Poverty, Political Freedom and the Roots of Terrorism in Developing Countries: An Empirical Assessment

Poverty, political freedom, and the roots of terrorism in developing countries: An empirical assessment

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Abstract: This paper finds that political freedom has a significant and non-linear effect on domestic terrorism, but this effect is not significant in the case of transnational terrorism. Some of our other novel findings are that while geography and fractionalization may limit a county's ability to curb terrorism, the presence of strong legal institutions deters it.

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1. Introduction

Economists are paying increasing attention to the analysis of terrorism. Contributions of Enders and Sandler (2006) and Krueger and Laitin (2007), among others, have analyzed the geographical and economic distribution of terrorist sources and targets.[1] While Enders and Sandler (2006) find evidence of transference of terror attacks on US interests from US soil to other regions, Krueger and Laitin (2007) find that richer nations are more likely to be targets, while politically repressed nations to be the sources of transnational terrorism. On the other hand, Abadie (2006) finds that terrorism is not directly affected by economic variables, but it has a significant non-monotonic relationship with political freedom.

We depart from Abadie (2006) in two main points. First, using newly available data we separate the analysis of "domestic" and "transnational" terrorism. This is important, because the causes and characteristics of the two, can, in principle, be quite different.[2] Second, given that most recent terrorist incidents have their sources in developing nations (which have increasingly become venues as well) our analysis focuses on developing nations.

Our most striking finding is that while political freedom affects domestic terrorism in a non-linear way, it has no statistically significant relationship with transnational terrorism. This is an important result for development policy. From Krueger and Laitin (2007) we know that the richer nations are prime targets of transnational terrorism. Therefore, it is in their interest to use aid policy to control it at the source. If political freedom is conducive to reduction of transnational terrorism, they can condition their aid packages to promote such freedom.

[1] The issue is also of interest to development economists. For example, Fleck and Kilby (2010) find that starting from 9/11 the US War on Terror has led to a significant change in the level and pattern of US foreign aid.

[2] Data for domestic terrorism is available only from 1998 onwards. We use the *Rand-MIPT Terrorism Database* which defines transnational terrorism as "incidents in which the perpetrators go abroad to strike their targets, select domestic targets associated with a foreign state, or create international incidents by attacking airline passengers or equipments." On the other hand, "domestic terrorism is defined as incidents perpetrated by local nationals against a purely domestic target."

However, in the absence of such a relationship, such an aid policy may not be effective in terms of the terror reduction objective.

The next section describes the data. Section 3 describes the empirical methodology and presents results, while section 4 summarizes our main findings.

2. Description of Data

Table 1 indicates the annual numbers of total, domestic and transnational terrorist incidents. For comparison purpose, we also report these incidents for 24 OECD countries. Domestic terrorism makes up about 89 percent of the total incidents of terrorism in our study of 125 developing countries.[3] Two observations are in order. First, domestic terrorism poses a much bigger challenge for developing countries than transnational terrorism. Second, an increase in overall terrorism in the period following 2002 in developing countries can be a consequence of higher enforcement against terrorism in developed countries, resulting in terror "deflection" to developing nations (for example, see Enders and Sandler, 2006).

Our independent variables are number of total, domestic and transnational incidents of terrorism. To measure poverty, we use data on country GDP per capita constant at 2000USD. We include the infant mortality rate to capture the extent of deprivation and physical suffering.

We also include population density in the model as a densely populated country can be more vulnerable to terrorism. This is perhaps due to more heterogeneity in populous nations, which may subject them to more internal tensions (Krueger and Malečková, 2003; Burgoon, 2006; Krueger and Laitin, 2007). The existing literature offers conflicting views on how

[3] Iraq, Palestine and Gaza Strips are outliers and, therefore, not included in the data. Non-availability of data on other explanatory variables is another reason for their exclusion. Also, it is worthwhile to note that this dataset does not suffer from selection bias because it collects information about terrorist incidents regardless of their intensity. For example, Sandler and Enders (2004) note that the *ITERATE* dataset suffers from some drawbacks of selection bias because it picks up only "newsworthy" incidents of international terrorism.

