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Economic growth and terrorism: domestic, international, and suicide

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Abstract

This study evaluates the controversial issue of whether economic growth exerts a dampening effect on terrorism. Unlike previous studies, it conceptualizes economic growth into two sectors (agricultural and industrial) and categorizes terrorism into three forms (domestic, international, and suicide). It offers a modified theory of hard targets, where richer industrial, but not richer agricultural, countries are more likely to attract suicide attacks. A cross-national, time-series data analysis of 127 countries for 1970–2007 shows evidence that when countries enjoy high levels of industrial growth, they are less disposed to domestic and international terrorist events, but are more likely to experience suicide attacks. These findings indicate that economic growth is not a cure-all solution for terrorism because it may be associated in some instances with more terrorist incidents. Nonetheless, healthy economic conditions are, without doubt, beneficial to the war on terrorism because the majority of suicide attacks occur in only a few countries.

JEL classifications: O49, H56

1. Introduction

Although the 11 September 2001 terrorist attacks prompted academics and policy makers to scrutinize more closely the effect of terrorism on economic growth (e.g., Gaibulloev and Sandler, 2011; Gaibulloev *et al.*, 2014), the inverse relationship has received a little attention and the findings are inconclusive. In this study, I examine the inverse relationship by noting that the inconclusive findings reported in previous studies neglect the fact that not all sectors of economic growth are uniformly associated with terrorist activity. By arguing that some sectors of growth are capable of inducing or reducing particular forms of terrorist activity while others may not give cause for concern, this article marks a significant departure from previous studies. In particular, I contend that although growth in the agricultural sector has no bearing on terrorist events, industrial growth has a significant effect. Furthermore, I assert that industrial growth affects different forms of terrorism in different ways. For example, it may exert a dampening effect on domestic and international terrorism while simultaneously encouraging more suicide terrorism. Put differently, I argue that

only some forms of economic growth are associated with terrorist activity, and even then, they only correlate with particular forms of terrorist attacks. I explain these different correlations by offering three modified theories of economic growth and terrorism that emphasize economic opportunities, social cleavages, and hard targets, respectively.

For empirical testing, I collect a cross-national, time-series data set for 127 countries from 1970 to 2007. A battery of negative binomial regression and rare events logit models are built to evaluate the different possible effects that agricultural and industrial growth have on three forms of terrorist activity. The estimated results show evidence that industrial growth, rather than agricultural growth, is related to a decrease in domestic and international terrorism while it is associated with an increase in suicide bombings. These findings are consistent with the prediction made by the modified theory of hard targets but not with those made by the theories of economic opportunities or social cleavages. Overall, the results of this study demonstrate that economic growth is not a cure-all solution for terrorism because in some instances it may breed more terrorism. Nevertheless, healthy economic conditions are certainly beneficial to the war on terrorism because the majority of suicide attacks occur in only a few countries.

The article proceeds in five sections: Section 2 reviews the relevant extant literature; Section 3 presents three modified theoretical perspectives on the connection between economic growth and terrorism (i.e., economic opportunities, social cleavages, and hard targets); Section 4 explains the research design with respect to statistical model building, operationalization, and data sources; Section 5 discusses the empirical results; finally, the Section 6 summarizes the main findings and discusses some policy implications.

2. Literature review

There are not many empirical studies that examine how economic growth affects terrorism. Interestingly, even among these few studies, there is no consensus on the relationship between economic growth and terrorism, which may have dissuaded researchers from further investigating this relationship. By reviewing existing recent studies in three groups, I highlight their arguments and findings and then discuss what is deficient in the current literature.

The first group maintains that economic growth is likely to reduce terrorist activity. For example, Blomberg *et al.* (2004) theorize that countries with low growth rates, high government tax rates, and higher political unrest will experience more terrorist incidents. Based on a pooled panel data for 130 countries from 1968 to 1991, the authors show evidence that lower economic growth correlates with higher incidents of international terrorism. Relying on a sample data set for 110 countries from 1971 to 2007, Freytag *et al.* (2011) run a series of negative binomial regression models and find the benefits of economic growth in terms of a reduction in terrorist incidents. On examining the effects of several socioeconomic determinants of terrorism and political violence with a sample of 12 countries in Western Europe, Caruso and Schneider (2011) uncover that high economic growth, inflation, and unemployment are associated with a decrease in terrorist activities.

The second group positions itself in opposition to the first group, asserting that economic growth actually leads to more terrorism. For example, after collecting time-series data for seven Western European countries, Gries *et al.* (2011) perform statistical tests for economic growth–domestic terrorism Granger causality. The authors demonstrate with cases in Germany, Portugal, and Spain that economic growth Granger-causes domestic

terrorist incidents. To investigate the impact of economic growth and inflation on terrorism in Pakistan, Shahbaz (2013) collects time-series data of terrorist activities for the years 1971–2010. After finding that economic growth and inflation are significant and positive predictors of terrorism, Shahbaz expresses a concern that although sustainable economic growth is desirable for Pakistan's pursuit of an increased national well-being, it also coincides with an increase of terrorist activities on Pakistani soil.

The third group reveals no causal relationship between economic growth and terrorism. Piazza (2006) evaluates the question of whether poor economic conditions are underlying factors of terrorism. The author gathers a cross-sectional, time-series data set for 96 countries for the years 1986–2002 and performs a battery of multivariate regression analyses. Piazza finds no statistically meaningful connection between economic measures including economic growth and terrorism. After developing a statistical model for international terrorism for a pooled panel data consisting of 139 countries from 1985 to 1998, Drakos and Gofas (2006) show no empirical evidence that economic growth is associated with international terrorism. When Kurrild-Klitgaard *et al.* (2006) conduct a statistical analysis of the relationship between economic and political freedom and the occurrence of transnational terrorism from 1996 to 2002, they also report no causal linkage between economic growth and terrorism.

Although these three research groups have advanced our scientific knowledge of terrorism, the inconclusive findings leave many researchers puzzled about the real impact of economic growth on terrorist activity. To solve the puzzle, I delve into two different sectors of economic growth. I assert that the aggregate measure of economic growth used in all of the existing studies is directly responsible for the mixed results because not all sectors of economic growth are uniformly relevant with the occurrence of terrorist activity. The aggregate growth measure may have distorted the estimated results because it misrepresents the true effects of some crucial or irrelevant sectors of economic growth on terrorism. In the next section, I make a theoretical argument that when the aggregate growth concept is separated into agricultural growth and industrial growth, we can have a better understanding of the causal relationship between growth and terrorism.

In addition, although the existing studies have attempted to explain terrorist incidents as causally related to certain economic conditions, their empirical research tends to focus on only one type of terrorist activity at a time. For example, when researchers investigate domestic terrorism, most of them neglect to compare determinants of domestic terrorism versus other forms of terrorism such as international (or suicide) terrorism. Regrettably, this means that researchers must remain uncertain whether their theoretical perspective will similarly account for the different types of terrorist events. This is another serious drawback in the literature given the fact that terrorists and terrorist organizations are rarely committed exclusively to a single tactic. The Tamil Tigers in Sri Lanka, for example, are notorious for their suicide bombings, but they also employ other tactics against both domestic and international targets to obtain their political goals. Thus, by focusing on only a single type of terrorist activity, previous studies have failed to perceive the entire picture. Here I attempt to explore the relationship between economic growth and three different forms of terrorist activity: international, domestic, and suicide.

3. Theoretical considerations

The main focus of this study is the role of economic growth, understood as the change in income per capita over time. Other economic conditions such as economic development,

poverty, and unemployment are beyond the purview of this article. Among the various economic conditions, I have chosen growth because it provides a foundation for the economic future of any society (see Ferrara, 2014). I argue that not all areas of economic growth have an identical effect on terrorist activity. The productive power of an industrial economy in terms of financial and material surpluses has a much stronger impact on the well-being of the working and middle classes relative to an agricultural economy. Following La Free and Dugan's (2007) definition, I refer to terrorism as an intentional threat or act of violence by a nonstate actor to attain a political, economic, religious, or social goal. To achieve their goals, terrorists or terrorist groups may choose to engage in domestic, international, and/or suicide terrorism, depending on their strategic and material advantages.

