Great Expectations and Hard Times —

The (Nontrivial) Impact of Education on Domestic Terrorism*

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Abstract: This contribution investigates the role of education in terrorism for 133 countries between 1984 and 2007. The findings point at a nontrivial effect of education on terrorism. Lower education (primary education) tends to promote terrorism for a cluster of countries in which socioeconomic, political and demographic conditions are unfavorable, while higher education (university education) reduces terrorism for a country cluster in which conditions are more favorable. This suggests that country-specific circumstances mediate the effect of education on the (opportunity) costs and benefits of terrorism. For instance, the prevalence of poor structural conditions in combination with advances in education may explain past and present waves of terrorism and political instability in the Middle East. The results of this study imply that a promotion of education needs to be accompanied by sound structural change to positively interact with (individual and social) development and reduce terrorism.

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"What is it that seduces some young people to terrorism? It simplifies things. The fanatic has no questions, only answers. Education is the way to eliminate terrorism."

- Elie Wiesel (1986 Nobel Peace Prize recipient), cited in Jai (2001)

"On the whole, there is little reason for optimism that [an] […] increase in educational attainment will lead to a meaningful reduction in […] terrorism."

- Krueger and Maleckova (2003: 142)

1. Introduction

In the aftermath of the terror attacks on the New York *World Trade Center* and the Washington *Pentagon* on September 11, 2001, policymakers, intellectuals and the general public largely agreed that education needed to be strengthened to work as an "antidote" against terrorism (cf. Jai 2001). This spoke to the idea that education is associated with less hatred, ignorance and fewer socioeconomic and political grievances, thus making terrorism less likely.

While intuitive, this *optimistic* view on the terrorism-education nexus is, however, called into question by anecdotal and academic evidence, which tends to be more *pessimistic* about the relationship between education and terrorism. For instance, the highly influential paper of Krueger and Maleckova (2003) finds that education does not matter to terrorism on a cross-country level, while—on an individual level—many terrorists tend to be rather well educated. Other studies point at a similar relationship (e.g., Berrebi 2007; Shafiq and Sinno 2010; Ganor 2011).

Why is there a disagreement over the impact of educational attainment on terrorist activity? We argue that there is a *country-specific* dimension to the terrorism-education nexus, which has been disregarded in previous empirical efforts. What is more, we argue that these very

country-specific factors determine whether education reduces or fuels terrorism. When country-specific conditions are favorable (e.g., sound institutions, strong economic development), education helps reducing terrorism. However, when country-specific conditions are poor, education may fuel terrorism. Said differently, the *'great expectations'* about the positive role of fostering education to significantly reduce terrorism—e.g., through education-centered foreign aid (Azam and Thelen 2008, 2010)—may in fact turn into *'hard times'* when country-specific conditions are unfavorable.

We provide an in-depth assessment of the terrorism-education nexus using cross-sectional time-series data for 133 countries between 1984 and 2007. As a major innovation, we identify groups of countries that differ with respect to certain socioeconomic, political and demographic traits (e.g., economic growth, income, politico-institutional conditions) by means of a *cluster analysis* and then analyze whether the dynamics of the nexus are *conditional upon cluster-specific circumstances*. We also add to the existing evidence by considering the relationship between education and *domestic terrorism*. Previous studies only consider the effect of education on *transnational terrorism*.[1] Domestic terrorism, however, accounts for the bulk of terrorist activity (e.g., Enders et al. 2011) and—as we will discuss below—is expected to have a closer relationship with education variables. Third, we use *several education indicators* (e.g., primary school enrollment, university enrollment), while earlier studies relied only on specific education proxies. This ought to add to the robustness of our findings, while providing new insights as to whether specific education proxies may matter more strongly to specific parts of the world. For instance, for demographic and economic reasons, lower (i.e., primary) education may be more important for developing

[1] Domestic terrorism involves only one country, whereas transnational terrorism involves at least two countries (e.g., because domestic groups attack international targets).

countries, while developed countries may benefit more from higher (i.e., university) education.

To preview our empirical findings, we indeed find evidence of a *'nontrivial'* effect of education on terrorism. Lower education levels tend to foster terrorism for a cluster of countries in which poor conditions abound (e.g., slow growth, poor human and economic rights situation), while higher education levels tend to reduce terrorism for a cluster of countries in which conditions are more favorable. These core findings are robust to a variety of sensitivity checks. Our findings call for a more nuanced analysis of the terrorism-education nexus, given that country-specific circumstances and the choice of adequate education proxies seem to matter to empirical inferences. Our results suggest that a promotion of education in developing countries may actually foster terrorism when poor structural socioeconomic, politico-institutional and demographic issues (e.g., poor economic growth, poverty, inequality, repression, discrimination) are not ameliorated at the same time. Interestingly, our framework does not only help better understanding the role of education in terrorism. It also relates to earlier historic events of political violence such as the French Revolution of 1789 (e.g., Glaser et al. 2007) or the 2011 popular uprisings of the Arab Spring (e.g., Campante and Chor 2011), which were characterized by the combination of increases in education that were coupled with poor institutional, socioeconomic and demographic circumstances. Such linkages have been largely ignored in the study of the role education in terrorism, but may account for the inconclusive evidence on the terrorism-education nexus on cross-national level as well as the positive correlation between education and terrorism on the micro level.

This paper is organized as follows. In Section 2 we discuss the literature on the relationship between education and terrorism. Section 3 introduces the data and empirical methodology. Section 4 presents and discusses our main empirical findings. Section 5 offers several robustness checks and extensions to our empirical efforts. Section 6 concludes.

2. The Terrorism-Education Nexus: Literature Review and Hypotheses

2.1 Great expectations: Why education should reduce terrorism

Following a rational-choice approach, education is expected to determine the level of terrorist activity by governing its (opportunity) costs and benefits. The optimistic view of the terrorism-education nexus suggests that education raises terrorism's opportunity costs by fostering individual socioeconomic success and political participation. For instance, higher education means higher personal human capital endowment and thus income, so that educated individuals ought to have more to lose (higher opportunity costs) when they choose to resort to terrorism. On the aggregate (national) level, higher levels of education are also found to be positively related to economic growth and a reduction in poverty and income inequality (e.g., Temple 1999; Glaeser et al. 2004; Cohen and Soto 2007). This may also affect the terrorists' calculus by reflecting higher opportunity or recruitment costs, given that, e.g., the size of the pool of potential terrorist recruits ought to shrink with favorable socioeconomic conditions (e.g., Bueno de Mesquita 2005).

Besides socioeconomic success, education is also found to positively correlate with political participation. For instance, Dee (2004) finds that voter participation and support for free speech increase with individual education. Similarly, Barro (1999) and Glaeser et al. (2007) argue that education is among the determinants of democracy. Consequently, the positive effect of education on political participation may mean higher terrorism opportunity costs (due to the recognition and use of nonviolent means to foster political change) and thus less terrorist activity. What is more, the favorable interaction between education, economic development and democracy may lead to positive politico-institutional outcomes, e.g., as corruption is reduced or redistribution is conducted in a more welfare-enhancing way (e.g., in

the form of public spending on education), which may further reinforce the positive effect of education on economic growth (e.g., Saint-Paul and Verdier 1993; Glaser et al. 2007).

Finally, education may also change personal attitudes towards extremist ideologies, the use of violence and its legitimization (Victoroff 2005). These effects may be reflected in lower (perceived) benefits from terrorism and higher recruitment costs for terrorist groups. For instance, educated individuals may evaluate the probability of terrorist success more realistically and therefore be less easy to recruit. Also, the educated may more easily see through the terrorists' propaganda, so that terrorist mobilization is constrained and popular support remains marginal. The latter mechanism can be understood as a representation of the popular—perhaps somewhat idealistic—idea that education counters hate and ignorance, and raises moral constraints associated with the use of violence (Victoroff 2005).

In summary, the optimistic view of the terrorism-education nexus argues that education raises the (opportunity) costs and lowers the benefits of terrorism in such a way that the risk of terrorism is reduced. This leads to our first hypothesis (*H1*):

> *Hypothesis 1: Countries with higher levels of education will experience (ceteris paribus) lower levels of terrorism.*

Some empirical studies on the causes of terrorism implicitly back this hypothesis. They find that terrorism is positively related to poor institutions such as a poor rule of law (e.g., Choi 2010; Walsh and Piazza 2011), socioeconomic underdevelopment (e.g., Blomberg and Hess 2008; Freytag et al. 2011) and inefficient means of redistribution and economic participation (e.g., Burgoon 2006; Krieger and Meierrieks 2010, Piazza 2011). If education positively interacts with economic and political development—as the previous discussion suggests—, then education ought to be negatively related to terrorism by removing economic and institutional grievances that usually fuel terrorism. Likewise, studies on the causes of other forms of political violence (e.g., protests, rebellions, civil war) suggest that interactions

between education, underdevelopment and conflict—which are similar to those discussed above—matter to these conflicts. For example, they consistently find that these conflicts are related to economic and political grievances (e.g., Fearon and Laitin 2003; Collier and Hoeffler 2004). What is more, the evidence suggests that education is negatively related to civil wars (e.g., Thyne 2006). If terrorism and other forms of conflict share similar roots—as suggested by, e.g., Gassebner and Luechinger (2011: 251)—, then education may have a similar (dampening) effect on terrorism.