education may affect terrorism (see Krueger and Malečková, 2003; Abadie and Gardeazabal, 2003). We use the adult literacy rate to reflect the effect of education on terrorism.[4]

Main variables of interest for this analysis are "political freedom" from Freedom House's Political Rights Index and "electoral self-determination" from the Cingranelli-Richards (CIRI) Human Rights Dataset. Following Abadie (2006), we use political freedom rather than civil liberties to measure political climate of a country because endogeneity may be a more serious concern for the latter. We invert this index, with a higher value corresponding to more freedom. Like political freedom, electoral self-determination indicates the extent to which citizens enjoy freedom of political choice. Its index value ranges from 0 to 2, with a higher value indicating free and open political participation.

To control for quality of institutions, we use the "rule of law" index compiled by Kaufmann et al., (2008) with scores between −2.5 and 2.5, where a higher value indicates a stronger legal system. We also include indices of ethnic, linguistic, and religious fractionalization whose values range between zero and one. A higher value reflects the probability that two randomly chosen individuals from the same country belong to different ethnic, linguistic or religious groups. Geographic variables include land area, elevation, fraction of the country in tropical climate, and whether it is landlocked.[5]

3. The Empirical Methodology and Results

A. *Regressions without IV*

[4] Data for the GDP per capita, infant mortality rate, population density, and adult literacy rate are taken from World Development Indicators (2009) of the World Bank. There are some missing data values for adult literacy rate and infant mortality rate. Since their values change slowly over time, values for missing observations are interpolated by calculating averages from available data.

[5] Fractionalization data are taken from Alesina et al., (2003), while geography data come from Gallup et al., (1991).

Since our dependent variable is a count variable and it also exhibits over-dispersion, we must employ either negative binomial or zero-inflated negative binomial models for estimation. The Vuong test favors the former (see Tables 3 and 4).[6] This method is standard and has been favored by several contributions to this literature (e.g., see Krueger and Malečková, 2003; Burgoon, 2006; Krueger and Laitin, 2007).

Our econometric specification follows Abadie (2006). We use annual observations for 125 developing countries over the period 1998-2007. In order to predict the determinants of different types of terrorism, we separately estimate the regressions of total, domestic and transnational terrorist incidents. All regressions include an exhaustive set of regional and time dummy variables, and are estimated with robust standard errors clustered over country.[7]

Table 2 shows results for total, domestic and transnational terrorism incidents, respectively. Since the findings for total and domestic terrorism are qualitatively similar, we focus on the latter. Also, we discuss the results pertaining to domestic terrorism first, and then turn to transnational terrorism. Along the lines of Abadie (2006), political freedom has a significantly non-linear effect on domestic terrorism, initially raising it, and reducing it at higher levels. Other interesting findings are that neither GDP per capita nor literacy is statistically significant, while "rule of law" exhibits a significant negative relation. The fractionalization variables suggest that ethnically diverse societies experience more domestic terrorism, while religiously fractionalized ones tend to face less.

Column 3 of Table 2 pertains to transnational terrorism. A striking result is that unlike domestic terrorism, political freedom does not have any statistically significant effect on

[6] It is worthwhile to note that the zero-inflated negative binomial model rests on an untenable assumption that some years do not experience terrorism with probability one. However, our central findings are qualitatively unaltered even when we use that model. These results are available from authors upon request.

[7] We ran several parsimonious regressions for robustness checks. However, to save space, we report results of the fully specified models only.

transnational terrorism. Other interesting contrasts are that GDP per capita is positive and significant, and that linguistically, but not ethnically, fractionalized nations experience more transnational terrorism.

Columns 4-6 investigate the robustness of the above results by using electoral self-determination as an alternative measure of democracy. The results strongly confirm our central finding regarding the contrasting effects of the political freedom variable. Results for the other variables remain qualitatively similar to columns 1-3.

