Online Appendix

Rebel constituencies and rebel violence against civilians in civil conflicts

Martin Ottmann

This Online Appendix presents the ZINB regression results of a series of alternative specification of the main models presented in the manuscript (Tables A1 to A6). It also displays the marginal effect plots of the estimated interactions between the three rebel constituency variables and the variables measuring rebels' ethnic appeals, resource financing and relative military strength (Figure A1.)

Table A1. ZINB regression with dependent variable logged

	Model 1a	Model 1b	Model 2a	Model 2b	Model 3a	Model 3b	Model 4a	Model 4b
Negative binomial								
Constituency overlap	0.036	0.036	-0.111	-0.096	-0.143	-0.167	-0.109	-0.131
	(0.076)	(0.081)	(0.082)	(0.105)	(0.103)	(0.136)	(0.107)	(0.146)
Constituency fractionalization	0.099		0.266*		0.252*		0.250*	
	(0.109)		(0.120)		(0.116)		(0.110)	
Constituency polarization		0.079		0.257*		0.257*		0.252+
		(0.123)		(0.119)		(0.125)		(0.132)
Population density (ln)			0.098***	0.095*	0.122***	0.123*	0.164***	0.165**
			(0.027)	(0.040)	(0.037)	(0.052)	(0.050)	(0.063)
Ethnic appeals					0.002	0.053	-0.082	-0.039
					(0.059)	(0.071)	(0.064)	(0.079)
Resource financing					0.089	0.074	0.107	0.098
					(0.078)	(0.083)	(0.075)	(0.073)
Rebel group stronger than gov't							-0.161*	-0.205*
							(0.080)	(0.089)
Battle deaths (ln)							0.063***	0.066***
							(0.015)	(0.015)
Gov't OSV (ln)							0.026**	0.029**
							(0.010)	(0.009)
Conflict duration							-0.017	-0.012
							(0.014)	(0.012)
Conflict duration (squared)							0.001+	0.001
							(0.001)	(0.000)
Constant	1.580***	1.585***	1.201***	1.208***	1.085***	1.069***	0.496*	0.447
	(0.061)	(0.066)	(0.102)	(0.146)	(0.152)	(0.220)	(0.252)	(0.313)
Logit inflation								
Constituency overlap	-0.647	-0.644	0.196	0.122	0.228	0.116	-0.608	-0.694
	(0.578)	(0.538)	(0.671)	(0.620)	(0.652)	(0.609)	(0.541)	(0.513)
Constituency fractionalization	-0.462		-0.967		-0.684		0.141	
	(0.856)		(0.795)		(0.960)		(0.739)	
Constituency polarization		0.180		-0.200		0.130		0.603

		(0.774)		(0.754)		(0.707)		(0.822)
Population density (ln)			-0.669**	-0.609**	-0.808**	-0.748**	-0.889***	-0.860***
			(0.246)	(0.226)	(0.251)	(0.250)	(0.262)	(0.253)
Ethnic appeals					-0.070	-0.071	0.663	0.709
					(0.569)	(0.616)	(0.564)	(0.579)
Resource financing					-1.236*	-1.327*	-1.437**	-1.503**
					(0.538)	(0.516)	(0.475)	(0.485)
Rebel group stronger than gov't							-0.892	-1.048
							(0.768)	(0.968)
Battle deaths (ln)							-0.692***	-0.690***
							(0.180)	(0.173)
Gov't OSV (ln)							-0.196*	-0.199*
							(0.081)	(0.080)
Conflict duration							-0.206**	-0.205**
							(0.078)	(0.076)
Conflict duration (squared)							0.006*	0.006+
							(0.003)	(0.003)
Constant	1.001*	0.838+	3.237***	2.860***	4.102***	3.746***	9.313***	9.134***
	(0.473)	(0.444)	(0.834)	(0.742)	(0.770)	(0.789)	(1.688)	(1.663)
AIC	843.267	844.736	811.133	817.023	799.079	804.398	729.164	728.719
BIC	869.861	871.329	845.325	851.214	844.668	853.786	816.543	816.098
Log pseudo likelihood	-414.634	-415.368	-396.566	-399.511	-387.539	-389.199	-341.582	-341.360
Number of observations	330	330	330	330	330	330	330	330