2.2 Education during hard and good times: An alternative view

Although the previous discussion provides some evidence that education may reduce terrorism, skeptical views prevail. While most cross-national (large-*N*) studies on the causes of terrorism do not consider the effect of education on terrorism, a review of those studies that control for the impact of education on terrorism does not provide a consistent picture (Table 1). For example, while Bravo and Dias (2006) find that education makes terrorism less likely, Testas (2004) comes to the opposite conclusion. Even more puzzling, studies that analyze the relationship between individual education and participation in terrorism often find that the two are positively related (e.g., Victoroff 2005; Berrebi 2007; Benmelech and Berrebi 2007; Krueger 2008). For example, in their highly influential contribution Krueger and Maleckova (2003) find that terrorist organization operatives active in the Arab-Israeli conflict (e.g., the Jewish underground, Hezbollah) are on average well-educated.

-Table 1 here -

Why may education positively correlate with terrorism? We argue that—building on the existing literature—education may fuel terrorism when country-specific conditions are unfavorable. Such poor conditions may consist of a set of socioeconomic (e.g., poor growth, economic disenfranchisement), politico-institutional (e.g., discrimination, corruption, poor

governance) or demographic (e.g., population growth) factors. Due to poor country-specific circumstances, advances in education may not sufficiently increase the opportunity costs of terrorism because the relevant transmission channels (e.g., income, political participation, economic growth) do not work properly on individual and social levels, meaning that nonviolent opportunities do not open up. For instance, slow economic growth and slack labor markets may cause individuals to take up jobs that do not match their qualification and thus their expected personal income. Also, institutional constraints (e.g., corruption, nepotism) may redirect the flow of educated labor into the public sector, consequently inhibiting economic growth by creating inefficiencies and constraining private economic activity (Pritchett 2001). Likewise, when political participation is constrained (e.g., due to poor democratic institutions), education cannot be easily linked to positive political development.

Other mechanisms may even promote the genesis of terrorism. First, education may make it easier for individuals to recognize those poor social conditions (e.g., socioeconomic and politico-institutional constraints) that limit personal and social success expected from education. For instance, Shafiq and Sinno (2010) argue that increases in education coupled with political disenfranchisement lead to a higher support for (suicide) terrorism, potentially because education helps individual to contextualize political problems and leads to the choice of violence as a means of achieving political change. Second, education may increase the (perceived) benefits from terrorism, given that an eventual removal of existing social constraints may benefit the educated the most. In case of terrorist success, education may finally pay off (e.g., in terms of income, growth and political participation), particularly for the highly educated. Third, when the labor market does not offer individuals an adequate return for their education investment, it may become increasingly attractive for individuals to pursue a 'career' in terrorism. Terrorist organizations may offer their operatives wages and other incentives (e.g., reputation as a terrorist leader, martyrdom) that are closer to individual

human capital endowments and associated aspirations than those offered by the regular labor market (cf. Bueno de Mesquita 2005). Fourth, education may also lower the (perceived) costs of terrorism. Intuitively, education makes terrorist success (e.g., performing an attack, evading prosecution) likelier. Bueno de Mesquita (2005) argues that due to the positive effect of individual human capital endowment on terrorist success terrorist organizations are particularly interested in members with higher levels of education.[2]

To sum up, when poor country-specific conditions abound education does not sufficiently translate into higher opportunity costs of terrorism. Instead, education may facilitate mobilization due to an increased attractiveness of terrorism for educated individuals, which reinforces the probability of terrorist success. This leads to the following hypothesis (*H2a*):

> *Hypothesis 2a: Countries with higher levels of education will experience (ceteris paribus) higher levels of terrorism when country-specific (socioeconomic, political, institutional, demographic etc.) circumstances are poor.*

This hypothesis finds support from a number of examples. For instance, Abeyratne (2004) argues that in Sri Lanka increases in education in combination with poor country-specific conditions (strong population growth, youth burdens, ethnic discrimination, socioeconomic and political volatility and exclusion) led to armed insurgencies by the communist *Janathā Vimukthi Peramu□a* and the separatist *Liberation Tigers of Tamil Eelam*. Similarly, Ganor (2011) argues that the expansion of education in Palestine in the 1970s was not meet by adequate demand for highly-skilled labor, instead increasing frustration, humiliation and radicalization among young Palestinians, which eventually filled the ranks of radical groups

[2] Note that the preponderance of poor social conditions and the lack of nonviolent alternatives also ought to increase the pool of potential recruits from which terrorist organizations usually choose the most educated members, meaning lower recruitment costs that may also facilitate terrorist activity (Bueno de Mesquita 2005).

active in the 1987 Intifada. Ganor (2011) also suggests that the interplay of education, denied opportunities, alienation and frustration may contribute to the radicalization—and possibly, terrorist activity—among Muslim youth in Western European communities. The findings of Testas (2004), Kavanagh (2011) and Urdal (2006) also suggest that the reciprocity between advances in education and poor social conditions matters to the genesis of terrorism. For instance, Urdal (2006) finds that an expansion in education that is coupled with demographic pressures makes civil conflict more likely. Finally, the recent revolutions and riots in Northern Africa and the Middle East—as other forms of political protest—can also be linked to the interaction between rising educational levels, which induce political activism, and socioeconomic underperformance (Campante and Chor 2011).[3]

Following this line of reasoning, the role of education in terrorism may be determined by the change of educational attainment relative to the change of politico-institutional and socio-demographic conditions. If the former dominates the latter at relatively low levels, terrorism becomes more likely. However, it seems reasonable to expect politico-institutional and socio-demographic factors to eventually catch up with educational quality. This ought to reverse outcomes. Hence, as corollary of hypothesis *H2a* we argue that education can be expected to exert a *dampening* effect on terrorism when social conditions are more favorable. Education ought to contribute to (individual and social) progress when socioeconomic, demographic and politico-institutional barriers—that govern employment, economic redistribution, political participation etc.—are low or nonexistent. This in turn is expected to make terrorism less likely by sufficiently raising its opportunity costs (as outlined above), where these effects ought to outweigh those through which education may fuel terrorism (e.g., the improved recognition of disenfranchisement). This leads to the final hypothesis (*H2b*):

[3] See Glaeser et al. (2007) for further historic examples where increases in education contributed to political protest and revolutions.

Hypothesis 2b: Countries with higher levels of education will experience (ceteris paribus) lower levels of terrorism when country-specific (socioeconomic, political, institutional, demographic etc.) circumstances are favorable.

This does not, however, rule out that terrorism emerges when favorable social conditions abound. In fact, the history of domestic terrorism in Western Europe and the US after the Second World War indicates that advances in education did not "immunize" societies against terrorism. Rather, many terrorists from these countries had an academic background (e.g., Victoroff 2005).[4] However, domestic terrorist activity in Western countries was often perpetrated by isolated groups that failed to obtain popular support or achieve generational transition (Cronin 2006). In accordance with our previous discussion, we may speculate that the beneficial interaction between advances in education and favorable country-specific conditions—besides other factors—minimized the pool of potential terrorists and supporters in these countries and raised terrorism opportunity costs, making a sustained and popularly supported terrorist campaign practically infeasible.

3. Data and Methodology

We test which of the hypotheses discussed in the previous section are supported by the data for a panel of 133 countries between 1984 and 2007.[5] The summary statistics are reported in Table 2. A country list is given in the appendix.

[4] As argued by Bueno de Mesquita (2005), the high educational level of Western terrorists can be explained by the screening of potential recruits for (educational) quality by terrorist groups.

[5] Our panel is unbalanced, given that some countries in the sample became independent only after 1991.

– Table 2 here –

3.1 Dependent variable: Domestic terrorism

Our dependent variable is the *number of domestic terrorist incidents* in a given year and country.[6] Previous studies have focused on the causes of transnational terrorism due to data constraints (Krieger and Meierrieks 2011). However, the relationship between education and domestic terrorism is not necessarily identical to the interaction between education and transnational terrorism as different factors may matter. For instance, transnational terrorism seems to be more strongly motivated by international political factors (e.g., foreign policy) than domestic terrorism (Dreher and Gassebner 2008; Savun and Phillips 2009).