When the victims and perpetrators are from the venue country, an act of violence is defined as domestic terrorism (e.g., the nerve gas attack on the Tokyo subway in March 1995); international terrorism involves at least two different nationals (e.g., the destruction of the Al Khubar Towers that housed US airmen in June 1996 near Dhahran, Saudi Arabia);[1] and suicide terrorism typically occurs when a terrorist purposefully dies in the process of carrying out his or her mission (e.g., the 1983 suicide car bombings of the US Marines barracks and the French paratroopers sleeping quarters in Beirut, Lebanon) (see Enders and Sandler, 2006). Note that because suicide terrorism is the most virulent form of the phenomenon, it has drawn special attention among scholars, policy makers, and journalists. For example, Pape and Feldman (2010, p.5) point out that 'this type of terrorism is responsible for more deaths than any other form of the phenomenon—from 1980 to 2001, over 70% of all deaths due to terrorism were the result of suicide terrorism even though this tactic amounted to only 3% of all terrorist attacks'. Following this research trend, I include suicide bombings as another critical terrorist phenomenon.

The theoretical foundation of this study relies on three perspectives prevalent in the political science and economics literature (i.e., economic opportunities, social cleavages, and hard targets). As explained in Sandler and Enders's (2004) work, a theory of economic opportunities predicts that as economic growth advances, a country's economy generates more job opportunities. As these opportunities extend to disadvantaged populations, the pursuit of economic interests is incentivized over the temptation to engage in risky terrorist violence (Blomberg *et al.*, 2004; Enders and Sandler, 2006; Freytag *et al.*, 2011). When growth is both steady and fast, the overall level of terrorist activity will decrease because rather than resorting to political violence, potential terrorists and their would-be sympathizers have greater opportunity to participate in the economy by producing, buying, and selling products or services. On the other hand, slow growth rates will lessen economic incentives, thus lowering the opportunity costs for engaging in violence. This way, poor economic growth facilitates recruitment for domestic terrorist groups and leads to an increase in the rate of domestic terrorism. Likewise, foreign terrorist groups are then more likely to carry out plots to further destabilize an already suffering domestic economy, thereby leading to a corresponding increase in international terrorism (Meierrieks and Gries, 2013). The fundamental assumption of the theory of economic opportunities, then, is that economic growth stimulates economic activity among a potentially disadvantaged population, thereby reducing the incentive to engage in terrorist activity as a means of addressing their grievances.

1 Sandler (2014) offers 11 reasons for distinguishing between domestic and international terrorism.

I argue that the theory of economic opportunities must be modified on the assumption that growth in different sectors of the economy produces different effects on terrorist activity. That is, financial and material growth in the agricultural sector is quite limited compared to that represented by an increase in industrial capital stock; as a result, the latter is more likely to foster a favorable economic environment in which would-be terrorists can seek better opportunities and upward mobility. In general, a population that earns its livelihood primarily through agriculture remains poor, rural, and unlikely to reap the benefits of agricultural growth. This is why we find many workers attempting to switch from the agricultural sector to the industrial sector as a national economy grows (Kuznets, 1973). Accordingly, the driving force of economic growth, and thus national well-being, is industrial output. Overall, industrialized economies allow people to consume more food, obtain better clothing and shelter, and gain access to more job opportunities, a social safety net, and better healthcare. These kinds of improvements in living standards tend to mitigate the political grievances of affected populations. Therefore, the economic opportunity theory must account for the fact that the economic growth takes place specifically in the industrial sector, not the agricultural sector, and this offers opportunities for social advancement that dissuade terrorist activity. With this in mind, I have constructed the following hypothesis about economic opportunities:

Hypothesis 1 All other things being equal, as industrial economic growth progresses, more economic opportunities become available to potential terrorists, thereby reducing the risk of terrorism, whether domestic, international, or suicide.

Originally formulated in the 1950s, a theory of social cleavages notes that society is historically divided into groups based on specific demographic or socioeconomic factors including economic wealth, class, vocation, ethnic group, and religious affiliation (see Berelson *et al.*, 1954; Lijphart, 1971). For example, Lipset and Rokkan (1967) consider industrial or economic cleavages to be interest-based (e.g., workers versus employers or owners). A theory of social cleavages explains that because members of a population will always benefit unequally from economic growth, there will inevitably be those who reap its greatest advantages (winners) and others who endure its disadvantages (losers); thus, any shift in the distribution of wealth that results from economic growth will cause some social groups to gain and others to suffer losses (Lijphart, 1971). The 'losers', according to this theory, may resort to terrorism in their effort to settle political and economic grievances. So we would expect to see terrorism rise along with economic growth because, as Caruso and Schneider (2011) demonstrate, terrorists and terrorist groups are likely to capitalize on an expanding gap between the rich and the poor by exploiting the grievances of economic losers.

However, the theory of social cleavages also offers an incomplete explanation of terrorist behavior because it fails to recognize that not all kinds of economic growth similarly result in an expansion of class inequality. Though economic growth in the industrial sector does indicate that an industrial economy is getting bigger, it does not necessarily indicate that it is getting better. Indeed, the process of growth may be uneven and unbalanced, thus aggravating social cleavages and favoring the emergence of terrorism. Compared to agricultural surpluses, a large industrial surplus encourages economic disparity and, in turn, social grievances. For example, when industrial growth increases the gap between the wages of urban and rural people, a good portion of the population is left without access to the benefits offered by the surplus; at this point, the demand for a redistribution of wealth becomes

politically powerful (Piazza, 2006). Therefore, we can draw the following hypothesis about social cleavages:

Hypothesis 2 All other things being equal, as industrial economic growth progresses, social cleavages intensify between haves and have-nots, thereby favoring the emergence of terrorist activity in all its forms.

A theory of hard targets predicts that 'as states become richer and better able to defend targets, suicide attacks are used more often' (Berman and Laitin, 2008, p.1944; see also Jain and Mukand, 2004; Hastings and Chan, 2013). However, this prediction is made without considering how countries acquire financial and material resources to provide additional protection for potential terrorist targets. These resources are often generated through quick-paced and steady economic growth and these growth revenues are set aside for counterterrorism-related activities in anticipation of growing threats. A stagnant or slow growth economy is unlikely to produce sufficient funds to manufacture the security resources necessary to enhance defense. Although enhanced counterterrorism efforts typically succeed in decreasing the overall terrorist activity, they may ironically incite the use of more extreme measures such as suicide bombing against hardened targets. As Berman and Laitin find in their formal modeling article (2008, p.1966), the 'further hardening of targets may reduce overall violence but will increase suicide attacks and may lead to proliferation of radical clubs'.

Though elegant, this theoretical prediction must once again be amended on the assumption that not all sectors of a national economy are equally capable of producing the surpluses necessary to acquire materials to harden potential targets. I assert that although agricultural growth is unlikely to produce adequate means to implement better security measures, industrial growth is likely to generate enough revenues to harden targets. Because agricultural growth is unrelated to either the development of innovative security technology or the production of counterterrorism devices, it makes no significant contribution to hardening potential terrorist targets. In addition, agricultural growth is unlikely to generate extra surplus to purchase and implement enhanced security devices. Even though some revenue from agricultural growth may be converted to protect a country's critical infrastructure from a terrorist attack, the conversion cannot last long because it is likely a temporary allocation. Fighting a war on terror is expensive, requiring continuous enhancements and newly developed security resources over a sustained period of time. A country that relies on limited revenues from agricultural growth will face great difficulty as it attempts to respond to high security demands.

Industrial growth is likely to lead toward the development of new security measures and accumulation of counterterrorism funds. Because installing reinforced doors in aircraft cockpits and placing Jersey barriers outside tall or politically sensitive facilities are incredibly costly operations, governments depend primarily on industrial businesses to generate corporate tax revenue to fund these expenditures. Fast and steady industrial growth offers a government ample financial and material resources to set aside for counterterrorism measures, thus helping deter domestic and international terrorist events (Fearon and Laitin, 2003; Meierrieks and Gries, 2013). Even so, enhanced security measures may backfire by encouraging terrorists and terrorist groups to resort to suicide terrorism as the only means to overcome hardened targets (Berman and Laitin, 2008). For example, enhanced security measures for the aviation industry, diplomatic compounds, and military facilities have helped produce some deterrence against terrorist attacks; however, they have also

encouraged terrorist groups to turn to suicide tactics because hardening targets raise the target's value to the terrorist group (Stewart, 2012; Hastings and Chan, 2013). Suicide bombings tend to draw more international headlines than other types of attacks and enable the terrorist group to have more bargaining power vis-à-vis the target government (Pape and Feldman, 2010). Simply put, shifting tactics from general terrorist attacks to suicide bombings is a result of hardening targets that is accompanied with a steady growth of industrial businesses. As a result, I draw the following hypothesis about hard targets:

Hypothesis 3 All other things being equal, as industrial economic growth progresses, more targets become hardened, making them more difficult for domestic and international terrorists to attack but prompting an increase in suicide attacks.

