

Supplementary Appendix for:
Fixed Effects in Rare Events Data

Appendix I. Simulations –

Table 1: RMSE for PML-FE Marginal Effects ($\rho = 0.5, \sigma = 1$)

	Pooled $N = 50$ $N = 100$	Random Effects $N = 50$ $N = 100$	UNC-FE $N = 50$ $N = 100$	PML-FE $N = 50$ $N = 100$
$T = 20$	0.0135 0.0120	0.0086 0.0065	0.0512 0.0499	0.0070 0.0047
$T = 50$	0.0134 0.0138	0.0057 0.0048	0.0264 0.0244	0.0042 0.0034

Table 2: RMSE for PML-FE Marginal Effects ($\rho = 0.25, \sigma = 1$)

	Pooled $N = 50$ $N = 100$	Random Effects $N = 50$ $N = 100$	UNC-FE $N = 50$ $N = 100$	PML-FE $N = 50$ $N = 100$
$T = 20$	0.0070 0.0066	0.0061 0.0040	0.0485 0.0475	0.0071 0.0047
$T = 50$	0.0066 0.0082	0.0040 0.0030	0.0240 0.0220	0.0043 0.0035

Table 3: RMSE for PML-FE Marginal Effects ($\rho = 0.5, \sigma = 2$)

	Pooled $N = 50$ $N = 100$	Random Effects $N = 50$ $N = 100$	UNC-FE $N = 50$ $N = 100$	PML-FE $N = 50$ $N = 100$
$T = 20$	0.0060 0.0059	0.0042 0.0033	0.0261 0.0273	0.0037 0.0026
$T = 50$	0.0065 0.0057	0.0028 0.0020	0.0107 0.0101	0.0024 0.0018

Table 4: RMSE for PML-FE Marginal Effects ($\rho = 0.25, \sigma = 2$)

	Pooled	Random Effects	UNC-FE	PML-FE
	$N = 50$	$N = 50$	$N = 50$	$N = 50$
	$N = 100$	$N = 100$	$N = 100$	$N = 100$
$T = 20$	0.0035	0.0036	0.0245	0.0038
	0.0035	0.0025	0.0259	0.0026
$T = 50$	0.0035	0.0024	0.0093	0.0024
	0.0033	0.0017	0.0086	0.0018

Appendix II. Illustration –

Table 1: Unit Heterogeneity in Civil War Onset (Coefficients)

	Model 1 (Pooled)	Model 2 (Random Effects)	Model 3 (UNC-FE)	Model 4 (PML-FE)	Model 5 (CON-FE)
<i>war11</i>	-0.954** (0.314)	-0.954** (0.314)	-2.414*** (0.401)	-2.250*** (0.347)	-2.326*** (0.391)
<i>gdpen1</i>	-0.344*** (0.072)	-0.344*** (0.072)	-0.135 (0.154)	-0.114 (0.123)	-0.135 (0.151)
<i>lpop11</i>	0.263*** (0.073)	0.263*** (0.073)	1.070* (0.421)	0.978** (0.350)	1.028* (0.413)
<i>lmtnest</i>	0.219** (0.085)	0.219** (0.085)	-	-	-
<i>ncontig1</i>	0.443 (0.274)	0.443 (0.274)	-1.379 (1.279)	-1.112 (1.070)	-1.327 (1.262)
<i>Oil1</i>	0.858** (0.280)	0.858** (0.280)	0.845 (0.719)	0.777 (0.618)	0.823 (0.704)
<i>nwstate1</i>	1.709*** (0.339)	1.709*** (0.339)	1.805*** (0.434)	1.657*** (0.393)	1.669*** (0.416)
<i>instab1</i>	0.618** (0.235)	0.618** (0.235)	0.789** (0.273)	0.751** (0.240)	0.757** (0.267)
<i>polity2l</i>	0.021 (0.017)	0.021 (0.017)	0.016 (0.025)	0.017 (0.022)	0.016 (0.025)
<i>ethfrac</i>	0.166 (0.373)	0.166 (0.373)	-	-	-
<i>relfrac</i>	0.285 (0.509)	0.285 (0.509)	-	-	-
N(states)	6327(156)	6327(156)	2535(65)	6327(156)	6327(156)

Standard errors in parentheses. ***significant at 1%; **significant at 5%; *significant at 10%.

Table 2: Unit Heterogeneity in Civil War Onset (AMEs)

	Model 1 (Pooled)	Model 2 (Random Effects)	Model 3 (UNC-FE)	Model 4 (PML-FE)
<i>warl1</i>	-0.012*** (0.003)	-0.012*** (0.003)	-0.068*** (0.011)	-0.035*** (0.005)
<i>gdpenl</i>	-0.006*** (0.001)	-0.006*** (0.001)	-0.005 (0.005)	-0.002 (0.002)
<i>lpopl1</i>	0.004*** (0.001)	0.004*** (0.001)	0.037** (0.015)	0.019*** (0.007)
<i>lmtnest</i>	0.004** (0.001)	0.004** (0.001)	-	-
<i>ncontig1</i>	0.008 (0.006)	0.008 (0.006)	-0.039 (0.035)	-0.018 (0.016)
<i>Oil1</i>	0.019** (0.008)	0.019** (0.008)	0.038 (0.042)	0.019 (0.019)
<i>nwstate1</i>	0.058*** (0.020)	0.058*** (0.020)	0.126** (0.050)	0.060*** (0.022)
<i>instab1</i>	0.012** (0.005)	0.012** (0.005)	0.033** (0.014)	0.017*** (0.007)
<i>polity2l</i>	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
<i>ethfrac</i>	0.003 (0.006)	0.003 (0.006)	-	-
<i>relfrac</i>	0.005 (0.008)	0.005 (0.008)	-	-
N(states)	6327(156)	6327(156)	2535(65)	6327(156)

Standard errors in parentheses. ***significant at 1%; **significant at 5%; *significant at 10%.

Table 3: Variance in Predictors

	Between	Within	B/W
<i>warl1</i>	0.238	0.246	0.967
<i>gdpenl</i>	3.921	2.097	1.870
<i>lpopl1</i>	1.411	0.302	4.672
<i>lmtnest</i>	1.447	0	
<i>ncontig1</i>	0.363	0.046	7.891
<i>Oil1</i>	0.310	0.160	
<i>nwstate1</i>	0.085	0.152	0.559
<i>instab1</i>	0.154	0.325	0.473
<i>polity2l</i>	6.430	3.953	1.927
<i>ethfrac</i>	0.279	0	
<i>relfrac</i>	0.219	0	