The economic mechanisms from education to reduced terrorist activity—via an amelioration of grievances (*H1*) or the interaction of education and country-specific conditions that (potentially) determines the effect of education on terrorism (*H2a* and *H2b*)— are intuitively expected to matter more strongly to the genesis of domestic terrorism. The fact that domestic terrorism is far more common than transnational terrorism (e.g., Enders et al. 2011) further motivates our decision to study the effect of education on domestic terrorism. Finally, there is a lack of evidence on the causes of domestic terrorism in general (Krieger and Meierrieks 2011), also with respect to the role of education in domestic terrorism (see Table 1).

The data for our dependent variable is drawn from Enders et al. (2011). They use raw terrorism data provided by the *Global Terrorism Database* (*GTD*). While the *GTD* contains data on domestic and transnational terrorism, it does not differentiate between the two. Enders et al. (2011) decompose the data series into domestic and transnational terrorist events. They also deal with some methodological problems (e.g., coding issues) in the *GTD* series. As a

[6] As a robustness check we also consider alternative measures of terrorist activity (Section 5).

result, the domestic terrorism data provided by Enders et al. (2011) are—to this date—the most reliable count data measuring this kind of activity.[7]

3.2 Education variables

As argued above, those large-*N* studies that analyze the determinants of terrorism and incorporate measures of education (see Table 1) may have failed to unveil a consistent relationship due to theoretical reasons (i.e., the failure to consider the moderating effect of country-specific conditions on the terrorism-education nexus). In addition to that, different analytical scopes (country samples, observation periods, education indicators etc.) may have contributed to empirical inconsistencies. In this study we use a uniform country sample to assess the influence of various education variables on the emergence of domestic terrorism. In so doing, we ought to analyze, amongst others, whether the choice of a specific education proxy matters to statistical inferences.

We measure education by *primary school enrollment per capita* (*primary education*), *secondary school enrollment per capita* (*secondary education*), the *sum of primary and secondary school enrollment*, *university enrollment per capita* (*university enrollment*) and the *literacy rate* (i.e., the number of people over 15 than can read or write over the total

[7] As a robustness check, we experiment with different approaches for dealing with remaining data problems that are discussed by Enders et al. (2011). For instance, Enders et al. (2011) argue that the *GTD* tends to overreport terrorism for some time periods, which should be accounted for by adjusting the data accordingly. However, such data adjustments lead to findings similar to those obtained using the unadjusted data (results available upon request).

population).[8] All education data are drawn from the *Cross-National Time-Series Data Archive*.

These measures ought to reflect the size and quality of a country's human capital stock. That is, higher enrollment and literacy rates are expected to correspond to higher levels of education, where education may either reduce terrorism uniformly (*H1*) or affect terrorism depending on country-specific circumstances (*H2a* and *H2b*). Our education measures may also reflect public investment in education and the effectiveness of educational institutions (e.g., Thyne 2006). For instance, higher enrollment rates ought to mean more investment in education (teachers, school buildings etc.) and stronger institutions related to education (e.g., child labor laws, compulsory education). A stronger public commitment to education ought to result in higher levels of education, which in turn matter to terrorism. Finally, our education variables also reflect the 'supply' and 'demand' of education. The 'supply' side of education relates to a country's demographic structure (i.e., population structure, growth and distribution). For instance, primary and secondary school enrollment may be more important to 'young' societies (developing countries), while tertiary education matters more to 'older' societies (developed countries). The 'demand' side of education relates to, e.g., the global division of labor, national economic structures and labor markets demands. For example, primary and secondary education may be more important to countries that do not rely on human-capital-intensive production (developing countries), whereas in other countries tertiary

[8] We also experimented with alternative measures of education as used by Thyne (2006). He employs data on primary, secondary and postsecondary enrollment, on literacy and government education spending, where the data is drawn from the World Development Indicators. While the results are not directly comparable due to data limitations (only the 1994-2007 period is available), the findings tend to support results from our main analysis (results available upon request).

education may more prominently determine personal and social success due to corresponding production and employment demands (developed countries).

In short, we have good reason to believe that our education proxies correlate with education 'inputs' (public investment, quality of educational institutions) and 'outputs' (size and quality of an economy's human capital stock). Our explanatory variables are expected to indicate whether education truly matters to terrorism via the transmission channels discussed in Section 2. However, we can also expect that specific education variables matter more strongly to specific country groups, depending on factors such as state capacity, demographic structure and economic demands. Specifically due to these reasons, we expect primary education to be the most adequate proxy of education for the developing world, whereas tertiary education is expected to be most important to developed economies (cf. Barro and Lee 2010).

3.3 Controls

We include a number of controls to avoid detecting only spurious correlations between education and terrorism. We control for the effect of variables that determine education and terrorism at the same time (to ensure that the ceteris paribus condition of our hypotheses holds) or which need to be included for obvious statistical reasons. Whenever possible, we do not include variables that reflect a possible transmission channel from education to terrorism, so as to better isolate and identify the aggregate impact of education on terrorism. For instance, we do not control for economic growth, given that we expect education to influence terrorist activity—amongst other effects—via its beneficial impact on economic activity.[9]

[9] Other potential determinants of terrorism that we do not include for this reason are, e.g., per capita income, the rule of law, measures of poverty and inequality, and the economic and human rights situation in a country. However, we control for these intervening variables in

Additional information on all control variables (e.g., operationalization, measurement, data sources) is given in the appendix.

First, we consider the effect of *population size*. Larger populations may signal higher demographic stress that fuels conflict. Alternatively, the positive correlation between population size and terrorism may simply stem from the fact that more populous countries provide more targets, victims and terrorists. In any case, population size is consistently found to be a strong, positive predictor of terrorism (Krieger and Meierrieks 2011; Gassebner and Luechinger 2011). At the same time, larger populations cause demand for more investment in education and may affect enrollment rates (e.g., Busemeyer 2007).

We also control for the effect of *per capita military spending* on terrorism. Gassebner and Luechinger (2011) argue that military spending constrains the opportunities for open rebellion and therefore leads to terrorism (as an alternative form of insurgency). On the other hand, higher military spending may reflect a higher state capacity that ought to suppress all forms of rebellion, meaning that a negative effect of military expenditures on terrorism also seems possible. Simultaneously, budget decisions in favor of more military spending may mean comparatively lower public spending on education and thus a lower level of education.

Next, we control for the influence of various forms of *political instability*. Specifically, we account for the impact of *general strikes*, *state failure* and *religious tensions*. Political instability is expected to positively correlate with terrorism, given that instability, e.g., ought

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additional model specifications as part of our robustness analysis the findings tend to support results from our main analysis (results available upon request). Their inclusion tends to reduce the overall effect of education on terrorism (as expected). Yet, the general results of this study are robust to the inclusion of these variables. Also, note that we use several of these variables as conditioning variables when we create country groups by means of a cluster analysis (Section 4).

to exacerbate existing grievances and provide terrorists with opportunities to network, recruit and train, while undermining the ability of governments to effectively counter terrorism (e.g., Piazza 2008; Gassebner and Luechinger 2011). At the same time, these forms of instability may also affect education.

It is also necessary to control for the effect of *democracy*. Given that education may impact terrorism through its effect on political openness, the inclusion of a regime type variable may mask the effect of education on terrorism. However, as found by Drakos and Gofas (2006a), democracies are systematically more likely to report terrorism (given that the press is less restricted) than autocratic regimes. The existence of an underreporting bias in terrorism therefore calls for the inclusion of a control that reflects this bias.[10] What is more, we also expect an effect of democracy on the patterns of education, given that democratic institutions usually positively correlate with public education efforts (e.g., Stasavage 2005; Burgoon 2006).

We furthermore consider the effect of *trade openness* on the terrorism-education nexus. As argued by Mirza and Verdier (2008), there are a number of channels through which economic integration may affect terrorism. For instance, integration may facilitate economic disruption through terrorism (e.g., as supply chains are more vulnerable) or increase media attention. While such effects make terrorism more likely by increasing its benefits, openness may, alternatively, also reduce terrorist activity when it predominantly produces economic gains that make violence comparatively less attractive (Mirza and Verdier 2008). At the same time, economic integration is also expected to affect education. For instance, trade may carry risk against which the government needs to provide insurance (e.g., by boosting social security

[10] We try to minimize the influence of this variable by using a very rough measure of democracy (see the appendix). As discussed below, we also run zero-inflated negative binomial models as a statistical method to deal with the existence of an underreporting bias.

spending), which may come at the expense of public education policies and efforts, thereby negatively affecting education (e.g., Burgoon 2006).

Finally, we control for the effect of *external conflict* (i.e., international tensions and wars) on terrorism as a source of external instability. On the one hand, external conflict may make terrorism more likely by tying resources to this conflict, consequently reducing the capacity of a state to control its territory and effectively counter internal problems (Lai 2007). On the other hand, this very tying of government resources can also be expected to compromise education, potentially leading to lower educational outcomes.