Among the three theoretical perspectives described above, I argue that the modified theory of hard targets more accurately links economic growth to all three forms of terrorism. This is because the other two theories fail to account for the adaptability of terrorist groups in their explanations (Stewart, 2012). When previous studies apply concepts of economic opportunities and social cleavages to terrorists or terrorist groups' activities, their focus is usually one type of terrorism, such as international terrorism, under the implicit assumption that terrorist groups will use the same conventional attack tactics despite the continuously enhanced security environment. Yet terrorist groups are unlikely to rely on the same attack methods when security is dramatically tightened in airports, government facilities, and military installments. In the meantime, terrorist groups will not forgo attacking hardened targets until their political goals are achieved. One must recognize that terrorist groups adapt to enhanced antiterrorism measures by changing their attack methods. Terrorist groups know that conventional attack methods will not be effective against newly hardened targets. They understand that a new method of attack is required once targets are hardened, and thus they frequently turn to suicide bombings as a viable alternative tactic. I believe that this phenomenon of terrorist adaptability is consistent with the prediction of the hard targets theory but not the other two theories: conventional terrorism is likely to decrease, while suicide terrorism is likely to increase.

4. Research design

Two statistical models are built to test the three hypotheses along with five others:

$$\begin{aligned} Terrorism_{it} = {} & \beta_0 + \beta_1 * Econ\ Growth_{it-1} + \beta_2 * Income\ Inequality_{it-1} \\ & + \beta_3 * Democracy_{it-1} + \beta_4 * State\ Failure_{it-1} \\ & + \beta_5 * Population_{it-1} + \beta_6 * Post\text{–}Cold\ War_i + \varepsilon_{1it} \end{aligned}$$

$$\begin{aligned} Terrorism_{it} = {} & \gamma_0 + \gamma_1 * Econ\ Growth\ in\ Agriculture_{it-1} \\ & + \gamma_2 * Econ\ Growth\ in\ Industry_{it-1} \\ & + \gamma_3 * Income\ Inequality_{it-1} + \gamma_4 * Democracy_{it-1} \\ & + \gamma_5 * State\ Failure_{it-1} + \gamma_6 * Population_{it-1} \\ & + \gamma_7 * Post\text{–}Cold\ War_i + \varepsilon_{2it} \end{aligned}$$

where subscript $i = 1,\ldots, N$ indicates the country and subscript $t = 1,\ldots,T$ indexes the time period. Terrorism is the dependent variable; β_0 and γ_0 are constant terms; β_1 through β_6

and γ_1 through γ_7 are coefficients for independent variables; and ε_{1it} and ε_{2it} are error terms.

I collect pooled panel data for 127 countries during the period from 1970 to 2007, using the country-year as the unit of analysis (Appendix Table A1 shows a list of sample countries). I employ four different but related dependent variables. The first variable is a count measure capturing the total number of terrorist incidents, regardless of type, occurring in a country in a given year. The second through fourth variables recategorize the first measure into domestic, international, and suicide terrorist incidents, respectively. The data come from the worldwide terrorism data set of Enders *et al.* (2011), who systematically separated La Free and Dugan's (2007) Global Terrorism Database (GTD)[2] into domestic and international terrorist incidents. Enders *et al.* underscore that 'no other article provides such a complete partitioning of domestic and transnational incidents' (2011, p.3). Suicide terrorism is identified based on the GTD, which records suicide attacks when the terrorist did not intend to escape from the attack alive.[3] Domestic and international terrorist incidents are mutually exclusive and collectively exhaustive, but suicide terrorist incidents are not because suicide bombers may choose either domestic or international targets.

The main independent variable, economic growth, captures an increase in the capacity of an economy to produce goods and services, comparing one period of time to another. Consistent with existing studies, it is measured as the annual percentage growth rate of GDP per capita in 2005. As explained in the data source—World Bank's *World Development Indicator 2013*, the partitioning of the agricultural and industrial sectors is determined by the International Standard Industrial Classification (ISIC). The agricultural sector includes forestry, hunting, and fishing, as well as cultivation of crops and livestock production; the industrial sector is made up of the value added through mining, manufacturing, and construction, as well as electricity, water, and gas services. Economic growth in the agricultural sector is represented by the annual percentage growth rate of GDP per capita in agricultural value added; likewise, economic growth in the industrial sector is industrial value added. The average agricultural growth is 2.58% during the study period, and the average industrial growth is 4.32%.[4]

To ensure the estimated results are not subject to omitted variable bias, I include five control variables: income inequality, democracy, state failure, population, and a post–Cold War indicator. Other control variables such as foreign occupation and terrorist group competition are not included because they have been well documented in previous studies

2 For more detailed information on the GTD, see http://www.start.umd.edu/gtd/. There are some problems with the database; for example, the data for 1993 are missing (La Free and Dugan, 2007). Note that the estimated results are virtually similar with or without the missing 1993 data.

3 Combining the GTD, the International Terrorism: Attributes of Terrorist Events, and the RAND Database of Worldwide Terrorism Incidents, Santifort-Jordan and Sandler (2014) collected a unique data set of about 2,500 suicide terrorist incidents for the years 1998–2010. The time period of this data overlaps with only 10 years of this study and the number of countries covers only 47 (excluding West Bank/Gaza) of the 127 sample countries of this study. When Santifort-Jordan and Sandler's data were merged with this study's, fewer than 300 observations were available for statistical runs, thereby making the estimated results offered by this data incompatible to those reported in the next section.

4 The agricultural sector consists of 2% of the total economic growth in dollars, and the industrial sector is 33%. The remaining 65% come from the services sector whose empirical implications are not explored in this study due to a lack of a theoretical explanation.

(e.g., Santifort-Jordan and Sandler, 2014) and because too many controls may complicate the estimation results (see Achen, 2002).[5]

A majority of previous studies find no relationship between income inequality and terrorist attacks. For example, Abadie's (2006) empirical research reports no effect of several economic variables including income inequality on terrorism. Yet a small number of recent studies point in the opposite direction. Derin-Güre (2009) finds some evidence that countries with high income inequality are associated with increased terrorism. Similarly, Lai (2007) reports that countries with higher levels of economic inequality are more likely to experience higher levels of terrorism. Consistent with the findings of recent studies, I expect that income inequality fuels terrorism. Income inequality is operationalized by the Gini index that measures net income inequality within each country, ranging from 0 to 100. Data is collected from Solt's (2009) newly collected data on standardized world income inequality. Note that when the Gini index is included in the model, about 30% of the terrorism data are dropped out of the estimation due to missing observations.

Some studies show that because democracy provides peaceful channels of conflict resolution, it is inversely related to terrorist activity (e.g., Eyerman, 1998; Li, 2005; Choi, 2010). Yet other studies find that democracies actually foster terrorist activity as a result of their commitment to individual freedoms which, they argue, facilitates the opportunity to assemble and strategize (e.g., Eubank and Weinberg, 2001). Because it is not my main variable of interest, I remain agnostic about the influence of democracy in this study. The democracy variable is a 21-point indicator ranging from least democracy (–10) to most democracy (+10) and its data are collected from the Polity data set (Marshall and Jaggers, 2007).

When the political leadership of a failed state is too weak to exercise legal authority over much of its territory, more terrorist activities are likely to occur (Rotberg, 2002). In fact, there are several studies that find supporting evidence for the significant and positive effect of failed states on terrorism (e.g., Piazza, 2008). Accordingly, I expect state failure to lead to increased terrorism. Gathered from the Political Instability Task Force (2014), the failed state variable is set on a scale of 0 to 17 after combining the following four features: the severity of ethnic wars (0–4), revolutionary wars (0–4), adverse regime changes (1–4), and genocides and politicides (0–5).[6]

Because highly populated countries have a harder time providing adequate security for their large populations, they run a greater risk of experiencing terrorist attacks (Eyerman, 1998). This positive correlation may also be due to a scale effect. That is, more populous countries simply tend to experience more terrorism (in absolute numbers) because they harbor more terrorists and provide more targets than small countries do. Choi and Luo's (2013) work, for example, shows evidence that highly populated countries experience more terrorist incidents than do less populated ones (see also Krieger and Meierrieks, 2011; Choi and Salehyan, 2013; Choi, 2014; Choi and Piazza, forthcoming). With this in mind, the population variable—measured by the logged total population—is expected to correspond

5 When those variables are included, they do not cause the main variables of interest to become insignificant, as shown in Appendix Table A2.

