 (.228)	-0.839* (.439)	0.033 (.379)
Constant	-15.413* (3.793)	2.348 (3.863)	-5.508 (3.364)

\* $p < .05$ . Robust standard errors clustered on target-year in parentheses.

Table 2: Strategic Model Estimation (Power 1's Utilities), Subsample 1

	<i>Unilateral Intvn. by 2</i> $\hat{\beta}_{14}$	<i>Unilateral Intvn. by 1</i> $\hat{\beta}_{15}$	<i>Joint Intvn.</i> $\hat{\beta}_{16}$	<i>Counter Intvn.</i> $\hat{\beta}_{17}$
Divisiveness	20.876 (31.207)	—	52.727 (63.202)	-107.17 (63.944)
Relative Capability (1 vs. Target)	—	7.657* (3.466)	—	—
Relative Capability (1 vs 2)	—	—	-17.018 (21.193)	26.645 (30.658)
Former Colony	—	1.031* (.292)	—	—
Contiguous Target	—	0.643* (.325)	—	—
Log(Deaths)	—	-0.108 (.137)	—	—
Log(Distance)	—	-0.950* (.202)	—	—
Constant	-13.599 (8.275)	-3.802 (3.504)	-31.453 (36.388)	68.468 (47.739)
N		10547		
Log Likelihood		-2844.91		
Wald $\chi^2$ (d.f. = 26)		361.92*		

\* $p < .05$ . Robust standard errors clustered on target-year in parentheses.

Table 3: Strategic Model Estimation (Power 2's Utilities), Subsample 2

	<i>Unilateral Intervention by 2</i> $\hat{\beta}_{24}$	<i>Joint Intervention</i> $\hat{\beta}_{26}$	<i>Counter Intervention</i> $\hat{\beta}_{27}$
Divisiveness	—	1.628* (.792)	1.895* (.609)
Relative Capability (2 vs. Target)	12.569* (4.561)	—	—
Relative Capability (2 vs 1)	—	-0.134 (.585)	0.147 (.441)
Former Colony	0.523 (.267)	0.512 (.687)	—
Contiguous Target	0.969* (.309)	-0.398 (.685)	1.943* (.873)
Log(Deaths)	0.257* (.056)	0.271* (.115)	0.215* (.082)
Log(Distance)	-0.497** (.208)	-0.537* (.266)	1.225* (.531)
Constant	-13.684* (4.565)	-1.722 (2.875)	-16.246* (4.652)

\* $p < .05$ . Robust standard errors clustered on target-year in parentheses.

Table 4: Strategic Model Estimation (Power 1's Utilities), Subsample 2

	<i>Unilateral Intvn. by 2</i> $\hat{\beta}_{14}$	<i>Unilateral Intvn. by 1</i> $\hat{\beta}_{15}$	<i>Joint Intvn.</i> $\hat{\beta}_{16}$	<i>Counter Intvn.</i> $\hat{\beta}_{17}$
Divisiveness	-10.079 (14.890)	—	59.902 (41.391)	-56.881 (32.916)
Relative Capability 1 vs. T	—	11.100* (3.927)	—	—
Relative Capability 1 vs 2	—	—	-2.903 (26.619)	64.374* (23.795)
Former Colony	—	1.694* (0.292)	—	—
Contiguous Target	—	0.529 (0.370)	—	—
Log(Deaths)	—	0.093 (.295)	—	—
Log(Distance)	—	-1.022* (.181)	—	—
Constant	6.185 (8.186)	-7.485* (3.577)	-13.902 (44.247)	2.573 (15.822)
N		10547		
Log Likelihood		-2817.91		
Wald $\chi^2$ (d.f. = 26)		335.80*		

\* $p < .05$ . Robust standard errors clustered on target-year in parentheses.

Table 5: Multinomial Logit

	<i>Unilateral Intvn. by 1</i>	<i>Unilateral Intvn. by 2</i>	<i>Joint Intvn.</i>	<i>Counter Intvn.</i>
Divisiveness	1.906* (.313)	1.880* (.313)	5.541* (1.383)	3.087* (.903)
Relative Capability (1 vs. 2)	1.868* (.927)	-3.100* (.616)	-3.652 (4.543)	19.936* (8.040)
Relative Capability <sup>2</sup> (1 vs. 2)	0.549 (.624)	0.677 (.645)	3.213 (4.477)	-20.264* (8.289)
Relative Capability (1 vs. Target)	7.053* (3.438)	1.543 (1.523)	2.466 (2.400)	12.963 (9.192)
Relative Capability (2 vs. Target)	1.691 (1.429)	7.387* (3.478)	4.993 (4.376)	-7.046 (5.564)
Former Colony (1)	1.268* (.243)	-0.281** (0.128)	1.488* (.503)	0.803 (.574)
Former Colony (2)	-0.236 (.127)	1.272* (.245)	1.806* (.427)	—
Contiguous Target (1)	0.509 (.281)	0.839* (.292)	-0.152 (1.133)	1.338* (.578)
Contiguous Target (2)	0.669* (.293)	0.517 (.281)	0.369 (.884)	2.145* (.664)
Log(Deaths)	0.267* (.056)	0.267* (.055)	0.368* (.155)	0.613 (.146)
Log(Distance) (1)	-0.772* (.161)	0.562* (.151)	-0.365 (.282)	0.319 (.255)
Log(Distance) (2)	0.547* (.147)	-0.778* (.162)	-0.558** (.257)	0.635 (.385)
Constant	-14.176* (3.271)	-12.007* (3.37)	-10.772* (4.963)	-31.232* (9.545)
N	21964			

\* $p < .05$ . Robust standard errors clustered on target-year in parentheses. Baseline category is status quo.

Table 6: Multinomial Logit

	<i>Unilateral Intvn. by 1</i>	<i>Unilateral Intvn. by 2</i>	<i>Joint Intvn.</i>	<i>Counter Intvn.</i>
Divisiveness	2.248* (.289)	2.235* (.289)	5.876* (1.360)	3.366* (.864)
Relative Capability (1 vs. 2)	1.773* (.290)	-1.785* (.299)	-2.963 (4.450)	20.572* (7.353)
Relative Capability <sup>2</sup> (1 vs. 2)	—	—	2.338 (4.432)	-19.292* (7.007)
Relative Capability (1 vs. Target)	9.435* (3.667)	—	—	—
Relative Capability (2 vs. Target)	—	9.613* (3.632)	—	—
Former Colony (1)	1.267* (.241)	—	1.475* (.511)	0.682 (0.628)
Former Colony (2)	—	1.274* (.242)	1.773* (.449)	—
Contiguous Target (1)	0.540 (.287)	—	-0.332 (1.157)	1.232* (.555)
Contiguous Target (2)	—	0.558 (.287)	0.216 (.898)	1.97* (.657)
Log(Deaths)	0.260* (.053)	0.260* (.052)	0.389* (.149)	0.619* (.139)
Log(Distance) (1)	-0.719* (.159)	—	-0.361 (.276)	0.270 (.254)
Log(Distance) (2)	—	-0.719* (.161)	-0.557** (.249)	0.599 (.386)
Constant	-10.509* (3.296)	-8.909* (3.398)	-4.073 (3.454)	-25.516* (6.871)
N	21964			

\* $p < .05$ . Robust standard errors clustered on target-year in parentheses. Baseline category is status quo.

## References

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