3.4 Empirical Methodology

The dependent variable of our empirical model is a count variable (the number of domestic terrorist attacks) which only assumes discrete and nonnegative values. Its variance of is also larger than its mean (see Table 2). Therefore, we employ a *negative binomial model for* (pooled) *count data*. This model is the standard econometric method used in the study of the determinants of terrorism (Krieger and Meierrieks 2011; Gassebner and Luechinger 2011).

For all model specifications we let the independent (education) and control variables enter the model with *(t-1)* lagged values. This reflects the idea that any changes in these parameters ought to affect terrorism only after some time. At the same time, we avoid potential reverse causation and endogeneity problems, given that lagging all explanatory variables ought to eliminate the correlation between these variables and the error term (e.g., Lai 2007). We include year dummies in all specifications to factor in time and trending effects (e.g., Burgoon 2006). Regional dummies (for the West, the Middle East, Sub-Saharan Africa, and Latin America) are included to account for effects that matter to certain parts of the world. For all estimations we rely on standard errors that are clustered over cross-sections, so as to account

for heteroskedasticity and serial correlation, given that previous tests indicated their presence and potential influence on statistical inferences.

4. Empirical Results

4.1 Full sample findings

Our estimation results for the complete sample of 133 countries are reported in Table 3. The findings reject *H1*.We do not find that higher levels of education coincide with a reduction in domestic terrorism. Rather, the findings suggest that higher levels of education correlate with stronger terrorist activity. In particular, there is a statistical significant association between lower education (literacy rates, primary education) and domestic terrorism, while there is no correlation between it and higher education (university enrollment). These findings are more in line with *H2a* and the empirical mainstream.

- Table 3 here -

Besides shedding first light on the relationship between education and terrorism, Table 3 also indicates that other factors influence terrorism. As expected, more populous countries are more prone to domestic terrorism. Internal political instability (incidences of strikes, state failure and religious tensions) and external threats (international conflict) make domestic terrorism more likely. These findings mirror the empirical mainstream and suggest that instability lowers the operating costs of terrorism (e.g., by diverting government resources to other threats and creating political vacuums) and terrorism's opportunity costs by constraining nonviolent activities (e.g., Lai 2007; Piazza 2008). Also, we find that democracies are more prone to domestic terrorism. As argued before, this positive correlation may indicate the presence of an underreporting bias. Finally, trade openness and military spending do not robustly influence terrorist activity.

4.2 Cluster analysis

The purpose of this subsection is to create groups of countries that differ with respect to certain socioeconomic, political and demographic variables. By differentiating between countries with 'good' (favorable) and 'bad' (unfavorable) conditions we expect to better assess the validity of our hypotheses *H2a* and *H2b*.

We employ a *cluster analysis* to identify natural groupings within our dataset that would otherwise not be apparent. For the cluster analysis we collect data on socioeconomic development and performance (GDP per capita, inflation, economic growth), politico-institutional variables (rule of law, corruption, government size, human rights situation, economic freedom, female labor participation) and demographic factors (population density, population growth, urbanization). We then average each variable over the respective available observation period and run a two-step cluster analysis (e.g., Chiu et al. 2001). One advantage of this procedure is that it automatically chooses the optimal number of clusters. The results of the cluster analysis are reported in Table 4.

- Table 4 here -

Our analysis identifies two clusters. In comparison to Cluster 2, Cluster 1 exhibits 'poorer' conditions with a weaker rule of law, a poorer protection of human and property rights, slower economic growth, and lower per capita income, female labor participation, urbanization and population density, but higher levels of corruption, population growth, inflation, and larger governments.[11] According to the exact breakdown of the sample (see the country list in the

[11] Other potential conditioning variables are not included due to a lack of data. For instance, we are not able to include data on youth burdens. However, we are confident that the two country groups are also similarly different with respect to these omitted variables. For

appendix), Cluster 2 includes all OECD economies, some rich oil economies and some emerging markets ('developed countries' cluster), while Cluster 1 includes all Sub-Saharan African countries and most countries located in Latin America, Asia and the Middle East ('developing countries' cluster).

For the developing countries we anticipate to find evidence for *H2a*. Here, increases in education are not expected to pay off because socioeconomic (e.g., high inflation, slow economic growth), politico-institutional (e.g., high levels of corruption and repression) and demographic (e.g., high population growth) conditions are unfavorable. Instead, education may fuel domestic terrorism, as outlined above. Given the demographic and economic structures in the developing world, this relationship ought to be more pronounced for variables reflecting lower education. By contrast, for the developed countries we expect to find evidence for *H2b*. Education ought to reduce terrorism by interacting favorably with good country-specific conditions. Variables indicating higher education ought to matter the most to this relationship.

4.3 Results for a subsample of developing countries

Table 5 reports the estimation results for a subsample of developing countries (Cluster 1). In short, the findings regarding the effect of education on domestic terrorism strongly mirror those reported for the full sample (see Table 3). That is, we find that variables reflecting lower

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instance, Cluster 1 ought to experience a much stronger demographic pressure from youth burdens than Cluster 2. Note that we also experimented with other cluster specifications (e.g., by dropping certain variables used for the cluster identification) and re-ran our estimations. Here, our results were usually in line with those reported in the main text (results available upon request).

education (primary education, literacy rate) are positively associated with terrorism, while higher education (university enrollment) does not play a role.

- Table 5 here -

These findings support hypothesis *H2a*. Conditional upon the presence of poor country-specific conditions, education makes terrorism more likely. Presumably, education does not increase terrorism's opportunity costs. The beneficial individual and social effects of education (e.g., socioeconomic success, political participation, institutional improvements) do not seem to materialize due to structural socioeconomic, political and demographic constraints that are endemic in these countries (see Table 4). Rather, education is positively correlated with terrorism because, e.g., education may facilitate mobilization due to an increased attractiveness of terrorism for educated individuals. This relationship in turn reinforces the probability of terrorist success. Note that the findings with respect to controls mirror those reported in Table 3.

4.4 Results for a subsample of developed countries

We analyze the effect of education on domestic terrorism for the smaller sample of developed economies (Cluster 2). The findings are reported in Table 6.

- Table 6 here -

Compared to the findings for the complete country sample (see Table 3) and the subsample of developing countries (see Table 5), the results for the subsample of developed countries reveal a different relationship between education and domestic terrorism. There is no positive association between lower education and terrorism. Instead, we find a *negative* and statistically significant effect of higher education (university enrollment) on domestic terrorism. This supports *H2b*. That is, in a favorable environment—characterized by, e.g.,

sufficient means of socioeconomic and political participation—education seems to exert a dampening influence on terrorism. On the one hand, there is good reason to believe that education can markedly improve personal and social living conditions (e.g., higher incomes, stronger economic growth, poverty reduction, democratization, institutional advances) when the barriers for socioeconomic and political participation are rather low. This ought to mean higher opportunity costs for terrorism and thus less terrorism. On the other hand, the availability of nonviolent opportunities and the lack of (visible) disenfranchisement ought to undermine efforts by terrorist groups to mobilize and rally popular support. This is equivalent to higher operating costs of terrorist organizations and less terrorism.

As argued before, this does not mean that the beneficial interaction between education and politico-economic development "immunizes" against the terrorist threat. There may still be reasons to rebel. However, terrorist movements in the developed world have rarely become mass movements but have remained rather isolated groups within society. One factor that may contribute to this isolation seems to be the appeasing effect of (advances in higher) education.

The findings with respect to controls mirror the previous ones with two exceptions. First, we find a weakly significant, negative effect of military spending on terrorism. Higher spending may indicate increased security and counterterrorism efforts that raise the operating costs of terrorism, thus making it less likely (e.g., Lai 2007).[12] Second, we also find that democracies are less likely to see terrorism. While this may be a mere consequence of our country sample and model specification—as suggested by Gassebner and Luechinger (2011)—, it may also indicate that political participation, in particular when it is coupled with a sound institutional

[12] The marginally positive effect of military spending on terrorism in Tables 3 and 5 can be interpreted as in Gassebner and Luechinger (2011). They argue that a positive correlation between spending and terrorism reflects the asymmetric nature of terrorist conflicts.

framework and relatively high levels of education, makes terrorism less likely by offering nonviolent means of voicing dissent and achieving political change.

5. Robustness and Extensions

This section scrutinizes the robustness of the findings presented in the previous section and discusses some extensions to these efforts. We only briefly discuss our findings. The corresponding tables are reported in the supplementary material.