6 The correlation between democracy and state failure is –0.18. The low correlation is not surprising given the fact that the former mainly measures political constraints on the chief executive (Gleditsch and Ward, 1997) while the latter captures political instability (Piazza, 2008).

to an increase in terrorism. Data for this variable are taken from the US Census Bureau (2008).[7]

Enders and Sandler (1999) provide evidence that the total number of terrorist attacks has decreased with the end of the Soviet funding of left-wing groups (see also Choi, 2010, 2011). To account for the systemic decrease in terrorist activity since the end of the Cold War, a post–Cold War variable is included. The post–Cold War variable is coded as 1 since 1991 and as 0 prior to that year.

Because the total number of terrorist events per year is compiled for the operationalization of the dependent variable, I considered Poisson regression as my baseline model. However, because the Pearson goodness-of-fit chi-squared test is statistically significant ($\chi^2 = 93490.82$, $p < 0.001$), it does not indicate that the model fits reasonably well. As an alternative model, negative binomial maximum-likelihood regression with Huber-White robust standard errors clustered by country is introduced because the variance, 2,593.99, of the terrorism data is much larger than its mean, 15.40 (i.e., the presence of overdispersion). Negative binomial regression adds a dispersion parameter to model the unobserved heterogeneity among observations; this allows the variance to exceed the mean, thus correcting for the overdispersion found in Poisson regression models (Hilbe, 2007). All predictors except for post–Cold War are lagged one year to ensure that they cause the outcome variable rather than the other way around.

5. Empirical results

This section consists of basic analysis and robustness checks. The former shows that among the three hypotheses, the hard targets hypothesis is statistically supported and the latter provides a series of robustness tests on the industrial growth and terrorism connection.

5.1 Basic analysis

Following Santifort-Jordan and Sandler (2014) and Gaibulloev and Sandler (2011), I perform two-sided hypothesis tests. Table 1 includes negative binomial regression models built to examine the effect of economic growth on terrorism. The first column lists independent variables including three economic growth–related variables: *Econ Growth*, *Econ Growth in Agriculture*, and *Econ Growth in Industry*. The next eight columns are arranged by types of terrorism: Models 1 and 2 for all terrorism, Models 3 and 4 for domestic terrorism, Models 5 and 6 for international terrorism, and Models 7 and 8 for suicide terrorism.[8] In an attempt to reduce a potential bias in data collection (because suicide incidents in the GTD only become frequent after 1988), the analysis of Models 7 and 8 limits the time

7 It would be interesting to limit the total population to the share of youth to total population because young people may hold more extreme views and thus may be more likely to engage in terrorist activity (see Bloom 2012; Krueger, 2008). Based on the UN Population Division data at http://esa.un.org/unpd/wpp/ASCII-Data/DISK_NAVIGATION_ASCII.htm, a ratio of young people (aged 15 and 24) to population is calculated. The ratio variable turned out to be an insignificant predictor of terrorism, so I decided not to use it in place of the population variable that achieves statistical significance across models.

8 I conduct three sets of multicollinearity diagnostics: R^2 statistics, variance inflation factors, and condition index. As shown in Appendix Table A3, there is no presence of severe multicollinearity among the predictors.

Table 1. Growth and terrorism: negative binomial regression

	1970–2007						1988–2007	
	Terrorism		Domestic terrorism		International terrorism		Suicide terrorism	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Econ Growth$_{it-1}$	−0.015**		−0.015*		−0.014*		0.035	
	(0.007)		(0.008)		(0.008)		(0.026)	
Econ Growth in Agriculture$_{it-1}$		0.003		0.001		0.003		−0.003
		(0.002)		(0.003)		(0.003)		(0.015)
Econ Growth in Industry$_{it-1}$		−0.010***		−0.010**		−0.010**		0.019***
		(0.004)		(0.004)		(0.005)		(0.007)
Income Inequality$_{it-1}$	0.019***	0.019***	0.023***	0.023***	0.015*	0.015*	0.004	0.005
	(0.007)	(0.007)	(0.007)	(0.007)	(0.008)	(0.008)	(0.021)	(0.021)
Democracy$_{it-1}$	0.058***	0.057***	0.063***	0.062***	0.054***	0.053***	0.024	0.024
	(0.013)	(0.013)	(0.013)	(0.013)	(0.014)	(0.014)	(0.037)	(0.036)
State Failure$_{it-1}$	0.230***	0.231***	0.243***	0.244***	0.213***	0.214***	0.271***	0.271***
	(0.031)	(0.031)	(0.035)	(0.035)	(0.032)	(0.032)	(0.067)	(0.065)
Population$_{it-1}$	0.349***	0.347***	0.383***	0.381***	0.326***	0.324***	0.734***	0.749***
	(0.046)	(0.046)	(0.047)	(0.047)	(0.051)	(0.051)	(0.084)	(0.081)
Post-Cold War$_i$	−0.305**	−0.306**	−0.196	−0.198	−0.532***	−0.532***		
	(0.133)	(0.133)	(0.146)	(0.146)	(0.137)	(0.138)		
Constant	−1.700***	−1.691***	−2.506***	−2.498***	−2.981***	−2.969***	−10.759***	−10.872***
	(0.552)	(0.552)	(0.606)	(0.604)	(0.613)	(0.612)	(1.392)	(1.411)
Wald chi^2	177.11	177.50	177.12	179.05	124.21	124.45	168.75	184.17
Prob > chi^2	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Log pseudo-likelihood	−6666.27	−6664.68	−5816.61	−5815.76	−4029.75	−4029.20	−314.11	−314.01
Dispersion = 1	76.28	76.22	82.05	82.02	11.85	11.84	3.31	3.31
Observations	2,665	2,665	2,665	2,665	2,665	2,665	1,787	1,787

Notes: Robust standard errors in parentheses. ***is 0.01, **is 0.05, and *is 0.102.

period to after 1988, which causes them to be 18 years shorter than Models 1 through 6.[9] Because Israel and Sri Lanka experience unusually high volumes of suicide attacks, they are considered outliers that may cause the estimated results to be distorted. For this reason, these countries are excluded from the statistical runs in Models 7 and 8. Furthermore, the post–Cold War dummy used in Models 1 through 6 may not be as relevant a factor in Models 7 and 8 because the start of the sample period is 1988—only two years before the Cold War; therefore, Models 7 and 8 exclude the dummy.[10]

The *Econ Growth* variable in Models 1, 3, 5, and 7 does not differentiate economic growth in the agricultural sector from that in the industrial sector; therefore, it explores the possibility that undifferentiated economic growth is causally related to the rate of terrorist activity. Models 1, 3, and 5 show that the *Econ Growth* variable is negatively associated with terrorism, whereas Model 7 fails to show any evidence for a connection between economic growth and suicide terrorism. These mixed findings are consistent with those of previous studies that have demonstrated the ambiguous relationship between growth and terrorism. Of course, the drawback of using the *Econ Growth* variable is that we cannot be certain about the driving force behind economic growth. Is it growth in the agricultural sector or in the industrial sector that affects the occurrence of terrorism? The *Econ Growth in Agriculture* and the *Econ Growth in Industry* variables were created precisely to explore this issue. As it turns out, *Econ Growth in Agriculture* fails to achieve statistical significance in Models 2, 4, 6, and 8, while *Econ Growth in Industry* emerges as a significant predictor of terrorism across all models. The insignificance of the *Econ Growth in Agriculture* variable indicates that this sector of the national economy has no bearing on terrorist behavior. On the other hand, the significance of the *Econ Growth in Industry* variable tells us that while industrializing economies are less vulnerable to terrorism in general, they become ironically somewhat of a lightning rod for suicide attacks.[11]

Interpreting the main findings in terms of incidence rate ratios should help assess the quantitative importance of the industrial growth variable on terrorism. It appears that if industrial growth increases by 1%, the percent change in the incidence rate of domestic terrorism is a 1% decrease while holding the other variables constant; for the incidence rate of

9 When the full years 1970–2007 are instead used for the suicide terrorism analysis, the results are very similar to those reported in Models 7 and 8. I also perform another robustness test by limiting domestic and international terrorism data to the years 1988–2007 so that all types of terrorism are during the same study period as suicide terrorism. As shown in Appendix Table A4, the main findings of this study remain the same: industrial growth leads to decreases in domestic and international terrorism but not in suicide terrorism, where instead I find an increase.

10 When the two countries and the post–Cold War dummy are included, the main findings are virtually the same as those in Models 7 and 8.