Robust standard errors clustered on rebel groups in parentheses
*** p<0.001; ** p<0.01; * p<0.05; + p<0.1

Table A2. ZINB regression with dependent variable lagged one year

	Model 1a	Model 1b	Model 2a	Model 2b	Model 3a	Model 3b	Model 4a	Model 4b
Negative binomial								
Constituency overlap	-0.267	-0.042	-1.202**	-0.576	-1.511	-1.734	-1.846*	-1.827+
	(0.452)	(0.500)	(0.448)	(0.500)	(1.053)	(1.148)	(0.816)	(1.010)
Constituency fractionalization	1.695		3.551**		2.423*		1.634**	
	(1.114)		(1.371)		(1.101)		(0.525)	
Constituency polarization		1.849+		3.694**		2.703*		1.474*
		(1.084)		(1.233)		(1.254)		(0.650)
Population density (ln)			0.805***	0.733**	1.105***	1.081***	1.201***	1.152***
			(0.192)	(0.224)	(0.244)	(0.266)	(0.273)	(0.328)
Ethnic appeals					0.082	0.757	-0.197	0.007
					(0.816)	(0.842)	(0.450)	(0.554)
Resource financing					1.528+	1.413	0.925+	0.926
					(0.839)	(0.921)	(0.519)	(0.578)
Rebel group stronger than gov't							-1.288**	-1.594***
							(0.414)	(0.425)
Battle deaths (ln)							0.390***	0.402***
							(0.075)	(0.085)
Gov't OSV (ln)							0.169**	0.198***
							(0.053)	(0.045)
Conflict duration							-0.211***	-0.168**
							(0.060)	(0.063)
Conflict duration (squared)							0.009***	0.007**
							(0.002)	(0.002)
Dependent variable, t-1	0.000+	0.000	0.000	0.000	0.000	0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	5.769***	5.597***	2.308**	2.247*	0.823	0.628	-1.374	-1.487
	(0.307)	(0.387)	(0.766)	(0.930)	(1.009)	(1.148)	(1.105)	(1.241)
Logit inflation								
Constituency overlap	-0.409	-0.413	0.023	0.006	0.155	0.042	-0.493	-0.512
	(0.468)	(0.444)	(0.555)	(0.517)	(0.527)	(0.498)	(0.537)	(0.539)
Constituency fractionalization	-0.106		-0.251		-0.051		0.499	

	(0.754)		(0.758)		(0.808)		(0.639)	
Constituency polarization		0.292		0.179		0.405		0.571
		(0.617)		(0.627)		(0.600)		(0.702)
Population density (ln)			-0.373*	-0.350*	-0.456*	-0.417*	-0.584*	-0.572*
			(0.189)	(0.178)	(0.207)	(0.203)	(0.249)	(0.263)
Resource financing					-0.471	-0.412	0.265	0.282
					(0.485)	(0.499)	(0.585)	(0.638)
Ethnic appeals					-1.263**	-1.293**	-1.431**	-1.448**
					(0.437)	(0.424)	(0.474)	(0.477)
Rebel group stronger than gov't							-1.261	-1.409
							(0.975)	(1.175)
Battle deaths (ln)							-0.562***	-0.550***
							(0.148)	(0.151)
Gov't OSV (ln)							-0.237**	-0.236**
							(0.082)	(0.080)
Conflict duration							-0.144+	-0.135+
							(0.076)	(0.073)
Conflict duration (squared)							0.005	0.004
							(0.003)	(0.003)
Dependent variable, t-1	-0.024**	-0.024**	-0.020**	-0.021***	-0.021**	-0.021***	-0.011*	-0.012
	(0.008)	(0.008)	(0.007)	(0.006)	(0.007)	(0.006)	(0.005)	(0.008)
Constant	1.563***	1.465***	2.702***	2.529***	3.594***	3.344***	7.876***	7.729***
	(0.301)	(0.302)	(0.664)	(0.631)	(0.729)	(0.727)	(1.452)	(1.503)
AIC	1812.125	1809.221	1792.053	1790.038	1776.690	1779.393	1691.665	1698.038
BIC	1845.927	1843.023	1833.366	1831.351	1833.026	1835.729	1785.559	1791.932
Log pseudo likelihood	-897.063	-895.611	-885.026	-884.019	-873.345	-874.696	-820.833	-824.019
Number of observations	316	316	316	316	316	316	316	316