5.1 Reverse causality and endogeneity

To the best of our knowledge, there is no evidence that causally relates an increase in terrorism to a reduction in education. Also, the socioeconomic consequences of terrorism tend to be small and short-lived, suggesting no strong adverse impact of terrorism on variables such as education (cf. Tavares 2004). However, it seems possible that terrorism impairs education by, e.g., diverting resources away from public spending on education and damaging the educational infrastructure, given that the civil war literature similarly suggests that conflict may compromise education (Thyne 2006). Furthermore, Dreher et al. (2011) find that terrorist activity causes out-migration of the most talented due to the high opportunity costs of losing their human capital investment. Arguably, in terrorized economies there may be a lower demand for education for the same reasons.

We therefore run a series of regressions of various education measures on past terrorist activity to examine whether reverse causation is present, where we also control for a number of covariates (e.g., instability, population size, regional and time dummies). While provisional, we find no evidence of a systematic effect of terrorism on education, implying that reverse causation is not present. Also, Durbin-Wu-Hausman tests do not indicate that

education is endogenous to terrorism. Finally, as in Azam and Thelen (2010) we also control for endogeneity using a two-step Hausman test. In the first stage of this test, we regress our respective education variable on a set of exogenous controls (e.g., external conflict, democracy, economic and institutional development) and store the respective residual from these regressions. In the second test stage, the residual is included in the respective count data model outlined above. A significant residual indicates that endogeneity is present and biases our findings. However, for diverse our model specifications (Tables 3, 5 and 6) this is not the case. That is, this method also does not indicate that education is endogenous to terrorism in ways that influence our statistical analyses.

5.2 Alternative dependent variables

Arguably, education and domestic terrorism ought to share the closest relationship. However, the strict coding rules of Enders et al. (2011) may lead to the omission of important information on terrorism (e.g., when a domestic group attacks international targets or when a domestic group does not claim responsibility for an attack). Thus, it seems reasonable to employ alternative measures of terrorist activity to examine the robustness of our findings. Thus, we also analyze the relationship between education and *total terrorist activity*. Here, *transnational* terrorist incidences together with *domestic* terrorism and attacks by *unknown perpetrators* make up for total terrorist activity, where the data are drawn from the *GTD*.

We run a series of estimations using the same empirical setup as described before. In summary, we find that our previously reported results hold when we focus on total instead of domestic terrorism. In particular, while lower education increases the likelihood of total terrorism in the developing world, higher education correlates negatively with these indicators in developed economies. This supports our hypotheses *H2a* and *H2b* that education interacts beneficially (detrimentally) with a favorable (unfavorable) environment. It adds to the value

of our findings that the results for the controls are very much in line with our previously reported findings in Tables 3, 5 and 6.[13]

5.3 Alternative estimation techniques

Next, we consider whether our findings are robust to alternative estimation methods. First, we run a series of *zero-inflated negative binomial regressions*, which is a method that accounts for the previously discussed reporting bias in terrorism. Drakos and Gofas (2006b) argue that autocracies tend to systematically underreport terrorism, so that the occurrence of excessive zeros is determined by a country's regime type. The zero-inflated estimations are modeled accordingly, where the control variable *democracy* is chosen as the variable governing the zero-always outcome which may result from an underreporting bias. Second, we estimate a series of *population-averaged negative binomial models* for panel data (or generalized estimation equation models). This statistical approach allows us to fully consider the panel structure of our dataset, while controlling for heterogeneity and autocorrelation by means of an AR(1) term.[14] Amongst others, Choi (2010) uses this empirical approach. Our results indicate that the zero-inflated estimation results closely mirror those presented beforehand.

[13] We also experiment with a different definition of domestic terrorism, where we code an attack as domestic when the attacking terrorist group is located in the country of the attack. The findings for this coding effort mirror those reported above. We also use the number of transnational terrorist incidents as an alternative dependent variable, employing the data provided by Enders et al. (2011). Here, our findings are once more in line with those reported in the main text (results available upon request).

[14] Note, however, that the unbalanced nature of our dataset may affect the findings.

The findings from the population-averaged model also tend to support the findings of this study.

5.4 Long-run effects of education on terrorism

Education changes slowly and therefore potentially needs some time to generate positive outcomes that in turn morph into higher terrorism (opportunity) costs and less terrorist activity. Therefore, we take 6-year averages of our dependent, education and control variables and then regress terrorism on contemporary values of the controls (i.e., averages of the same period) and on past values of the education proxy (i.e., averages of the previous period). This ought to reflect a long-run causal effect of education on terrorism. Remarkably, we find that previous innovations in primary education positively sway terrorist activity for the full sample and the subsample of less developed economies. We also find that past changes in university enrollment negatively correlate with present levels of terrorism in the developed world. That is, there indeed seems to be a causal effect of education on terrorism that depends on country-specific circumstances and emerges through the influence of education on the cost-benefit matrices of (potential) terrorists.

5.5 Education expansion and terrorism

Next, we consider the effect of changes in education on terrorism, given that some studies analyze the effect of changes in education (instead of level data) on socioeconomic and political variables (e.g., Temple 1999). An expansion in education may reflect, e.g., an increasing inflow of resource into the education system (e.g., public investment) and an extension of a country's human capital, but also increasing demographic, economic and political pressures when the growth of education is not accompanied—due to poor structural

conditions and related constraints—by sufficient means of socioeconomic and political participation. In short, we find that an expansion in education tends to positively correlate with the emergence of terrorism in less developed countries, while an expansion in education tends to reduce domestic terrorism in the developed world. Once more, these findings support our hypotheses *H2a* and *H2b*.

5.6 Transmission channels

Finally, we try to identify the transmission channels through which education influences terrorism. Here, auxiliary regressions indicate—as argued above—that education positively correlates with economic growth, higher income levels, more political openness and a better human and economic rights situation. These correlations are more robust—as one would expect—for the subsample of developed economies. While these findings come from ad hoc estimations and surely need further scrutiny, they are nevertheless in line with previous theoretical and empirical findings (Section 2) and suggest that respective transmission channels from education to terrorism are indeed present.

6. Conclusion

This paper provides a reassessment of the terrorism-education nexus. Our study is motivated by conflicting hypotheses that relate a country's level of education to its level of terrorist activity. The optimistic—perhaps somewhat naïve—view argues that education makes terrorism less likely by inducing socioeconomic and political progress, thereby raising terrorism's opportunity costs. Also, from this perspective education reduces the risk of terrorism by raising its (perceived) costs and lowering its (perceived) benefits as, e.g., the higher educated are expected to be 'immune' to terrorist propaganda, to disapprove hate,

ignorance and the use of violence, and to be more realistic about the probability of terrorist success. In contrast to this, more skeptical—at times, pessimistic—voices argue that education tends to work into the opposite direction.

We argue for a more nuanced perspective, taking both views into consideration. We suggest that the true impact of education on terrorism is conditional upon socioeconomic, politico-institutional and demographic circumstances. When these circumstances are unfavorable, education may incite terrorism because advances in education do not sufficiently translate into higher opportunity costs of terrorism. Instead, education may amplify feelings of frustration, humiliation and disenfranchisement (as argued by the proponents of the pessimistic view). What is more, education may increase the attractiveness of terrorism as an "occupation", given that it may pay wages and offer career paths that match one's expectations more closely than regular employment. Finally, education may increase the perceived benefits from terrorism (e.g., mental and material rewards from eventual terrorist success), while lowering its perceived costs and increasing the probability of terrorist success (i.e., the "productivity" of terrorism), which makes the educated the preferred recruits for terrorist groups. Education can only be expected to reduce terrorism when country-specific conditions are favorable, so that education can eventually have a beneficial effect.

We analyze the validity of the hypotheses on the terrorism-education nexus using data for 133 countries between 1984 and 2007. We find no evidence that education reduces terrorism across the board. Rather, we find that education at lower levels (primary education) leads to more terrorism for a cluster of countries in which poor conditions abound (e.g., slow growth, poor human and economic rights situation), high-level education (university education) reduces domestic terrorism for a cluster of countries in which conditions are more favorable. These core findings are robust to a variety of methodological changes and robustness checks. They also match recent and historic events where educational advances promoted instability

due to poor structural conditions—e.g., the French Revolution of 1789, as argued by Glaeser et al. (2007)—, the Middle Eastern experience with terrorism on which Krueger and Maleckova (2003) build their argument and the recent series of revolutions and popular uprisings during the Arab Spring (Campante and Chor 2011).

What are the implications of this study? From a research perspective, we believe that scholars should more thoroughly take into account the potentially heterogeneous (i.e., country-specific) relationship between education and terrorism, accounting for conditional and interacting effects and testing their hypotheses using various education proxies, given that the careful identification of the terrorism-education nexus seems to crucially depend on these factors. Future research may benefit from the eventual advent of more consistent education data may help to better understand the role of education content, quality and public spending in the terrorism-education nexus.[15] Although we already touched on these issues, future research may also more thoroughly consider the exact mechanism which influence the interaction between education, development and terrorism and which correlate with country-specific conditions. Finally, future research may investigate the role of education in religious (Islamic) terrorism. For instance, education seems to play a major role in the terrorist insurgency by the group *Boko Haram* (which roughly translates as *Western or non-Islamic education is a sin*) in Nigeria, where terrorist activity seems to have emerged partly as a response to Western influence making itself felt through education.