11 The causal effect of growth-related variables is assumed to take one year in the statistical model. Yet there is a possibility that the process of tightening security followed by industrial growth may take more than one year. I test several different lag terms such as two, three, five, and eight because there is no existing theory about how many lags are appropriate. I find no consistent pattern for lag effect as displayed in Appendix Table A5—an example of a three-year lag effect analysis. I reason that because prevention of terrorist threats is one of the highest priorities for politicians and policy makers, adding enhanced security measures should not take more than one year as long as industrial economic growth continues. For example, the 11 September 2001 attacks prompted the Aviation and Transportation Security Act, which required that all passenger screening must, by 19 November 2002, be conducted by federal employees.

international terrorism, there is a 1% decrease. By contrast, if a country were to increase its industrial growth by 1%, its relative change in the expected number of suicide terrorism would be expected to increase by 2%, while holding all other variables in the model constant. It also would be interesting to look at some individual countries whose industrial growth performed well. Jordan is a good example, as its average growth rate in the industrial sector was 9.43% during the study period, which was much higher than 4.23% for the entire sample. If Jordan were to increase its industrial growth by 1%, the changes in the predicted rate would be –0.0082 for domestic terrorism, –0.0030 for international terrorism, and 0.0002 for suicide terrorism. Another example is South Korea, whose industrial growth rate was 9.54% on average. For a 1% increase in its industrial growth, the changes in the predicted rate in South Korea would be –0.0591 for domestic terrorism, –0.0202 for international terrorism, and 0.0021 for suicide terrorism. These quantitative comparisons confirm that growth in the industrial sector appears to be a double-edged sword, producing both favorable and unfavorable consequences in terrorist activity.

Moving on to evaluate the validity of the three hypotheses of growth and terrorism put forward earlier, I find that the estimated results are consistent with the prediction of the hard targets hypothesis but not with either economic opportunities or social cleavages. *Econ Growth in Industry* is significantly different from 0 across all models; it also produces a change in the coefficient sign relative to forms of terrorism. As hypothesized, the results show evidence for the negative connection between growth and domestic and international terrorism; likewise, it indicates a positive link between growth and suicide terrorism. Neither the economic opportunities hypothesis nor the social cleavages hypothesis garners statistical support in a consistent manner. For example, the coefficient sign on the *Econ Growth in Industry* variable changes in its relationship with suicide terrorism even though both theories predict that there would be no such change. While the theory of economic opportunities can explain why *Econ Growth in Industry* is negatively associated with domestic and international terrorist activity, it fails to account for the positive relationship between growth and suicide terrorism. Similarly, while the theory of social cleavages sheds light on why growth increases the likelihood of suicide attacks, it does not explain why it may lead to a lower rate of domestic and international terrorist events.

Use of several examples may further elucidate the predictive power of the hard targets theory. For comparison purposes, four countries are selected from the top 10 percentile of the industrial growth group (Turkey and Pakistan) and the bottom 10 percentile (El Salvador and Peru). In the data set, El Salvador and Peru recorded 2.04% and 2.92%, which is much lower than the average industrial growth rate of 4.23% for the entire sample, whereas Turkey and Pakistan enjoyed a relatively high growth rate: 5.47% and 6.29%, respectively. According to the prediction of the hard targets theory, high growth performance should lead to less domestic and international terrorism but more suicide terrorism. This means that Turkey and Pakistan should experience less domestic and international terrorism than El Salvador and Peru, but the first two countries should encounter more suicide terrorism than the other two. The empirical data are consistent with this prediction because the frequency of the two high-growth countries was 46.47 and 39.35 for domestic terrorism, 6.91 and 6.50 for international terrorism, and 0.84 and 0.82 for suicide terrorism,[12] while that of the two low-growth countries was 84.11 and 171.19, 7.31 and 13.15, and 0 and 0. It appears that high growth performance in industrial sectors is the main driving

12 Note that the average suicide attacks for the entire sample countries are 0.09.

force in reducing a great deal of domestic terrorism and a good size of international terrorism, while it fuels increased suicide terrorism.

The effects of the five control variables are also interesting. While the coefficients of *State Failure* and *Population* achieve significance with a positive sign regardless of the type of terrorism, those of *Income Inequality*, *Democracy*, and *Post-Cold War* do not receive consistent support across models. When countries are on the verge of state failure or have relatively large populations, as hypothesized, they are more likely to fall victim to a variety of terrorist plots. We also see from the results that both domestic and international terrorism become more prevalent with a higher level of income inequality and democratic governance, and that international terrorism has become less frequent since the end of the Cold War.

5.2 Robustness checks

To further confirm the robustness of the results reported so far, I employ two alternative estimation methods used in previous studies: rare events logit and negative binomial regression with fixed effects. It may be the case that the terrorism data are prone to the problem of excessive zero observations, as terrorist incidents are rare across countries and time. To assuage such a problem, I turn to the rare events logit model that was developed by Tomz *et al*. (1999). The rare events logit effectively addresses the issue of excessive zeros in the data.[13] To run this technique, the event count dependent variable is converted into a binary measure, coded as 1 if any attacks are recorded and as 0 otherwise. Table 2 shows the estimated results of the rare events logit model which, as it turns out, do not differ significantly from the main results in Table 1.[14]

13 The statistics literature also recommends that zero-inflated negative binomial regression be used for cross-sectional data with excessive zeros. A standard negative binomial regression model loses some of its effectiveness when the prevalence of zero counts in the data poses a statistical challenge by not being estimated appropriately (see Greene, 2003; Hilbe, 2007). However, zero-inflated negative binomial regression is not an appropriate estimation method for the cross-sectional, time-series terrorism data of this study in which the presence of excessive zeros, when estimated in Stata, is connected to individual observations with zero counts rather than to individual countries with no count events.

14 Keshk's (2003) two-stage probit least squares are a simultaneous equations model that can use the converted binary measure of terrorism and the continuous measure of economic growth. Adopted from Gaibulloev and Sandler's (2011, p.358) baseline model, the first equation is constructed as Economic Growth$_{it} = \alpha_0 + \alpha_1$*Terrorism$_{it} + \alpha_2$*GDP Per Capita$_{it-1} + \alpha_3$*Gross Capital Formation$_{it-1} + \alpha_4$*Interstate War$_{it} + \alpha_5$*Intrastate War$_{it} + \varepsilon_{3it}$. The data are gathered from the World Bank's *World Development Indicator 2013* and Gleditsch *et al.* (2002). The second equation is adopted from Model 1 of Table 2. The overall results appear to show that even when the mutual causality concerns are taken into consideration, the effect of industrial growth remains as predicted. However, there is a serious problem with Keshk's simultaneous equations results because they are obtained under the unrealistic assumption that only industrial growth but not agricultural growth is endogenous to terrorism. Keshk's Stata syntax for the simultaneous equations model allows researchers to include only one endogenous variable in each parenthesis in the command line, making it impossible to accommodate two endogenous relationships at once. Put differently, the simultaneous equations model fails to account for the two endogenous relationships of industrial and agricultural growth at the same time, thereby yielding biased estimates. Therefore, a further exploration of mutual causality between different growth sectors and terrorism will have to await a subsequent methodology study.

Table 2. Growth and terrorism: rare events logit

	1970–2007						1988–2007	
	Terrorism		Domestic terrorism		International terrorism		Suicide terrorism	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Econ Growth$_{it-1}$	−0.037***		−0.035***		−0.029***		0.049*	
	(0.010)		(0.010)		(0.010)		(0.026)	
Econ Growth in Agriculture$_{it-1}$		0.005		−0.000		0.005		−0.006
		(0.006)		(0.005)		(0.006)		(0.017)
Econ Growth in Industry$_{it-1}$		−0.023***		−0.022***		−0.017**		0.027***
		(0.007)		(0.008)		(0.008)		(0.007)
Income Inequality$_{it-1}$	0.015***	0.015***	0.022***	0.022***	0.013***	0.012***	0.000	0.001
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.014)	(0.014)
Democracy$_{it-1}$	0.060***	0.060***	0.065***	0.064***	0.057***	0.057***	0.023	0.022
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.025)	(0.025)
State Failure$_{it-1}$	0.491***	0.497***	0.422***	0.426***	0.407***	0.412***	0.327***	0.325***
	(0.066)	(0.066)	(0.058)	(0.057)	(0.053)	(0.053)	(0.065)	(0.063)
Population$_{it-1}$	0.535***	0.532***	0.540***	0.537***	0.499***	0.495***	0.821***	0.837***
	(0.037)	(0.038)	(0.037)	(0.037)	(0.035)	(0.036)	(0.088)	(0.087)
Post-Cold War$_i$	−0.321***	−0.320***	−0.078	−0.076	−0.598***	−0.595***		
	(0.090)	(0.090)	(0.090)	(0.090)	(0.094)	(0.094)		
Constant	−5.645***	−5.669***	−6.553***	−6.567***	−5.772***	−5.783***	−12.343***	−12.443***
	(0.418)	(0.416)	(0.428)	(0.427)	(0.403)	(0.403)	(1.259)	(1.255)
Observations	2,665	2,665	2,665	2,665	2,665	2,665	1,787	1,787

Note: Robust standard errors in parentheses. ***is 0.01, **is 0.05, and *is 0.10.