Robust standard errors clustered on rebel groups in parentheses
*** p<0.001; ** p<0.01; * p<0.05; + p<0.1

Table A3. ZINB regression with battle deaths and government one-sided violence lagged one year

	Model 4a	**Model 4b**
Negative binomial		
Constituency overlap	-1.554** (0.524)	-1.709** (0.633)
Constituency fractionalization	1.657** (0.587)	
Constituency polarization		1.731*** (0.494)
Population density (ln)	1.053*** (0.191)	1.045*** (0.206)
Ethnic appeals	-0.717** (0.248)	-0.450 (0.294)
Resource financing	1.243*** (0.370)	1.193*** (0.337)
Rebel group stronger than gov't	-0.125 (0.279)	-0.332 (0.303)
Battle deaths (ln), t-1	-0.160** (0.058)	-0.153** (0.056)
Gov't OSV (ln), t-1	0.258*** (0.052)	0.304*** (0.048)
Conflict duration	-0.040 (0.049)	0.004 (0.054)
Conflict duration (squared)	0.003 (0.002)	0.001 (0.002)
Constant	1.667** (0.572)	1.373* (0.635)
Logit inflation		
Constituency overlap	-0.066 (0.568)	-0.173 (0.534)
Constituency fractionalization	-0.216 (0.723)	
Constituency polarization		0.457 (0.684)
Population density (ln)	-0.747** (0.240)	-0.699** (0.234)
Ethnic appeals	0.132 (0.546)	0.170 (0.559)
Resource financing	-1.387** (0.479)	-1.476** (0.476)
Rebel group stronger than gov't	-2.142* (0.884)	-2.303* (1.122)
Battle deaths (ln), t-1	-0.166** (0.060)	-0.168** (0.058)
Gov't OSV (ln), t-1	-0.049 (0.067)	-0.055 (0.069)
Conflict duration	-0.139* (0.069)	-0.139* (0.071)
Conflict duration (squared)	0.005+ (0.003)	0.004 (0.003)
Constant	5.099*** (0.978)	4.845*** (0.965)
AIC	1789.869	1790.948
BIC	1876.251	1877.330
Log pseudo likelihood	-871.934	-872.474
Number of observations	316	316

Robust standard errors clustered on rebel groups in parentheses
*** p<0.001; ** p<0.01; * p<0.05; + p<0.1

