

## **Floods and armed conflict**

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## **ONLINE APPENDIX**

Table A1. *List of countries*

<b>All countries (N =126 countries)</b>
Albania, Algeria, Angola, Argentina, Armenia, Australia, Austria, Azerbaijan, Bahrain, Bangladesh, Belarus, Belgium, Bolivia, Botswana, Brazil, Bulgaria, Burkina Faso, Cameroon, Canada, Chile, China, Colombia, Congo, Democratic Republic of Congo, Costa Rica, Croatia, Cuba, Cyprus, Czech Republic, Denmark, Dominican Republic, Ecuador, Egypt, EL Salvador, Estonia, Ethiopia, Finland, France, Gabon, Gambia, Germany, Ghana, Greece, Guatemala, Guinea, Guinea-Bissau, Guyana, Haiti, Honduras, Hungary, India, Indonesia, Iran, Iraq, Ireland, Israel, Italy, Jamaica, Japan, Jordan, Kazakhstan, Kenya, Kuwait, Kyrgyz Republic, Latvia, Lebanon, Liberia, Libya, Lithuania, Madagascar, Malawi, Malaysia, Mali, Mexico, Mongolia, Morocco, Mozambique, Myanmar, Namibia, Netherland, New Zealand, Nicaragua, Niger, Nigeria, Norway, Oman, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Portugal, Rumania, Russia, Saudi Arabia, Senegal, Sierra Leone, Singapore, Slovakia, Slovenia, South Africa, Spain, Sri Lanka, Sudan, Swaziland, Sweden, Switzerland, Syria, Tanzania, Thailand, Togo, Trinidad and Tobago, Tunisia, Turkey, Uganda, Ukraine, United Arab Emirates, United Kingdom, Uruguay, United States of America, Venezuela, Vietnam, Yemen, Zambia.
<b>Developing countries (N=88 countries)</b>
Albania, Algeria, Angola, Argentina, Armenia, Azerbaijan, Bangladesh, Belarus, Bolivia, Botswana, Brazil, Bulgaria, Burkina Faso, Cameroon, Chile, China, Colombia, Congo, Cuba, Democratic Republic of Congo, Costa Rica, Dominican Republic, Ecuador, Egypt, EL Salvador, Ethiopia, Gabon, Gambia, Ghana, Guatemala, Guinea, Guinea-Bissau, Guyana, Haiti, Honduras, India, Indonesia, Iran, Iraq, Jamaica, Jordan, Kazakhstan, Kenya, Kyrgyz Republic, Latvia, Lebanon, Liberia, Libya, Lithuania, Madagascar, Malawi, Malaysia, Mali, Mexico, Mongolia, Morocco, Mozambique, Myanmar, Namibia, Nicaragua, Niger, Nigeria, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Rumania, Russia, Senegal, Sierra Leone, South Africa, Sri Lanka, Sudan, Syria, Tanzania, Thailand, Togo, Tunisia, Turkey, Uganda, Ukraine, Uruguay, Venezuela, Vietnam, Yemen, Zambia.
<b>Countries experiencing armed conflict or conflict-prone countries (N=52)</b>
Algeria, Angola, Azerbaijan, Bangladesh, Burkina Faso, Colombia, Congo, Democratic Republic of Congo, Croatia, Egypt, El Salvador, Ethiopia, Guatemala, Guinea, Guinea-Bissau, Honduras, India, Indonesia, Iran, Iraq, Israel, Lebanon, Liberia, Mali, Mexico, Morocco, Mozambique, Nicaragua, Niger, Nigeria, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Rumania, Russia, Senegal, Sierra-Leone, South Africa, Spain, Sri Lanka, Sudan, Thailand, Togo, Trinidad and Tobago, Turkey, Uganda, United Kingdom, Venezuela, and Yemen.

Table A2. *Rainfall variability and armed conflict (exclusion restriction)*

VARIABLES	Armed conflict onset		Armed conflict incidence	
	(1)	(2)	(3)	(4)
Rainfall variability	0.0008 (0.0129)	0.0084 (0.0129)	0.0087 (0.0268)	0.0094 (0.0237)
GDP growth		0.0001 (0.0009)		-9.85e-05 (0.0017)
Ln(GDP/capita)		0.0132 (0.0329)		0.0404 (0.0602)
Ethnic tensions		0.0040 (0.0053)		-0.0405*** (0.0101)
Ln(total population)		-0.311** (0.155)		-1.099 (0.763)
Polity2		-0.0010 (0.0021)		-0.0024 (0.0030)
Polity2 x Polity2		5.61e-05 (0.0002)		-0.0018*** (0.0007)
Youth population (%)		-0.0050* (0.0028)		0.0043 (0.0077)
Ln(population density)		0.399** (0.159)		1.260 (0.765)
Infant mortality rate		9.70e-05 (0.0005)		0.0045** (0.0018)
Conflict in neighboring country (=1)		0.0194* (0.0105)		-0.0134 (0.0279)
Country fixed effects	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes
Observations	2614	2614	2614	2614
Number of id	126	126	126	126

Notes: OLS estimates. Robust standard errors (clustered at country level) in parentheses.