In their 'Dirty pool' article, Green *et al.* (2001, p.442) speak critically of a pooled panel data analysis, saying that 'analyses of [cross-sectional, time-series] data that make no allowance for fixed unobserved differences between [countries] often produce biased results'. This is an important criticism to bear in mind because use of country fixed effects enables us to take into account the unique political and economic environments of each country in terms of its attractiveness to terrorists. While examining the relationship between economic growth and general terrorism, Meierrieks and Gries (2013, p.93) similarly caution that 'country-specific factors may influence whether growth exerts a causal effect on terrorism by governing the responsiveness to socio-economic progress'. Taking advantage of these methodological insights, I employ conditional fixed-effects negative binomial regression models. As shown in Table 3, conditional fixed-effects negative binomial regression models reveal that *Econ Growth in Industry* is related to all forms of terrorist activity except for international terrorism in Model 6. The insignificant effect of industrial growth on international terrorism has something to do with the loss of many observations, after the income inequality variable is included in the model. Models 7 and 8 display additional test results by replicating Models 5 and 6 after excluding the income inequality variable. The coefficient on *Econ Growth in Industry* becomes significant and the sign is negative, as predicted by the modified theory of hard targets. By and large, the main findings of this study appear to be robust across a number of estimation techniques.

6. Concluding remarks

The impact of economic growth on terrorist activity is an understudied area, and the previous empirical results are mixed and inconsistent. This study sheds new light on the literature of economic growth and terrorism by reconceptualizing the former into two separate sectors (i.e., agriculture and industry) as well as by recategorizing the latter into three forms (i.e., domestic, international, and suicide). Given its potentially enormous impact on terrorist activity, the role of industrial growth is brought to the fore. This is in contrast to previous studies that lump together all the growth sectors. Whereas previous studies focus on one type of terrorism at a time, I investigate the three different forms of terrorist activity together. In addition, three modified theoretical perspectives are offered to explain the industry growth and terrorism connection: economic opportunities, social cleavages, and hard targets.

A cross-national, time-series data analysis of 127 countries for the years 1970–2007 offers supporting evidence for the hypothesis of hard targets: when countries sustain higher levels of industrial growth rather than agricultural growth, they are less likely to experience domestic and international terrorism, but are more likely to experience suicide attacks. What can a government learn from these findings? Unfortunately, the findings are not all optimistic because a well-functioning market economy based on quick-paced but steady economic growth is not necessarily a cure-all solution for growing terrorist threats. If a government seeks to benefit from industrial growth, it should take into consideration what forms of terrorism it needs to counter. If the goal is to deter domestic and international terrorism, it should not hesitate to harden potential targets; however, if it has suffered from a series of suicide attacks, it should be aware that an enhancement of its security measures may have the opposite of its intended effect. Simply put, politicians and policy makers in suicide terrorism-prone countries such as Iraq, Turkey, Pakistan, and Afghanistan should

Table 3. Growth and terrorism: fixed effects

	1970–2007								1988–2007	
	Terrorism		Domestic terrorism		International terrorism				Suicide terrorism	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10
Econ Growth$_{it-1}$	−0.018***		−0.020***		−0.010		−0.009*		0.067**	
	(0.005)		(0.005)		(0.006)		(0.005)		(0.031)	
Econ Growth in Agriculture$_{it-1}$		0.004		0.002		0.003		0.002		0.002
		(0.003)		(0.004)		(0.004)		(0.003)		(0.014)
Econ Growth in Industry$_{it-1}$		−0.013***		−0.014***		−0.006		−0.006*		0.026*
		(0.003)		(0.003)		(0.004)		(0.003)		(0.014)
Income Inequality$_{it-1}$	−0.007*	−0.007*	−0.005	−0.005	−0.005	−0.005			0.047	0.049
	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)			(0.049)	(0.048)
Democracy$_{it-1}$	0.039***	0.039***	0.045***	0.045***	0.026***	0.026***	0.034***	0.034***	−0.002	0.001
	(0.006)	(0.006)	(0.006)	(0.006)	(0.007)	(0.007)	(0.006)	(0.006)	(0.035)	(0.035)
State Failure$_{it-1}$	0.169***	0.175***	0.184***	0.190***	0.151***	0.155***	0.148***	0.151***	0.170	0.166
	(0.016)	(0.016)	(0.017)	(0.017)	(0.019)	(0.019)	(0.016)	(0.015)	(0.124)	(0.122)
Population$_{it-1}$	0.082***	0.082***	0.126***	0.125***	0.069*	0.068	0.124***	0.124***	1.049**	1.067**
	(0.028)	(0.028)	(0.031)	(0.031)	(0.041)	(0.041)	(0.035)	(0.035)	(0.473)	(0.451)
Post-Cold War$_i$	−0.192***	−0.195***	−0.069	−0.073	−0.392***	−0.391***	−0.350***	−0.347***		
	(0.061)	(0.061)	(0.067)	(0.067)	(0.071)	(0.071)	(0.063)	(0.063)		
Constant	−1.492***	−1.517***	−2.336***	−2.363***	−1.183**	−1.183**	−2.067***	−2.082***	−15.915***	−16.080***
	(0.358)	(0.358)	(0.404)	(0.403)	(0.522)	(0.522)	(0.360)	(0.360)	(5.795)	(5.667)
Observations	2,596	2,596	2,573	2,573	2,369	2,369	3,298	3,298	412	412

Note: Robust standard errors in parentheses. ***is 0.01, **is 0.05, and *is 0.10.

think hard about how to balance economic growth and deterrence of different types of terrorism.

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References

Abadie, A. (2006) Poverty, political freedom and the roots of terrorism, *American Economic Review*, **96**, 159–77.

Achen, C. (2002) Toward a new political methodology, *Annual Review of Political Science*, **5**, 423–50.

Berelson, B., Lazarsfeld, P., and McPhee, W. (1954) *Voting*, University of Chicago Press, Chicago, IL.

Berman, E. and Laitin, D.D. (2008) Religion, terrorism and public goods, *Journal of Public Economics*, **92**, 1942–67.

Blomberg, S.B., Hess, G.D., and Weerapana, A. (2004) Economic conditions and terrorism, *European Journal of Political Economy*, **20**, 463–78.

Bloom, D. (2012) Youth in the balance, *Finance & Development*, **49**, 7–11.

Caruso, R. and Schneider, F. (2011) The socio-economic determinants of terrorism and political violence in Western Europe (1994–2007), *European Journal of Political Economy*, **27**, 37–49.

Choi, S.W. (2010) Fighting terrorism through the rule of law?, *Journal of Conflict Resolution*, **54**, 940–66.

Choi, S.W. (2011) Does US military intervention reduce or increase terrorism?, APSA 2011 Annual Meeting Paper; available at http://ssrn.com/abstract=1900375 (accessed 1 September 2014).

Choi, S.W. (2014) Causes of domestic terrorism, *Korean Journal of International Studies*, **12**, 137–59.

Choi, S.W. and Luo, S. (2013) Economic sanctions, poverty, and international terrorism, *International Interactions*, **39**, 217–45.

Choi, S.W. and Piazza, J. (2015) Internally-displaced populations and suicide terrorism, *Journal of Conflict Resolution*, forthcoming.

Choi, S.W. and Salehyan, I. (2013) No good deed goes unpunished, *Conflict Management and Peace Science*, **30**, 53–75.

Derin-Güre, P. (2009) Does terrorism have economic roots?, Working Papers Series wp2009-01, Department of Economics, Boston University.

Drakos, K. and Gofas, A. (2006) In search of the average transnational terrorist attack venue, *Defence and Peace Economics*, **17**, 73–93.

Enders, W. and Sandler, T. (1999) Transnational terrorism in the post-cold war era, *International Studies Quarterly*, **43**, 145–67.

Enders, W. and Sandler, T. (2006) *The Political Economy of Terrorism*, Cambridge University Press, New York.