B. ***IV Regressions***

To deal with potential endogeneity problems with respect to GDP per capita (see Abadie, 2006; Abadie and Gardeazabal, 2008, among others), we follow Abadie (2006) and use geographic landlock (fraction of country area beyond 100 km of ice-free coast) as an instrument. The main motive for using this instrument is that it has been shown to predict economic growth (see Gallup et al., 1999), and the implicit identification assumption is that landlock affects terrorism only through its exogenous impact on national income.

The IV results are presented in Table 3. While GDP per capita loses statistical significance for transnational terrorism, our contrasting findings regarding political freedom are confirmed using both the political freedom index and the electoral self-determination index.

C. ***IV Fixed Effects Regressions***

As a further robustness check, we also estimate our model employing the IV fixed effects Negative Binomial estimator.[8,9] Since landlock is a time invariant variable, it cannot be used as an instrument for GDP per capita in the fixed effects regression. The variable of past savings

[8] Dreher and Gassebner (2008) also employed fixed effects Negative Binomial estimator to estimate the impact of the political proximity to the U.S. on terrorism in 116 countries.

[9] Note that the fixed effects estimation drops the countries with all zero outcomes in terrorism incidents. That is why the sample size is reduced in these regressions in Table 4.

rates has been shown to affect income per capita and was used as its instrument by Acemoglu et al., (2008). Following that, we also use past savings rates of a country as an instrument for its GDP per capita. The identification assumption is that variations in past savings rates affect income per capita, but should have no direct affect on terrorism.[10] The results in Table 4 further reinforce our findings that political freedom in a country has significantly non-monotonic effect on domestic terrorism only.

4. Conclusion

We complement the existing literature in the following ways. First, using alternative measures of political freedom we show that Abadie's (2006) non-linear relationship between terrorism and political freedom applies to domestic terrorism only, and cannot find support for it in the transnational terrorism data. Second, although other factors such as geography and fractionalization may limit a country's ability to curb terrorism, we consistently find that "rule of law" is a significant deterrent. In the light of these findings we propose that a focus on the composition of terrorism (and not only on its level) is important in framing effective counterterrorism policy, especially for developed nations, whose interests are often prime targets of transnational terrorism. ■

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[10] Data for the savings rates are also taken from World Development Indicators (2009) of the World Bank.

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Table1: Numbers of terrorism incidents

	125 Developing Countries			24 OECD Countries		
Year	Total terrorism	Domestic terrorism	Trans. Terrorism	Total terrorism	Domestic terrorism	Trans. terrorism
1998	745	641	104	236	205	31
1999	640	587	53	382	323	59
2000	547	491	56	340	303	37
2001	692	545	147	402	381	21
2002	1229	1022	207	269	244	25
2003	871	695	176	304	263	41
2004	1019	911	108	201	176	25
2005	1630	1533	97	200	180	20
2006	2219	2084	135	152	137	15
2007	708	626	82	50	45	5

Data source: Rand-MIPT Incident Terrorism Database (2008).

Table 2: Terrorism and country characteristics in developing countries
(Negative Binomial regressions with robust standard errors clustered over countries)