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table A3. *Floods and armed conflict (1985-2009) second stage results – alternative indicator for floods with logit estimates*

VARIABLES	Flood magnitude (coefficients)				3-years moving average in flood frequency (coefficients)			
	Armed conflict onset		Armed conflict incidence		Armed conflict onset		Armed conflict incidence	
	IV	No IV	IV	No IV	IV	No IV	IV	No IV
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<b>Floods</b>	<b>-0.0432</b>	<b>0.0049</b>	<b>0.181*</b>	<b>0.0144</b>	<b>0.134</b>	<b>0.0336</b>	<b>1.662*</b>	<b>0.158*</b>
	<b>(0.0761)</b>	<b>(0.0102)</b>	<b>(0.119)</b>	<b>(0.0113)</b>	<b>(0.709)</b>	<b>(0.0741)</b>	<b>(0.942)</b>	<b>(0.0834)</b>
GDP growth	0.0131	0.0113	0.0251	0.0185	0.0150	0.0133	0.0287	0.0195
	(0.0181)	(0.0179)	(0.0386)	(0.0165)	(0.0242)	(0.0177)	(0.0390)	(0.0164)
Ln(GDP/capita)	0.0079	-0.0670	0.0565	0.0644	-0.0571	-0.0713	-0.222	0.0180
	(0.208)	(0.252)	(0.475)	(0.355)	(0.298)	(0.257)	(0.590)	(0.363)
Ethnic tensions	-0.177	-0.142	-0.560**	-0.636***	-0.151	-0.147	-0.488**	-0.607***
	(0.167)	(0.127)	(0.251)	(0.125)	(0.170)	(0.129)	(0.220)	(0.127)
Ln(total population)	1.921	1.723	-36.02	-37.93***	0.862	0.479	-36.80	-38.69***
	(11.78)	(10.44)	(41.66)	(11.42)	(10.11)	(10.66)	(41.16)	(11.49)
Polity2	0.0181	0.0130	-0.0285	-0.0139	0.0085	0.0110	-0.0491	-0.0184
	(0.0362)	(0.0279)	(0.0523)	(0.0267)	(0.0430)	(0.0282)	(0.0475)	(0.0274)
Polity2 x Polity2	-0.0063	-0.0065	-0.0223**	-0.0216***	-0.0065	-0.0064	-0.0210**	-0.0208***
	(0.0074)	(0.0063)	(0.0096)	(0.0053)	(0.0075)	(0.0064)	(0.0097)	(0.0054)
Youth population (%)	-0.0274	-0.0337	0.210	0.188**	-0.0341	-0.0517	0.247	0.191**
	(0.0725)	(0.0850)	(0.248)	(0.0928)	(0.0963)	(0.0870)	(0.275)	(0.0962)
Ln(population density)	-1.361	-1.393	36.66	39.30***	-0.623	-0.178	36.89	39.97***
	(11.63)	(10.42)	(41.83)	(11.40)	(10.04)	(10.64)	(41.36)	(11.47)
Infant mortality rate	0.0215**	0.0191**	0.0351*	0.0343***	0.0186*	0.0185**	0.0258	0.0332***
	(0.0094)	(0.0081)	(0.0208)	(0.0121)	(0.0111)	(0.0082)	(0.0241)	(0.0124)
Conflict in neighboring country (=1)	0.452	0.454	-0.125	-0.109	0.535	0.487	-0.111	-0.0939
	(0.347)	(0.346)	(0.462)	(0.288)	(0.336)	(0.356)	(0.487)	(0.292)
Oil wealth (=1)	0.955**	0.850*	0.319	0.463	0.780	0.779	-0.0517	0.320
	(0.478)	(0.500)	(0.867)	(0.567)	(0.519)	(0.507)	(0.929)	(0.578)
Ln(terrain ruggedness)	0.107	0.0724	0.566	0.592	0.0995	0.0676	0.469	0.598
	(0.275)	(0.235)	(0.602)	(0.472)	(0.268)	(0.238)	(0.621)	(0.478)
Ln(country area)	-1.370	-1.399	36.25	38.92***	-0.653	-0.171	36.41	39.59***

	(11.66)	(10.43)	(41.89)	(11.43)	(10.04)	(10.65)	(41.40)	(11.50)
Country fixed effects	No	No	No	No	No	No	No	No
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,249	2,374	2,468	2,595	2,134	2,259	2,353	2,480
Number of id	126	126	126	126	126	126	126	126