Enders, W., Sandler, T., and Gaibulloev, K. (2011) Domestic versus transnational terrorism, *Journal of Peace Research*, **48**, 319–37.

Eubank, W. and Weinberg, L. (2001) Terrorism and democracy, *Terrorism and Political Violence*, **13**, 155–64.

Eyerman, J. (1998) Terrorism and democratic states, *International Interactions*, **24**, 151–70.

Fearon, J.D. and Laitin, D.D. (2003) Ethnicity, insurgency, and civil war, *American Political Science Review*, **97**, 75–90.
Ferrara, P. (2014, January 14) Why economic growth is exponentially more important than income inequality, *Forbes*; available at http://www.forbes.com/sites/peterferrara/2014/01/14/why-economic-growth-is-exponentially-more-important-than-income-inequality/print/ (accessed 1 September 2014).
Freytag, A., Krüger, J.J., Meierrieks, D., and Schneider, F. (2011) The origins of terrorism, *European Journal of Political Economy*, **27**, 5–16.
Gaibulloev, K. and Sandler, T. (2011) The adverse effect of transnational and domestic terrorism on growth in Africa, *Journal of Peace Research*, **48**, 355–71.
Gaibulloev, K., Sandler, T., and Sul, D. (2014) Dynamic panel analysis under cross-sectional dependence, *Political Analysis*, **22**, 258–73.
Gleditsch, K. and Ward, M. (1997) Double take, *Journal of Conflict Resolution*, **41**, 361–83.
Gleditsch, N.P., Wallensteen, P., Eriksson, M., Sollenberg, M., and Strand, H. (2002) Armed conflict 1946–2001, *Journal of Peace Research*, **39**, 615–37.
Green, D., Kim, S.Y., and Yoon, D. (2001) Dirty pool, *International Organization*, **55**, 441–68.
Greene, W. (2003) *Econometric Analysis*, Prentice Hall, Upper Saddle River, NJ.
Gries, T., Krieger, T., and Meierrieks, D. (2011) Causal linkages between domestic terrorism and economic growth, *Defence and Peace Economics*, **22**, 493–508.
Hastings, J.V. and Chan, R.J. (2013) Target hardening and terrorist signaling, *Terrorism and Political Violence*, **25**, 777–97.
Hilbe, J. (2007) *Negative Binomial Regression,* Cambridge University Press, Cambridge.
Jain, S. and Mukand, S.W. (2004) The economics of high-visibility terrorism, *European Journal of Political Economy*, **20**, 479–94.
Keshk, O. (2003) CDSIMEQ, *Stata Journal*, **3**, 157–67.
Krieger, T. and Meierrieks, D. (2011) What causes terrorism?, *Public Choice*, **147**, 3–27.
Krueger, A.B. (2008) What makes a homegrown terrorist?, *Economic Letters*, **101**, 293–96.
Kurrild-Klitgaard, P., Justesen, M.K., and Klemmensen, R. (2006) The political economy of freedom, democracy, and transnational terrorism, *Public Choice*, **128**, 289–315.
Kuznets, S. (1973) Modern economic growth, *American Economic Review*, **63**, 247–58.
La Free, G. and Dugan, L. (2007) Introducing the global terrorism database, *Terrorism and Political Violence*, **19**, 181–204.
Lai, B. (2007) Draining the swamp, *Conflict Management and Peace Science*, **24**, 297–310.
Li, Q. (2005) Does democracy promote or reduce transnational terrorist incidents?, *Journal of Conflict Resolution*, **49**, 278–97.
Lijphart, A. (1971) Class voting and religious voting in the European democracies, *Acta Politica*, **6**, 158–71.
Lipset, S.M. and Rokkan, S. (1967) *Party Systems and Voter Alignments*, Free Press, Toronto.
Marshall, M. and Jaggers, K. (2007) POLITY IV Project; available at http://www.systemicpeace.org/inscr/p4manualv2006.pdf (accessed 1 September 2014).
Meierrieks, D. and Gries, T. (2013) Causality between terrorism and economic growth, *Journal of Peace Research*, **50**, 91–104.
Pape, R.A. and Feldman, J.K. (2010) *Cutting the Fuse*, University of Chicago Press, Chicago, IL.
Piazza, J. (2006) Rooted in poverty?, *Terrorism and Political Violence*, **18**, 159–77.
Piazza, J. (2008) Incubators of terror?, *International Studies Quarterly*, **52**, 469–88.
Political Instability Task Force. (2014) State failure problem set, 1955–2013; available at http://www.systemicpeace.org/inscrdata.html (accessed 6 October 2014).
Rotberg, R.I. (2002) Failed states in a world of terror, *Foreign Affairs*, **81**, 127–40.
Sandler, T. and Enders, W. (2004) An economic perspective on transnational terrorism, *European Journal of Political Economy*, **20**, 301–16.
Sandler, T. (2014) The analytical study of terrorism, *Journal of Peace Research*, **51**, 257–71.

Santifort-Jordan, C. and Sandler, T. (2014) An empirical study of suicide terrorism, *Southern Economic Journal*, **80**, 981–1001.

Shahbaz, M. (2013) Linkages between inflation, economic growth and terrorism in Pakistan, *Economic Modelling*, **32**, 496–506.

Solt, F. (2009) Standardizing the world income inequality database, *Social Science Quarterly*, **90**, 231–42.

Stewart, S. (2012, July 26) The persistent threat to soft targets; available at http://www.stratfor.com/weekly/persistent-threat-soft-targets#axzz38geV10fl (accessed 1 September 2014).

Tomz, M., King, G., and Zeng, L. (1999) RELOGIT; available at http://gking.harvard.edu/ (accessed 1 September 2014).

US Census Bureau, Population Division. (2008) International Database (IDB); available at http://www.census.gov/ipc/www/idb/summaries.html (accessed 1 September 2014).

Appendix

Table A1. List of sample countries

Albania	Congo Brazzaville	Hungary	Mexico	Slovenia
Algeria	Costa Rica	India	Moldova	South Africa
Angola	Croatia	Indonesia	Mongolia	Spain
Argentina	Cuba	Iran	Morocco	Sri Lanka
Armenia	Cyprus	Israel	Mozambique	Switzerland
Australia	Czech Republic	Italy	Nepal	Sweden
Austria	Denmark	Ivory Coast	Netherlands	Tajikistan
Azerbaijan	Djibouti	Jamaica	New Zealand	Tanzania
Bangladesh	Dominican Republic	Japan	Nicaragua	Thailand
Belarus	Ecuador	Jordan	Nigeria	Togo
Benin	Egypt	Kazakhstan	Norway	Trindidad and Tobago
Bhutan	El Salvador	Kenya	Pakistan	Tunisia
Bolivia	Estonia	Korea (South)	Panama	Turkey
Botswana	Ethiopia	Kyrgyzstan	Papua New Guinea	Turkmenistan
Brazil	Fiji	Laos	Paraguay	Uganda
Burkina Faso	Finland	Latvia	Peru	Ukraine
Burundi	France	Lebanon	Philippines	USA
Cambodia	Gabon	Lesotho	Poland	Uruguay
Cameroon	Gambia	Liberia	Portugal	Uzbekistan
Canada	Georgia	Lithuania	Romania	Venezuela
Central African Republic	Germany	Madagascar	Russia	Yemen
Chad	Guatemala	Malawi	Rwanda	Zambia
Chile	Guinea	Malaysia	Senegal	Zimbabwe
China	Guyana	Mali	Sierra Leone	
Colombia	Haiti	Mauritania	Singapore	
Comoros	Honduras	Mauritius	Slovak Republic	