From a policy perspective, our findings indicate that advances in education produce great expectations and may result in hard times when those expectations are not meet. That is, a sole strengthening of education in developing countries—e.g., through foreign aid (Azam and Thelen 2008, 2010)—may not help in the war on terror. Rather, in line with broad strategies

[15] Also, future empirical studies may benefit from a further reduction of measurement errors that may plague cross-national education data (e.g., Cohen and Soto 2007).

of ‘state-building’, the promotion of education should be accompanied by domestic and international efforts to ameliorate poor structural socioeconomic, politico-institutional and demographic conditions (poor economic growth, poverty, inequality, repression, discrimination, corruption, deficient legal institutions etc.).

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Table 1: Large-*N* Studies Controlling for the Effect of Education on Terrorism

Study	*Scope*	*Terrorism Variable*	*Education Proxy*	*Effect of Terrorism*
Bravo and Dias (2006)	60-85 countries 1997-2004†	domestic and transnational terrorism (location)	literacy rate of adult population	(-)/significant
Azam and Thelen (2008)	176 countries 1990-2004†	transnational terrorism (origin)	(gross) secondary school enrollment	(-)/significant
Azam and Thelen (2010)	132 countries 1990-2004†	transnational terrorism (origin)	(gross) secondary school enrollment	(-)/significant
Krueger and Maleckova (2003)	148 countries 1997-2002†	transnational terrorism (origin)	illiteracy rate	(-)/not significant
Testas (2004)	37 Muslim countries 1968-1991†	transnational terrorism (location)	university enrollment	(+)/significant
Kurrild-Klitgaard et al. (2006)	97-121 countries 1996-2002†	transnational terrorism (location and origin)	UNDP education index	largely (+)/not significant
Drakos and Gofas (2006b)	139 countries 1985-1999	transnational terrorism (location)	secondary school enrollment index	(+)/not significant
Tavares (2004)	sample not reported 1987-2001	transnational terrorism (location)	illiteracy of adult males	(-)/significant
Urdal (2006)	99-158 countries 1984-1995	domestic and transnational Terrorism (location)	Tertiary education growth, interacted with youth burden	(+)/significant

Note: (†) indicates pure cross-sectional analysis.

Table 2: Summary Statistics [Full Sample]

Variable	N*T	Mean	Std. Dev.	Min.	Max.
Domestic Terrorist Attacks	3082	11.049	42.103	0	673
Total Terrorist Attacks	3076	18.737	64.190	0	1041
Primary Enrollment	3053	12.146	4.943	2.94	35.71
Secondary Enrollment	3053	6.667	3.255	0.33	16.6
Prim. + Sec. Enrollment	3053	18.81	5.281	3.63	38.91
University Enrollment	3078	0.620	1.705	0	20.454
Literacy Rate	3045	77.840	23.307	8.4	99.9
Population Size	3192	9.239	1.563	5.437	14.086
Military Spending	2973	4.087	1.680	0.032	9.923
Strikes	3070	0.159	0.570	0	7
State Failure	3078	0.604	1.649	0	13.5
Religious Tensions	2967	0.244	0.228	0	1
Democracy	3041	6.442	3.536	0	10
Trade Openness	3072	73.593	47.777	1.035	441.224
External Conflict	2967	0.201	0.197	0	1

Table 3: Education and Domestic Terrorism Activity [Full Sample]

	(1)	(2)	(3)	(4)	(5)	(6)
Primary Education $_{t-1}$	0.063					0.065
	(2.85)***					(2.94)***
Secondary Education $_{t-1}$		0.026				0.030
		(0.72)				(0.83)
Prim. + Sec. Education $_{t-1}$			0.052			
			(2.95)***			
University Enrollment $_{t-1}$				-0.812		-0.085
				(1.34)		(1.08)
Literacy Rate $_{t-1}$					0.016	
					(2.55)**	
Population Size $_{t-1}$	0.727	0.721	0.723	0.782	0.715	0.780
	(7.40)***	(7.26)***	(7.37)***	(7.43)***	(7.27)***	(7.29)***
Military Spending p.c. $_{t-1}$	0.164	0.113	0.127	0.160	0.007	0.176
	(1.82)*	(1.19)	(1.44)	(1.75)*	(0.07)	(1.75)*
General Strikes $_{t-1}$	0.330	0.352	0.346	0.336	0.367	0.321
	(3.00)***	(3.19)***	(3.15)***	(2.93)***	(3.46)***	(2.92)***
State Failure $_{t-1}$	0.500	0.499	0.491	0.483	0.486	0.489
	(4.62)***	(4.55)***	(4.72)***	(4.41)***	(4.72)***	(4.68)***
Religious Tensions $_{t-1}$	2.120	2.010	2.011	2.045	2.126	2.042
	(4.13)***	(3.73)***	(3.86)***	(3.90)***	(4.07)***	(3.87)***
Democracy $_{t-1}$	0.124	0.121	0.118	0.124	0.109	0.121
	(3.24)***	(3.12)***	(3.06)***	(3.18)***	(2.65)***	(3.17)***
Trade Openness $_{t-1}$	-0.003	-0.003	-0.003	-0.003	-0.003	-0.03
	(0.96)	(0.96)	(1.06)	(0.81)	(1.01)	(0.96)
External Conflict $_{t-1}$	1.716	1.726	1.848	1.744	1.969	1.898
	(3.62)***	(3.75)***	(3.88)***	(3.79)***	(4.59)***	(3.96)***
Log Pseudolikelihood	-5463.60	-5477.71	-5464.66	-5496.28	-5472.10	-5459.24
N*T	2692	2692	2692	2702	2686	2692

Notes: Dependent variable is the number of the number of domestic terrorist incidents. Robust absolute z-values clustered on countries reported in parentheses. Constant not reported. All models include time and regional dummies (not reported). (*), (**) and (***) indicate significance at 10%, 5% and 1% level, respectively.

Table 4: Cluster Analysis

	Cluster 1		*Cluster 2*	
	Mean	Std. Dev.	Mean	Std. Dev.
Law and Order	-0.579	0.668	0.993	0.620
Corruption	0.507	0.579	-0.869	0.974
Government Size	0.050	1.164	-0.085	0.628
Physical Integrity	-0.544	0.773	0.932	0.558
Population Density	-0.127	0.217	0.218	1.610
Population Growth	0.288	0.826	-0.493	1.085
Urbanization	-0.474	0.876	0.813	0.596
GDP per capita	-0.586	0.277	1.005	0.992
Economic Growth	-0.229	1.115	0.393	0.593
Property Rights Protection	-0.588	0.714	1.008	0.475
Inflation	0.160	1.229	-0.275	0.134
Female Labor Participation	-0.038	0.985	0.064	1.033
Cluster Distribution	N=84 (63.2%)		N=49 (36.8%)	

Notes: Results from two-step cluster analysis. Optimal number of cluster automatically chosen based on Schwarz's Bayesian Criterion. Variables were averaged over respective period of observation and standardized before analysis. See text for a discussion of variables.

Table 5: Education and Domestic Terrorism [Subsample of Less Developed Countries]

	(1)	(2)	(3)	(4)	(5)	(6)
Primary Education $_{t-1}$	0.068					0.069
	(2.88)***					(2.86)***
Secondary Education $_{t-1}$		0.039				0.047
		(1.09)				(1.31)
Prim. + Sec. Education $_{t-1}$			0.065			
			(3.37)***			
University Enrollment $_{t-1}$				-0.095		-0.020
				(0.72)		(0.13)
Literacy Rate $_{t-1}$					0.011	
					(1.81)*	
Population Size $_{t-1}$	0.585	0.552	0.573	0.624	0.546	0.589
	(5.05)***	(4.90)***	(5.19)***	(5.53)***	(4.75)***	(5.10)***
Military Spending p.c. $_{t-1}$	0.167	0.108	0.103	0.188	0.067	0.130
	(1.64)*	(1.05)	(1.00)	(1.59)	(0.60)	(1.01)
General Strikes $_{t-1}$	0.211	0.247	0.217	0.235	0.276	0.212
	(1.99)**	(2.40)**	(2.15)**	(2.11)**	(2.68)***	(2.00)**
State Failure $_{t-1}$	0.521	0.521	0.514	0.504	0.501	0.514
	(4.67)***	(4.58)***	(4.94)***	(4.33)***	(4.55)***	(4.85)***
Religious Tensions $_{t-1}$	1.917	1.726	1.810	1.734	1.898	1.838
	(3.62)***	(3.16)***	(3.38)***	(3.26)***	(3.42)***	(3.43)***
Democracy $_{t-1}$	0.209	0.207	0.212	0.204	0.196	0.211
	(6.44)***	(5.84)***	(6.55)***	(5.85)***	(5.29)***	(6.52)***
Trade Openness $_{t-1}$	-0.005	-0.006	-0.006	-0.005	-0.005	-0.006
	(1.46)	(1.50)	(1.70)*	(1.30)	(1.47)	(1.57)
External Conflict $_{t-1}$	2.155	2.124	2.377	1.987	2.199	2.329
	(4.58)***	(4.66)***	(4.85)***	(4.47)***	(4.78)***	(4.80)***
Log Pseudolikelihood	-3672.92	-3686.66	-3670.66	-3707.86	-3700.90	-3670.22
N*T	1700	1700	1700	1710	1703	1700

Notes: Dependent variable is the number of the number of domestic terrorist incidents. Robust absolute z-values clustered on countries reported in parentheses. Constant not reported. All models include time and regional dummies (not reported). (*), (**) and (***) indicate significance at 10%, 5% and 1% level, respectively.