Table A4. ZINB regression with alternative rebel organization control variables

	Model 4a	**Model 4b**
Negative binomial		
Constituency overlap	-1.561*** (0.462)	-1.365** (0.503)
Constituency fractionalization	2.263** (0.699)	
Constituency polarization		2.617*** (0.746)
Population density (ln)	1.017*** (0.153)	1.090*** (0.196)
Rebels' mobilization capability	-0.010 (0.343)	-0.424 (0.302)
Strength of rebels' central command	0.109 (0.388)	0.080 (0.438)
Rebel group stronger than gov't	-1.181** (0.397)	-1.946*** (0.483)
Battle deaths (ln)	0.464*** (0.089)	0.446*** (0.070)
Gov't OSV (ln)	0.127+ (0.065)	0.191*** (0.039)
Conflict duration	-0.235* (0.101)	-0.192*** (0.056)
Conflict duration (squared)	0.010** (0.003)	0.008*** (0.002)
Constant	-0.989 (0.811)	-1.408 (0.926)
Logit inflation		
Constituency overlap	-0.819 (0.582)	-0.849 (0.571)
Constituency fractionalization	-0.112 (0.779)	
Constituency polarization		0.180 (0.827)
Population density (ln)	-0.657** (0.240)	-0.637** (0.232)
Rebels' mobilization capability	0.980* (0.435)	0.981* (0.450)
Strength of rebels' central command	-0.181 (0.462)	-0.185 (0.468)
Rebel group stronger than gov't	-1.584 (1.681)	-1.771 (2.102)
Battle deaths (ln)	-0.809*** (0.190)	-0.818*** (0.188)
Gov't OSV (ln)	-0.092 (0.071)	-0.093 (0.072)
Conflict duration	-0.145* (0.064)	-0.146* (0.060)
Conflict duration (squared)	0.004+ (0.002)	0.004+ (0.002)
Constant	8.304*** (1.592)	8.233*** (1.618)
AIC	1820.225	1816.356
BIC	1907.605	1903.735
Log pseudo likelihood	-887.113	-885.178
Number of observations	330	330

Robust standard errors clustered on rebel groups in parentheses
*** p<0.001; ** p<0.01; * p<0.05; + p<0.1

Table A5. ZINB regression with territorial control by rebels

	Model 4a	**Model 4b**
Negative binomial		
Constituency overlap	-1.791* (0.765)	-1.992* (0.909)
Constituency fractionalization	1.655** (0.599)	
Constituency polarization		1.549* (0.614)
Population density (ln)	1.205*** (0.262)	1.201*** (0.297)
Ethnic appeals	-0.181 (0.463)	0.080 (0.541)
Resource financing	1.169+ (0.701)	0.838 (0.679)
Rebel group stronger than gov't	-1.292** (0.397)	-1.574*** (0.402)
Battle deaths (ln)	0.343*** (0.098)	0.390*** (0.106)
Gov't OSV (ln)	0.173*** (0.048)	0.208*** (0.043)
Conflict duration	-0.177** (0.067)	-0.174* (0.076)
Conflict duration (squared)	0.008** (0.003)	0.007* (0.003)
Rebels' territorial control	-0.200 (0.648)	0.295 (0.652)
Constant	-1.296 (1.048)	-1.667 (1.129)
Logit inflation		
Constituency overlap	-0.615 (0.561)	-0.726 (0.546)
Constituency fractionalization	0.336 (0.770)	
Constituency polarization		0.795 (0.858)
Population density (ln)	-0.838** (0.265)	-0.801** (0.257)
Ethnic appeals	0.700 (0.576)	0.780 (0.606)
Resource financing	-1.183* (0.585)	-1.217* (0.588)
Rebel group stronger than gov't	-1.070 (0.877)	-1.297 (1.137)
Battle deaths (ln)	-0.717*** (0.190)	-0.716*** (0.181)
Gov't OSV (ln)	-0.193* (0.081)	-0.195* (0.081)
Conflict duration	-0.190* (0.079)	-0.186* (0.076)
Conflict duration (squared)	0.005 (0.003)	0.005 (0.003)
Rebels' territorial control	-0.541 (0.537)	-0.604 (0.496)
Constant	9.180*** (1.706)	8.946*** (1.699)
AIC	1796.130	1799.830
BIC	1891.107	1894.807
Log pseudo likelihood	-873.065	-874.915
Number of observations	330	330

Robust standard errors clustered on rebel groups in parentheses
*** p<0.001; ** p<0.01; * p<0.05; + p<0.1