Notes: Logit estimates. Bootstrapped standard errors (400 replications) in parentheses.  
 \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table A4. *Floods and armed conflict (1985-2009) second stage results – alternative sample definitions with logit estimates*

VARIABLES	Developing countries (coefficients)				Conflict prone countries (coefficients)			
	Armed conflict onset		Armed conflict incidence		Armed conflict onset		Armed conflict incidence	
	IV	No IV	IV	No IV	IV	No IV	IV	No IV
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<b>Flood frequency</b>	<b>-0.162</b>	<b>0.0277</b>	<b>0.877<sup>a</sup></b>	<b>0.0645</b>	<b>0.0238</b>	<b>0.0782</b>	<b>0.835*</b>	<b>0.0924</b>
	<b>(0.335)</b>	<b>(0.0574)</b>	<b>(0.670)</b>	<b>(0.0598)</b>	<b>(0.331)</b>	<b>(0.0644)</b>	<b>(0.476)</b>	<b>(0.0622)</b>
GDP growth	0.0110	0.0091	0.0234	0.0149	0.0113	0.0108	0.0209	0.0235
	(0.0221)	(0.0192)	(0.0413)	(0.0170)	(0.0228)	(0.0181)	(0.0331)	(0.015)
Ln(GDP/capita)	0.0608	-0.0079	0.659	0.598	-0.151	-0.1242	0.482	0.300
	(0.245)	(0.311)	(0.570)	(0.418)	(0.281)	(0.2607)	(0.630)	(0.403)
Ethnic tensions	-0.0396	-0.0104	-0.574**	-0.608***	-0.0131	-0.0105	-0.533**	-0.563***
	(0.160)	(0.136)	(0.231)	(0.128)	(0.153)	(0.1150)	(0.212)	(0.126)
Ln(total population)	3.581	3.581	-32.74	-35.90***	3.623	4.7105	-36.84	-37.51***
	(13.62)	(11.28)	(49.88)	(11.66)	(13.11)	(11.36)	(34.16)	(11.49)
Polity2	0.0060	0.0022	-0.0434	-0.0228	-0.00242	-0.0038	-0.0528	-0.0305
	(0.0341)	(0.029)	(0.0497)	(0.0273)	(0.0490)	(0.0280)	(0.0479)	(0.0273)
Polity2 x Polity2	-0.0067	-0.007	-0.0235***	-0.0228***	0.0010	0.0012	-0.0199**	-0.0192***
	(0.005)	(0.006)	(0.0083)	(0.0053)	(0.0070)	(0.0061)	(0.0093)	(0.0055)
Youth population (%)	-0.122	-0.1192	0.114	0.0594	-0.148	-0.1539*	0.139	0.0895
	(0.121)	(0.1006)	(0.305)	(0.101)	(0.101)	(0.0856)	(0.285)	(0.100)
Ln(population density)	-3.058	-3.254	33.28	37.22***	-3.497	-4.638	36.79	38.23***
	(13.59)	(11.26)	(50.01)	(11.64)	(13.10)	(11.34)	(34.24)	(11.46)
Infant mortality rate	0.0223***	0.0204**	0.0474**	0.0438***	0.0065	0.0079	0.0125	0.0091
	(0.0083)	(0.0082)	(0.0221)	(0.0127)	(0.0073)	(0.0072)	(0.018)	(0.0124)
Conflict in neighboring country (=1)	0.405	0.3940	-0.0968	-0.0952	0.495	0.5371	-0.0216	-0.199
	(0.277)	(0.3668)	(0.427)	(0.292)	(0.302)	(0.3307)	(0.475)	(0.301)
Oil wealth (=1)	0.660	0.580	0.165	0.250	0.624	0.5994	-0.133	0.361
	(0.559)	(0.521)	(0.894)	(0.566)	(0.511)	(0.4521)	(1.000)	(0.580)
Ln(country area)	-2.904	-3.068	33.18	37.05***	0.0891	0.0998	0.365	0.245
	(13.69)	(11.28)	(50.01)	(11.67)	(0.298)	(0.2141)	(0.565)	(0.504)

Ln(terrain ruggedness)	0.122 (0.369)	0.0520 (0.258)	0.427 (0.570)	0.5814 (0.5263)	-3.349 (13.12)	-3.588 (11.34)	37.00 (34.28)	38.28*** (11.49)
Country fixed effects	No	No	No	No	No	No	No	No
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1825	1825	1825	1825	1,058	1,058	1,058	1,058
Number of id	88	88	88	88	52	52		

Notes: Logit estimates. Bootstrapped standard errors (400 replications) in parentheses.

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1, <sup>a</sup> – significant at 14% level.