Table A2. Growth and terrorism: more control variables

	Negative binomial regression							
	1970–2007						1988–2007	
	Terrorism		Domestic terrorism		International terrorism		Suicide terrorism	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Econ Growth$_{it-1}$	−0.024***		−0.024***		−0.023***		0.037	
	(0.007)		(0.007)		(0.008)		(0.030)	
Econ Growth in Agriculture$_{it-1}$		0.001		−0.001		0.000		−0.003
		(0.002)		(0.003)		(0.004)		(0.017)
Econ Growth in Industry$_{it-1}$		−0.014***		−0.014***		−0.012**		0.017**
		(0.004)		(0.005)		(0.005)		(0.007)
Income Inequality$_{it-1}$	0.015**	0.015**	0.020***	0.019***	0.009	0.009	−0.010	−0.009
	(0.006)	(0.006)	(0.007)	(0.007)	(0.008)	(0.008)	(0.021)	(0.021)
Democracy$_{it-1}$	0.049***	0.049***	0.055***	0.055***	0.043***	0.043***	0.016	0.015
	(0.012)	(0.012)	(0.013)	(0.013)	(0.013)	(0.014)	(0.037)	(0.036)
State Failure$_{it-1}$	0.225***	0.228***	0.241***	0.244***	0.206***	0.210***	0.263***	0.262***
	(0.033)	(0.033)	(0.037)	(0.037)	(0.034)	(0.034)	(0.068)	(0.067)
Population$_{it-1}$	0.249***	0.247***	0.295***	0.293***	0.211***	0.207***	0.601***	0.620***
	(0.048)	(0.048)	(0.052)	(0.052)	(0.046)	(0.047)	(0.087)	(0.084)
Post-Cold War$_i$	−0.258**	−0.256**	−0.159	−0.158	−0.443***	−0.442***		
	(0.125)	(0.125)	(0.140)	(0.139)	(0.128)	(0.129)		
Foreign Occupation$_{it-1}$	−0.500	−0.501	−0.532	−0.538	−0.716***	−0.712***	−0.569	−0.505
	(0.330)	(0.322)	(0.406)	(0.398)	(0.270)	(0.262)	(0.724)	(0.737)
Terrorist Group Competition$_{it-1}$	0.878***	0.864***	0.770***	0.757***	1.155***	1.141***	2.707***	2.698***
	(0.135)	(0.133)	(0.161)	(0.160)	(0.161)	(0.162)	(1.033)	(1.036)
Constant	−1.151**	−1.153**	−2.004***	−2.004***	−2.444***	−2.439***	−11.149***	−11.292***
	(0.540)	(0.539)	(0.617)	(0.615)	(0.561)	(0.561)	(1.649)	(1.671)
Observations	2,618	2,618	2,618	2,618	2,618	2,618	1,767	1,767

Note: Robust standard errors in parentheses. ***is 0.01, **is 0.05, and *is 0.10.

Table A3. Multicollinearity diagnostics

	R^2	Variance inflation factors	Square root of VIFs
Econ Growth in Agriculture$_{it-1}$	0.02	1.02	1.01
Econ Growth in Industry$_{it-1}$	0.04	1.04	1.02
Income Inequality$_{it-1}$	0.08	1.09	1.04
State Failure$_{it-1}$	0.13	1.15	1.07
Econ Development$_{it-1}$	0.10	1.11	1.05
Population$_{it-1}$	0.07	1.08	1.04
Post-Cold War$_i$	0.06	1.06	1.03
Mean variance inflation factor		1.08	
	Eigenvalues	Condition index	
1	4.24	1.00	
2	1.06	2.00	
3	1.01	2.04	
4	0.78	2.33	
5	0.54	2.80	
6	0.31	3.70	
7	0.05	9.25	
8	0.01	21.98	
Condition number		21.98	
Eigenvalues and condition Index computed from the scaled raw sscp with an intercept			
Det(correlation matrix)		0.77	

Notes: A general rule of thumb: a serious multicollinearity problem is suspected if R^2 is greater than 0.80, if the mean of all the variance inflation factors is considerably larger than 10, or if condition number exceeds 1000.

Table A4. Growth and terrorism, 1988–2007

	Negative binomial regression							
	Terrorism		Domestic terrorism		International terrorism		Suicide terrorism	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Econ Growth$_{it-1}$	−0.021*		−0.020		−0.051***		0.035	
	(0.013)		(0.014)		(0.016)		(0.026)	
Econ Growth in Agriculture$_{it-1}$		−0.001		−0.002		−0.004		−0.003
		(0.007)		(0.008)		(0.008)		(0.015)
Econ Growth in Industry$_{it-1}$		−0.024***		−0.026***		−0.038***		0.019***
		(0.009)		(0.010)		(0.012)		(0.007)
Income Inequalty$_{it-1}$	−0.003	−0.003	−0.004	−0.004	−0.001	−0.001	0.004	0.005
	(0.012)	(0.012)	(0.013)	(0.013)	(0.015)	(0.015)	(0.021)	(0.021)
Democracy$_{it-1}$	0.020	0.018	0.020	0.017	0.002	−0.000	0.024	0.024
	(0.023)	(0.023)	(0.024)	(0.024)	(0.026)	(0.026)	(0.037)	(0.036)
State Failure$_{it-1}$	0.343***	0.346***	0.355***	0.359***	0.290***	0.297***	0.271***	0.271***
	(0.053)	(0.053)	(0.054)	(0.054)	(0.056)	(0.057)	(0.067)	(0.065)
Population$_{it-1}$	0.580***	0.580***	0.603***	0.604***	0.536***	0.533***	0.734***	0.749***
	(0.063)	(0.063)	(0.065)	(0.064)	(0.068)	(0.068)	(0.084)	(0.081)
Constant	−4.558***	−4.525***	−4.938***	−4.905***	−6.082***	−6.093***	−10.759***	−10.872***
	(0.867)	(0.867)	(0.922)	(0.925)	(0.935)	(0.934)	(1.392)	(1.411)
Observations	1,787	1,787	1,787	1,787	1,787	1,787	1,787	1,787

Note: Robust standard errors in parentheses. ***is 0.01, **is 0.05, and *is 0.10.

Table A5. Growth and terrorism: three-year lag effects

	Negative binomial regression							
	Terrorism		Domestic terrorism		International terrorism		Suicide terrorism	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Econ Growth$_{it-1}$	−0.002		−0.004		−0.002		0.041*	
	(0.008)		(0.009)		(0.008)		(0.025)	
Econ Growth$_{it-2}$	−0.015**		−0.010		−0.017*		−0.020	
	(0.007)		(0.007)		(0.009)		(0.020)	
Econ Growth$_{it-3}$	−0.013*		−0.011		−0.017**		−0.020	
	(0.007)		(0.008)		(0.008)		(0.028)	
Econ Growth in Agriculture$_{it-1}$		0.003		0.001		0.002		0.008
		(0.003)		(0.004)		(0.004)		(0.016)
Econ Growth in Agriculture$_{it-2}$		−0.002		−0.003		−0.006		0.025
		(0.004)		(0.004)		(0.005)		(0.018)
Econ Growth in Agriculture$_{it-3}$		−0.002		−0.001		−0.008*		0.005
		(0.004)		(0.004)		(0.005)		(0.016)
Econ Growth in Industry$_{it-1}$		−0.006		−0.006		−0.007		0.023**
		(0.005)		(0.006)		(0.006)		(0.009)
Econ Growth in Industry$_{it-2}$		−0.002		0.002		−0.002		−0.025**
		(0.004)		(0.004)		(0.006)		(0.012)
Econ Growth in Industry$_{it-3}$		−0.007*		−0.007		−0.007		−0.014
		(0.004)		(0.005)		(0.006)		(0.021)
Income Inequalty$_{it-1}$	0.020***	0.020***	0.024***	0.025***	0.015*	0.016*	−0.006	−0.008
	(0.007)	(0.007)	(0.008)	(0.008)	(0.009)	(0.009)	(0.025)	(0.025)

(continued)

Table A5. Continued

	Negative binomial regression							
	Terrorism		Domestic terrorism		International terrorism		Suicide terrorism	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Democracy$_{it-1}$	0.060***	0.060***	0.066***	0.066***	0.055***	0.054***	0.007	0.006
	(0.013)	(0.013)	(0.014)	(0.014)	(0.014)	(0.014)	(0.038)	(0.037)
State Failure$_{it-1}$	0.263***	0.264***	0.275***	0.278***	0.239***	0.243***	0.265***	0.263***
	(0.037)	(0.036)	(0.040)	(0.040)	(0.034)	(0.034)	(0.067)	(0.066)
Population$_{it-1}$	0.369***	0.365***	0.402***	0.399***	0.343***	0.339***	0.776***	0.794***
	(0.046)	(0.046)	(0.048)	(0.048)	(0.051)	(0.052)	(0.093)	(0.092)
Post-Cold War$_i$	−0.437***	−0.434***	−0.345**	−0.345**	−0.610***	−0.609***		
	(0.140)	(0.138)	(0.154)	(0.153)	(0.144)	(0.143)		
Constant	−1.832***	−1.844***	−2.644***	−2.661***	−3.067***	−3.103***	−10.490***	−10.663***
	(0.592)	(0.592)	(0.650)	(0.648)	(0.632)	(0.639)	(1.486)	(1.522)
Observations	2,297	2,297	2,297	2,297	2,297	2,297	1,508	1,508

Note: Robust standard errors in parentheses. ***is 0.01, **is 0.05, and *is 0.10.