Table A6. ZINB regression with EPR rebel constituency variables

	Model 1a	Model 1b	Model 2a	Model 2b	Model 3a	Model 3b	Model 4a	Model 4b
Negative binomial								
Constituency overlap (EPR)	-0.227	-0.033	0.175	0.296	-0.167	-0.097	-0.321	-0.349
	(0.392)	(0.455)	(0.502)	(0.601)	(0.537)	(0.677)	(0.357)	(0.379)
Constituency fractionalization (EPR)	-1.977*		-2.053*		-0.318		-0.030	
	(0.988)		(0.982)		(1.779)		(0.513)	
Constituency polarization (EPR)		-1.456		-1.369		-0.369		0.047
		(0.994)		(0.893)		(1.379)		(0.481)
Population density (ln)			-0.284	-0.242	0.318	0.327	0.558***	0.566***
			(0.301)	(0.294)	(0.399)	(0.264)	(0.157)	(0.149)
Ethnic appeals					-0.533	-0.534	-1.272***	-1.268***
					(0.485)	(0.448)	(0.375)	(0.378)
Resource financing					1.541	1.546+	0.519	0.533
					(1.122)	(0.870)	(0.333)	(0.342)
Rebel group stronger than gov't							-1.846***	-1.859***
							(0.451)	(0.447)
Battle deaths (ln)							0.394***	0.394***
							(0.084)	(0.083)
Gov't OSV (ln)							0.251***	0.251***
							(0.052)	(0.050)
Conflict duration							-0.124+	-0.126*
							(0.063)	(0.059)
Conflict duration (squared)							0.006*	0.006*
							(0.003)	(0.002)
Constant	6.591***	6.545***	7.603***	7.392***	4.570*	4.537**	1.205	1.169
	(0.578)	(0.573)	(1.579)	(1.533)	(2.022)	(1.386)	(0.853)	(0.845)
Logit inflation								
Constituency overlap (EPR)	0.399	0.423	0.851	0.872+	0.815+	0.815	0.105	-0.031
	(0.518)	(0.509)	(0.520)	(0.517)	(0.492)	(0.497)	(0.557)	(0.542)
Constituency fractionalization (EPR)	-0.454		-0.687		-0.605		0.812	
	(0.812)		(0.894)		(1.148)		(0.759)	
Constituency polarization (EPR)		-0.172		-0.194		-0.046		1.071

		(0.664)		(0.662)		(0.732)		(0.716)
Population density (ln)			-0.674**	-0.663**	-0.823***	-0.808**	-1.000***	-1.021***
			(0.212)	(0.211)	(0.231)	(0.248)	(0.253)	(0.251)
Ethnic appeals					-0.143	-0.157	0.353	0.422
					(0.575)	(0.595)	(0.560)	(0.567)
Resource financing					-1.275*	-1.273*	-1.509**	-1.520**
					(0.544)	(0.543)	(0.524)	(0.526)
Rebel group stronger than gov't							-0.872	-0.956
							(0.772)	(0.861)
Battle deaths (ln)							-0.706***	-0.733***
							(0.174)	(0.153)
Gov't OSV (ln)							-0.187*	-0.192**
							(0.074)	(0.074)
Conflict duration							-0.196**	-0.196**
							(0.071)	(0.072)
Conflict duration (squared)							0.006*	0.006*
							(0.003)	(0.003)
Constant	0.534	0.491	2.880**	2.761**	3.933***	3.810***	9.599***	9.741***
	(0.377)	(0.367)	(0.876)	(0.843)	(0.879)	(0.927)	(1.716)	(1.604)
AIC	1997.412	2000.757	1958.905	1964.615	1933.805	1934.901	1807.417	1804.413
BIC	2023.920	2027.265	1992.987	1998.698	1983.034	1984.130	1894.515	1891.511
Log pseudo likelihood	-991.706	-993.379	-970.453	-973.308	-953.902	-954.450	-880.708	-879.206
Number of observations	326	326	326	326	326	326	326	326