Dependent variable→ *Independent variables↓*	*Total Terr.* *(1)*	*Dom. Terr.* *(2)*	*Trans. Terr.* *(3)*	*Total Terr.* *(4)*	*Dom. Terr.* *(5)*	*Trans. Terr.* *(6)*
Ln (Income per capita)	0.614 (1.66)	0.586 (1.51)	0.769*** (2.65)	0.641* (1.93)	0.608* (1.75)	0.783*** (2.84)
Political freedom	0.697** (2.04)	0.865** (2.29)	0.247 (0.77)			
(Political freedom)²	–0.080* (1.77)	–0.097** (1.98)	–0.023 (0.55)			
Electoral self-determination				1.550*** (3.46)	2.324*** (4.59)	0.694 (1.50)
(Electoral self-determination)²				–0.522*** (2.87)	–0.787*** (3.69)	–0.261 (1.35)
Ln (Adult literacy)	0.250 (0.36)	0.475 (0.61)	–0.374 (0.66)	0.960 (1.22)	1.132 (1.35)	0.325 (0.55)
Ln (Infant mortality)	–1.356*** (2.85)	–1.353*** (2.75)	–1.095** (2.56)	–1.099** (2.47)	–1.023** (2.30)	–1.032** (2.43)
Ln (Population density)	1.035*** (4.53)	1.201*** (4.60)	0.658*** (4.20)	1.013*** (4.61)	1.160*** (4.63)	0.657*** (3.90)
Rule of law	–2.049*** (6.41)	–2.190*** (5.99)	–2.035*** (6.34)	–1.940*** (5.83)	–2.028*** (5.60)	–1.984*** (5.56)
Ethnic fractionalization	1.730* (1.91)	1.924* (1.90)	1.163 (1.51)	1.904** (2.28)	2.164** (2.30)	1.170 (1.52)
Linguistic fractionalization	0.303 (0.41)	–0.001 (0.01)	1.334* (1.89)	0.528 (0.73)	0.388 (0.49)	1.491* (1.88)
Religious fractionalization	–2.486** (1.98)	–2.636* (1.96)	–1.892** (2.54)	–2.590** (2.03)	–2.952** (2.08)	–2.041*** (2.73)
Ln (Country area)	0.599*** (4.96)	0.687*** (4.75)	0.321*** (3.21)	0.583*** (4.69)	0.647*** (4.58)	0.324*** (3.09)
Ln (Elevation)	0.464** (2.12)	0.532** (2.08)	0.548** (2.78)	0.490** (2.50)	0.560** (2.31)	0.541*** (2.93)
Tropical area (fraction)	–1.003 (1.35)	–1.320 (1.59)	–0.876 (1.55)	–0.612 (0.80)	–0.844 (0.97)	–0.813 (1.47)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Regional dummies	Yes	Yes	Yes	Yes	Yes	Yes
Vuong test [ZINB vs. NB]	z=0.52	z=0.33	z=1.17	z=0.10	z=0.36	z=0.38
Over-dispersion parameter	3.538	4.104	3.040	3.346	3.767	2.907
Log pseudo likelihood	–1992.24	–1749.97	–961.07	–1911.73	–1681.94	–904.85
No of observations	1159	1159	1159	1125	1125	1125

Note: Robust absolute z-statistics, adjusted over countries, are shown in parentheses. ***, ** and * indicate significance at 1, 5 and 10 percent levels, respectively.

Table 3: Terrorism and country characteristics in developing countries
(IV regressions with robust standard errors clustered over countries)