Table 6: Education and Domestic Terrorism [Subsample of Developed Countries]

	(1)	(2)	(3)	(4)	(5)	(6)
Primary Education $_{t-1}$	0.061					0.073
	(0.89)					(1.11)
Secondary Education $_{t-1}$		-0.107				-0.091
		(1.17)				(0.94)
Prim. + Sec. Education $_{t-1}$			-0.003			
			(0.05)			
University Enrollment $_{t-1}$				-0.132		-0.183
				(2.37)**		(3.02)***
Literacy Rate $_{t-1}$					0.041	
					(1.13)	
Population Size $_{t-1}$	0.940	0.921	0.927	1.062	0.877	1.108
	(4.30)***	(4.42)***	(4.32)***	(4.66)***	(4.21)***	(5.07)***
Military Spending p.c. $_{t-1}$	-0.442	-0.472	-0.484	-0.461	-0.487	-0.401
	(1.77)*	(1.87)*	(1.95)*	(1.92)*	(1.98)**	(1.65)*
General Strikes $_{t-1}$	0.404	0.396	0.423	0.397	0.377	0.349
	(2.29)**	(2.22)**	(2.17)**	(2.04)**	(2.14)**	(2.18)**
State Failure $_{t-1}$	1.397	1.517	1.420	1.361	1.363	1.406
	(5.08)***	(5.58)***	(5.26)***	(4.91)***	(5.11)***	(5.20)***
Religious Tensions $_{t-1}$	2.302	2.731	2.420	2.525	2.446	2.694
	(1.80)*	(2.07)**	(1.85)*	(1.98)**	(2.06)**	(1.93)*
Democracy $_{t-1}$	-0.127	-0.137	-0.140	-0.144	-0.189	-0.127
	(1.97)**	(2.05)**	(2.13)**	(2.13)**	(3.09)***	(1.86)*
Trade Openness $_{t-1}$	-0.003	-0.004	-0.004	-0.003	-0.004	-0.002
	(0.73)	(1.03)	(0.88)	(0.74)	(0.99)	(0.57)
External Conflict $_{t-1}$	2.526	2.333	2.789	3.178	3.250	2.590
	(2.35)**	(2.16))**	(2.75)***	(3.17)***	(3.16)***	(2.42)**
Log Pseudolikelihood	-1734.53	-1733.23	-1736.75	-1731.52	-1721.00	-1724.02
N*T	992	992	992	992	983	992

Notes: Dependent variable is the number of the number of domestic terrorist incidents. Robust absolute z-values clustered on countries reported in parentheses. Constant not reported. All models include time and regional dummies (not reported). (*), (**) and (***) indicate significance at 10%, 5% and 1% level, respectively.

Appendix A. List of Countries

Albania	Egypt	Lebanon	Saudi Arabia†
Algeria	El Salvador	Liberia	Senegal
Angola	Estonia†	Libya	Sierra Leone
Argentina	Ethiopia	Lithuania†	Singapore†
Armenia	Finland†	Luxembourg†	Slovak Republic†
Australia†	France†	Madagascar	Slovenia†
Austria†	Gabon	Malawi	Somalia
Azerbaijan	Gambia	Malaysia	South Africa
Bahamas†	Germany†	Mali	Spain†
Bahrain†	Ghana	Malta†	Sri Lanka
Bangladesh	Greece†	Mexico	Sudan
Belarus	Guatemala	Moldova	Sweden†
Belgium†	Guinea	Mongolia	Switzerland†
Bolivia	Guinea-Bissau	Morocco	Syria
Botswana†	Guyana	Mozambique	Tanzania
Brazil	Haiti	Namibia	Thailand
Bulgaria†	Honduras	Netherlands†	Togo
Burkina Faso	Hungary†	New Zealand†	Trinidad & Tobago
Cameroon	Iceland†	Nicaragua	Tunisia
Canada†	India	Niger	Turkey
Chile†	Indonesia	Nigeria	Uganda
China	Iran	Norway†	Ukraine
Colombia	Iraq	Oman†	United Arab Emirates†
Congo (Republic)	Ireland†	Pakistan	United Kingdom†
Congo (Zaire)	Israel†	Panama	United States†
Costa Rica†	Italy†	Papua New Guinea	Uruguay†
Cote d'Ivoire	Jamaica	Paraguay	Venezuela
Croatia†	Japan†	Peru	Vietnam
Cuba	Jordan	Philippines	Yemen
Cyprus†	Kazakhstan	Poland†	Zambia
Czech Republic†	Kenya	Portugal†	Zimbabwe
Denmark†	Korea (South) †	Qatar†	
Dominican Republic	Kuwait†	Romania	
Ecuador	Latvia†	Russia	

Notes: (†) indicates that country is included in subsample of developed countries. Other countries included in subsample of less developed countries. See the text for a further discussion.

Appendix B. Control and Cluster Analysis Variables

Population Size – Source: Penn World Table (http://pwt.econ.upenn.edu). Definition: Size of population. Unit: In thousands, logged.

Per Capita Military Spending – Source: National Material Capabilities Dataset (http://www.correlatesofwar.org/). Definition: Per capita spending on the military. Unit: Ratio, logged plus unity.

General Strikes – Source: Cross-National Time-Series Data Archive (http://www.databanksinternational.com). Definition: Any strike of 1,000 or more industrial or service workers that involves more than one employer and that is aimed at national government policies or authority. Unit: Number.

State Failure – Source: State Failure Task Force (http://globalpolicy.gmu.edu/pitf/pitfpset.htm). Definition: Additive index of intensity of ethnic and revolutionary wars, genocides/politicides and adverse regime changes. Unit: Index.

Religious Tensions – Source: International Country Risk Guide (http://www.prsgroup.com/ICRG.aspx). Definition: Assessment of the degree of tension within a country attributable to religious divisions. Unit: Score, rescaled to values in [0,1], with higher values indicating stronger tensions.

Democracy – Source: PolityIV Project (http://www.systemicpeace.org/polity/polity4.htm). Definition: Combined polity score of institutionalized democracy score minus institutionalized autocracy score with converted instances of 'standardized authority scores' to conventional polity scores. Unit: Score, rescaled to values in [0,10], with higher values indicating higher levels of democracy.

Trade Openness – Source: Penn World. Definition: Exports plus imports to real GDP per capita, i.e., total trade as percentage of GDP. Unit: Ratio.

External Conflict – Source: International Country Risk Guide. Definition: An assessment of the risk to the incumbent government from foreign action, ranging from non-violent external pressure (diplomatic pressures, territorial disputes, sanctions, etc) to violent external pressure (cross-border conflicts to all-out war). Unit: Score, rescaled to values in [0,1], with higher values indicating higher risk of external conflict.

Law and Order – Source: International Country Risk Guide. Definition: An assessment of the strength and impartiality of the legal system and of the popular observance of the law. Unit: Score, rescaled to values in [0,1], with higher values meaning a stronger rule of law.

Corruption – Source: International Country Risk Guide. Definition: Measures actual or potential corruption in the form of excessive patronage, nepotism, job reservations, 'favor-for-favors', secret party funding, and close ties between politics and business. Unit: Score, rescaled to values in [0,1], with higher values indicating more corruption.

Government Size – Source: Penn World Table. Definition: Share of government consumption to real GDP. Unit: Ratio.

Physical Integrity Index – Source: CIRI Human Rights Data Project (http://ciri.binghamton.edu/). Definition: Additive index summarizing government respect for disappearance, extrajudicial killing, political imprisonment, and torture. Unit: Ratio, with higher values indicating a better human rights situation.

Population Density – Source: Cross-National Time-Series Data Archive. Definition: Population per area. Unit: Ratio.

Population Growth – Source: Penn World Table. Definition: Growth rate of population. Unit: Growth rate.