Robust standard errors clustered on rebel groups in parentheses
*** p<0.001; ** p<0.01; * p<0.05; + p<0.1
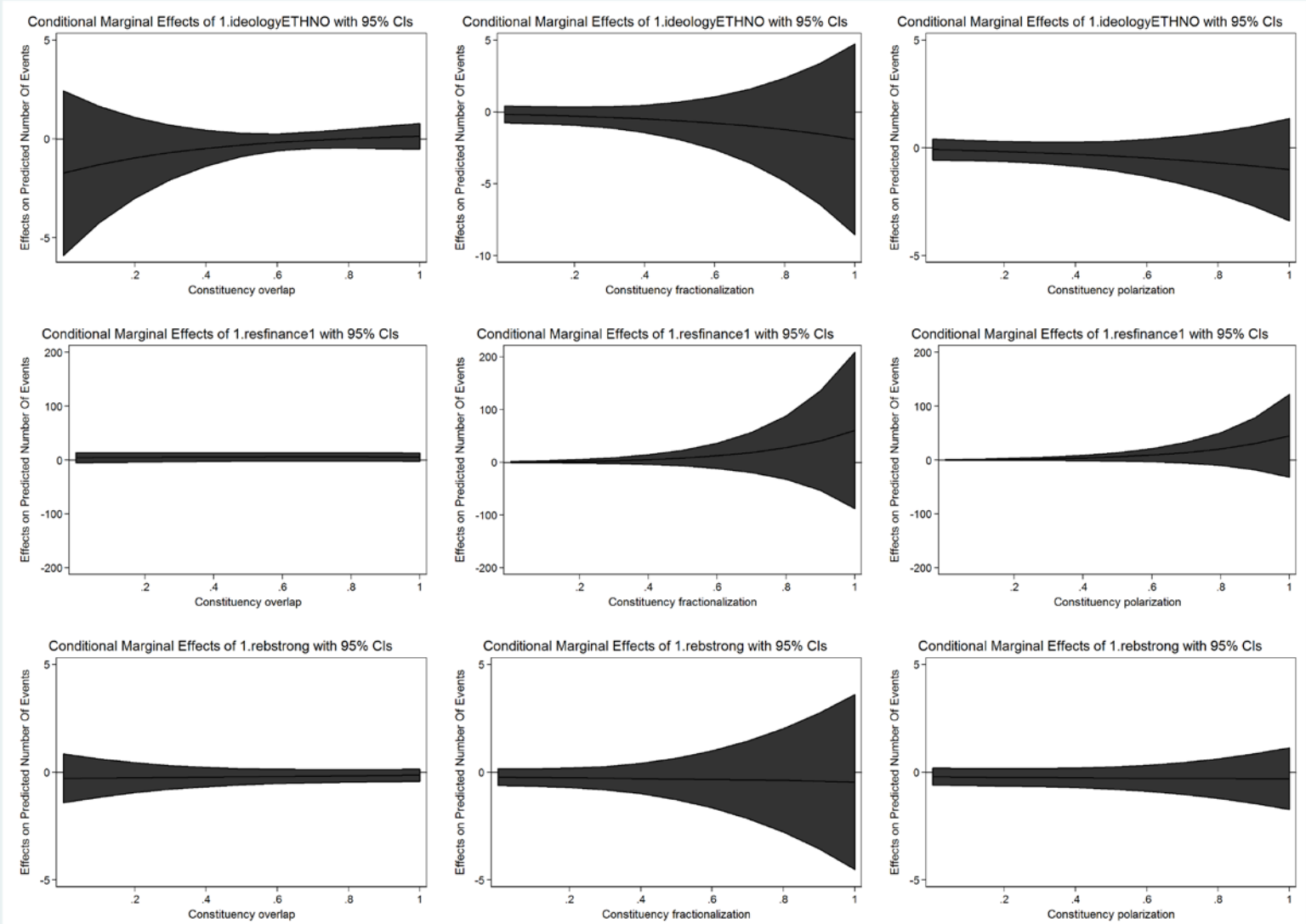
Figure A1. Marginal effect plots of interactions between rebel constituency variables and ethnic appeals, resource financing and relative rebel strength variables