Dependent variable→ *Independent variables↓*	*Total Terr.* *(1)*	*Dom. Terr.* *(2)*	*Trans. Terr.* *(3)*	*Total Terr.* *(4)*	*Dom. Terr.* *(5)*	*Trans. Terr.* *(6)*
Ln (Income per capita)	0.972 (0.91)	1.032 (0.84)	0.844 (0.95)	0.209 (0.19)	–0.052 (0.04)	0.839 (0.84)
Political freedom	0.683* (1.87)	0.838** (2.06)	0.142 (0.41)			
(Political freedom)²	–0.077 (1.64)	–0.094* (1.78)	–0.007 (0.17)			
Electoral self-determination				1.421*** (2.95)	2.267*** (4.15)	0.558 (1.11)
(Electoral self-determination)²				–0.460** (2.40)	–0.751*** (3.35)	–0.206 (0.99)
Ln (Adult literacy)	0.126 (0.14)	0.302 (0.29)	–0.381 (0.51)	1.368 (1.33)	1.688 (1.51)	0.321 (0.38)
Ln (Infant mortality)	–1.127 (1.27)	–1.043 (1.06)	–1.067 (1.39)	–1.521 (1.60)	–1.599 (1.53)	–1.058 (1.22)
Ln (Population density)	1.075*** (4.23)	1.275*** (4.37)	0.653*** (3.17)	0.933*** (3.72)	1.069*** (3.73)	0.640*** (2.78)
Rule of law	–2.183*** (5.66)	–2.325*** (5.23)	–2.122*** (5.87)	–1.941*** (4.84)	–1.952*** (4.38)	–2.046*** (5.11)
Ethnic fractionalization	1.829** (2.03)	2.091** (2.09)	1.352 (1.67)	1.782** (2.13)	2.006** (2.08)	1.306 (1.52)
Linguistic fractionalization	0.266 (0.37)	–0.015 (0.02)	1.228* (1.75)	0.528 (0.74)	0.403 (0.52)	1.381* (1.73)
Religious fractionalization	–2.190* (1.93)	–2.423* (1.87)	–1.534** (2.02)	–2.037* (1.72)	–2.316 (1.66)	–1.712** (2.19)
Ln (Country area)	0.603*** (4.68)	0.688*** (4.37)	0.345*** (3.39)	0.604*** (4.45)	0.680*** (4.15)	0.341*** (3.19)
Ln (Elevation)	0.510** (2.07)	0.598** (2.10)	0.544** (2.54)	0.418* (1.84)	0.463* (1.73)	0.536** (2.55)
Tropical area (fraction)	–0.819 (0.88)	–1.163 (1.10)	–0.859 (1.14)	–0.770 (0.76)	–1.157 (1.02)	–0.817 (1.02)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Regional dummies	Yes	Yes	Yes	Yes	Yes	Yes
Vuong test [ZINB vs. NB]	z=0.31	z=0.19	z=1.53	z=0.43	z=0.58	z=0.84
Over-dispersion parameter	3.672	4.237	3.338	3.503	3.898	3.224
Log pseudo likelihood	–1997.14	–1753.10	–969.29	–1918.92	–1687.12	–913.66
No of observations	1159	1159	1159	1125	1125	1125

Note: Robust absolute z-statistics, adjusted over countries, are shown in parentheses. ***, ** and * indicate significance at 1, 5 and 10 percent levels, respectively.

Table 4: Terrorism and country characteristics in developing countries
(IV fixed effects Negative Binomial regressions)

Dependent variable→ *Independent variables↓*	*Total Terr.* *(1)*	*Dom. Terr.* *(2)*	*Trans. Terr.* *(3)*	*Total Terr.* *(4)*	*Dom. Terr.* *(5)*	*Trans. Terr.* *(6)*
Ln (Income per capita)	0.284 (0.25)	0.060 (0.05)	2.183 (1.14)	0.167 (0.14)	0.386 (0.31)	2.259 (1.09)
Political freedom	0.431* (1.97)	0.651*** (2.61)	–0.136 (0.44)			
(Political freedom)^{2}	–0.061** (2.24)	–0.087*** (2.78)	0.007 (0.18)			
Electoral self-determination				0.222 (0.83)	0.684** (2.25)	–0.392 (1.06)
(Electoral self-determination)^{2}				–0.097 (0.84)	–0.244* (1.94)	0.089 (0.54)
Ln (Adult literacy)	1.032* (1.87)	1.148* (1.88)	0.458 (0.56)	0.908 (1.59)	1.392** (2.24)	0.270 (0.30)
Ln (Infant mortality)	–0.165 (0.46)	–0.037 (0.10)	–0.340 (0.66)	–1.223 (0.32)	0.240 (0.59)	–0.210 (0.37)
Ln (Population density)	0.374 (0.47)	0.214 (0.25)	1.916 (1.43)	0.251 (0.25)	0.462 (0.43)	2.240 (1.26)
Rule of law	–0.916*** (3.13)	–0.916*** (2.84)	–1.764*** (3.54)	–1.032*** (3.76)	–1.190*** (4.03)	–1.705*** (3.56)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Log pseudo likelihood	–1293.19	–1111.71	–578.34	–1264.94	–1093.76	–554.63
No of observations	888	780	719	865	775	696

Note: Absolute z-statistics are shown in parentheses. ***, ** and * indicate significance at 1, 5 10 percent levels, respectively.