Urbanization – Source: World Development Indicators (http://data.worldbank.org/data-catalog/world-development-indicators). Definition: Share of population living in urban areas. Unit: Ratio.

Per Capita Income – Source: Penn World Table. Definition: Real GDP per capita in constant prices (Laspeyres). Unit: Income in constant 2005 International US-Dollar.

Economic Growth – Source: Penn World Table. Definition: Growth rate of real GDP per capita in constant prices. Unit: Growth rate.

Economic Rights – Source: International Country Risk Guide. Definition: An assessment of factors affecting the risk to investment that are not covered by other political, economic and financial risk components. Risk rating assigned as the sum of three subcomponents (contract viability/expropriation, profits repatriation, payment delays). Unit: Score, rescaled to values in [0,1], with higher values indicating better property rights protection.

Inflation – Source: World Development Indicators. Definition: Inflation measured by the annual growth rate of the GDP implicit deflator, showing the rate of price change in the economy as a whole. Unit: Growth rate.

Female Labor Participation – Source: World Development Indicators. Definition: Shows the extent to which women are active in the labor force. Unit: Percentage of the total labor force.

Supplementary Tables

Table S1: Education and Total Terrorist Activity

Model	*Education Variable(s)*	*Full Sample*	*Developed Countries*	*Less Developed Countries*
(1)	Primary	0.058	0.024	0.067
	Education $_{t-1}$	(2.74)***	(0.40)	(3.00)***
(2)	Secondary	0.018	-0.049	0.014
	Education $_{t-1}$	(0.51)	(0.59)	(0.39)
(3)	Prim. + Sec.	0.045	-0.009	0.056
	Education $_{t-1}$	(2.60)***	(0.16)	(3.08)***
(4)	University	-0.095	-0.144	-0.088
	Enrollment $_{t-1}$	(1.66)*	(3.15)***	(0.72)
(5)	Literacy	0.014	0.037	0.011
	Rate $_{t-1}$	(2.35)**	(1.15)	(1.78)*
(6)	Primary	0.058	0.045	0.067
	Education $_{t-1}$	(2.78)***	(0.81)	(2.93)***
	Secondary	0.018	-0.045	0.019
	Education $_{t-1}$	(0.52)	(0.53)	(0.53)
	University	-0.099	-0.175	-0.024
	Enrollment $_{t-1}$	(1.36)	(3.33)***	(0.17)

Notes: Dependent variable is the total (i.e., domestic and transnational) number of terrorist incidents. Table reports only coefficient for respective education proxy from a pooled NBR regression of total terrorism on lagged values of the controls and on the respective education variable. Other model specifications (inclusion of regional and time dummies, control variables) as in Table 3. Robust absolute z-values clustered on countries reported in parentheses. (*), (**) and (***) indicate significance at 10%, 5% and 1% level, respectively.

Table S2: Results from Alternative Estimation Techniques

Model	*Education Variable(s)*	*Full Sample*	*Developed Countries*	*Less Developed Countries*
Panel A: Zero-Inflated Negative Binomial Regression				
(1)	Primary	0.064	0.010	0.072
	Education $_{t-1}$	(2.89)***	(0.14)	(3.06)***
(2)	Secondary	0.029	-0.129	0.039
	Education $_{t-1}$	(0.77)	(1.30)	(1.09)
(3)	Prim. + Sec.	0.054	-0.057	0.068
	Education $_{t-1}$	(3.12)***	(0.95)	(3.66)***
(4)	University	-0.092	-0.168	-0.111
	Enrollment $_{t-1}$	(1.58)	(3.10)***	(0.81)
(5)	Literacy	0.015	-0.013	0.011
	Rate $_{t-1}$	(2.39)**	(0.22)	(1.73)*
(6)	Primary	0.066	0.016	0.073
	Education $_{t-1}$	(3.05)***	(0.26)	(3.02)***
	Secondary	0.031	-0.147	0.047
	Education $_{t-1}$	(0.85)	(1.48)	(1.31)
	University	-0.099	-0.197	-0.034
	Enrollment $_{t-1}$	(1.34)	(3.49)***	(0.21)
Panel B: Generalized Estimation Equation Regression with AR(1) term				
(1)	Primary	0.050	0.109	0.054
	Education $_{t-1}$	(2.65)***	(1.22)	(2.69)***
(2)	Secondary	0.041	-0.012	0.037
	Education $_{t-1}$	(1.07)	(0.18)	(0.90)
(3)	Prim. + Sec.	0.044	0.023	0.052
	Education $_{t-1}$	(2.50)**	(0.26)	(2.99)***
(4)	University	-0.097	-0.081	-0.137
	Enrollment $_{t-1}$	(2.39)**	(1.49)	(1.68)*
(5)	Literacy	0.012	0.054	0.011
	Rate $_{t-1}$	(1.95)*	(2.12)**	(1.77)*
(6)	Primary	0.052	0.138	0.053
	Education $_{t-1}$	(2.64)***	(1.42)	(2.55)**
	Secondary	0.040	0.016	0.039
	Education $_{t-1}$	(1.12)	(0.23)	(1.04)
	University	-0.098	-0.152	-0.092
	Enrollment $_{t-1}$	(2.17)**	(1.99)**	(1.05)

Notes: Dependent variable is the number of domestic terrorist incidents. Table reports only coefficient for respective education proxy from a pooled zero-inflated NBR regression (Panel A) and a panel generalized estimation equation model (Panel B). Inflation variable in Panel A is democracy. In Panel B it is controlled for an AR(1) term. Other model specifications (inclusion of regional and time dummies, control variables) as in Table 3. Robust absolute z-values clustered on countries reported in parentheses. (*), (**) and (***) indicate significance at 10%, 5% and 1% level, respectively.

Table S3: Long-Run Effect of Education on Domestic Terrorism

Model	*Education Variable(s)*	*Full Sample*	*Developed Countries*	*Less Developed Countries*
(1)	Primary	0.052	0.006	0.056
	Education $_{t-1}$	(2.41)**	(0.08)	(2.49)**
(2)	Secondary	0.019	-0.028	0.001
	Education $_{t-1}$	(0.47)	(0.30)	(0.02)
(3)	Prim. + Sec.	0.044	-0.019	0.044
	Education $_{t-1}$	(2.46)**	(0.27)	(2.32)**
(4)	University	-0.076	-0.168	-0.039
	Enrollment $_{t-1}$	(1.06)	(1.98)**	(0.19)
(5)	Literacy	0.014	0.063	0.010
	Rate $_{t-1}$	(1.97)**	(1.19)	(1.29)
(6)	Primary	0.053	0.034	0.056
	Education $_{t-1}$	(2.50)**	(0.43)	(2.38)**
	Secondary	0.021	-0.024	0.006
	Education $_{t-1}$	(0.54)	(0.232)	(0.13)
	University	-0.084	-0.188	0.020
	Enrollment $_{t-1}$	(0.94)	(2.12)**	(0.08)

Notes: Table reports only coefficient for respective education proxy from a pooled NBR regression of six-year averages of terrorism on contemporaneous values of the controls and on lagged values (i.e., average values of education in the previous six-year period) of the respective education variable. Other model specifications (dependent variable, inclusion of regional and time dummies, control variables) as in Table 3. Robust absolute z-values clustered on countries reported in parentheses. (**) indicates significance at 5%.

Table S4: Changes in Education and Domestic Terrorism

Model	*Education Variable(s)*	*Full Sample*	*Developed Countries*	*Less Developed Countries*
(1)	Δ Primary	0.303	-0.600	0.464
	Education	(1.59)	(1.83)*	(2.33)**
(2)	Δ Secondary	0.089	-0.373	0.341
	Education	(0.47)	(1.67)*	(1.57)
(3)	Δ Prim. + Sec.	0.113	-0.113	0.328
	Education	(1.51)	(1.54)	(2.41)**
(4)	Δ University	-1.081	-2.239	-1.058
	Enrollment	(1.26)	(2.16)**	(1.62)
(5)	Δ Literacy	-0.224	-0.665	-0.149
	Rate	(2.42)**	(1.81)*	(1.81)*
(6)	Δ Primary	0.292	-0.831	0.439
	Education	(1.51)	(2.33)**	(2.22)**
	Δ Secondary	0.083	-0.402	0.263
	Education	(0.47)	(1.81)*	(1.37)
	Δ University	-0.940	-2.003	-0.692
	Enrollment	(1.02)	(1.89)*	(0.82)

Notes: Table reports only coefficient for respective education proxy from a pooled NBR regression of domestic terrorism on lagged values of the controls and on changes in the respective education variable. Change (Δ) is defined as the difference between two periods. Other model specifications (inclusion of regional and time dummies, control variables) as in Table 3. Robust absolute z-values clustered on countries reported in parentheses. (*), (**) and (***) indicate significance at 10%, 5% and 1% level, respectively.