Relative Deprivation Theory in Terrorism: A Study of Higher Education and Unemployment as Predictors of Terrorism

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Abstract

What country conditions breed terrorism? Relative deprivation theory holds that instead of an absolute standard of deprivation, a gap between expected and achieved welfare leads men to political violence. My research examines whether levels of unemployment and higher education that reflect relative deprivation correspond with an increase in terrorist attacks. A recent surge in empirical studies of terrorism has shown that, contrary to popular belief, terrorists tend to be highly educated and from wealthier families than average. This study models relative deprivation by examining the effect of unemployment and tertiary education on levels of terrorism. I examine terrorist attacks from 1980-2008 across 56 countries to see whether the interaction effect of unemployment and higher education is positively correlated with an increase in the number of terrorist attacks. The results of my multivariate regression suggest that this interaction may be somewhat significant in countries where there have been previous attacks. Additionally, while unemployment and population size are strongly correlated with increased instances of terrorism, higher education alone has no significant relationship with a nation's levels of terrorism. I discuss possible reasons for the significance of these indicators and the policy implications of my findings.

Introduction

Perhaps the most glaring misconception about terrorism is the assumption that terrorists are underprivileged, uneducated individuals on the fringe of society. Increasingly, empirical studies of terrorism have demonstrated that such a notion is flawed. Not only is there no empirical basis for this perception, but terrorism also appears to be more of a desirable undertaking than a last resort for many individuals. As detailed in a paper by Alan Krueger and Jitka Malecková (2003), as well as a later study by Alan Krueger and David Laitin (2008), terrorists tend to be more highly educated and from wealthier families than the average population. Krueger and Malecková (2003) demonstrate the desirability of terrorism by citing a report from UN relief worker Nasra Hassan, who quotes a Hamas leader as saying the organization's biggest problem is "the hordes of young men who beat on our doors, clamoring to be sent [on suicide missions]."

Part of what makes terrorism so *terrorizing* is our inability to rationalize such extreme acts of violence and often self-sacrifice. What circumstances other than pure desperation could drive a person to become a terrorist? The rationale behind the idea that terrorists are desperate seems logical; rational choice theorists, at least, would posit that if a person is willing to risk his life and/or freedom to commit an act of terrorism, he must have few preferable alternatives. Although academics from various disciplines have focused their attention on answering this question, researchers have offered no conclusive explanation.

In this paper, I examine relative deprivation theory as a possible explanation for what motivates individuals to commit terrorist attacks. In Part A, I discuss the theory of relative deprivation, and how Ted Robert Gurr explains political violence as the result of collective discontent arising from a discrepancy between expected and achieved welfare. In Part B, I

review the existing literature and empirical research on terrorism. My paper builds on existing research of social and economic conditions by examining the interaction effect of unemployment and higher education as a possible determinant of terrorism. I turn in Part C to a time series analysis of unemployment and education levels in countries where there have been terrorist attacks, as well as an overall look at nations regardless of their terrorist record. I model relative deprivation theory by looking at whether countries with a highly educated workforce and high levels of unemployment experience more terrorist attacks.

My findings suggest that while this interaction effect is slightly significant in regressions including only country-years where terrorist attacks occurred, the effect is insignificant when examined in the larger context of all country-years, regardless of whether or not an attack occurred. However, my results suggest that unemployment is a significant factor. This strong relationship suggests that countries with fewer employment opportunities are more likely to experience terrorist attacks. Higher education, on the other hand, does not appear to be correlated with a nation's incidence of terrorism. The lack of relationship does not support my theory that education may actually be positively correlated with the number of terrorist attacks. Part D of this paper further outlines my results and inferences.

Although terrorist attacks perpetrated by radical Islamist organizations such as Hamas and Al-Qaeda have captured the public limelight since September 11th, 2001, terrorism is not a new phenomenon. To assume that Al-Qaeda operates on an unprecedented scale is misguided, as Political Scientist and terrorism specialist Louise Richardson points out in her book *What Terrorists Want* (2006). While it may be difficult to pinpoint similarities between the Irish Republican Army (IRA), the Shining Path in Peru, and Sri Lanka's Tamil Tigers, all terrorist organizations perpetrate a specific kind of political violence.

Until policy-makers can understand the root causes of terrorism, they will be unable to implement effective measures to prevent it. While academics have made great strides in disseminating the false perceptions that permeate the international debate, the true determinants of terrorism remain uncertain. My results suggest that in nations that have experienced terrorist attacks previously, relative deprivation theory may hold some predictive power. However, it does not explain what generates terrorism in the first place.

Part A: Relative Deprivation Theory

In order to understand my hypothesis, it is important first to understand relative deprivation as a theory of political violence. Ted Robert Gurr explains in *Why Men Rebel* (1970) that instead of an absolute standard of deprivation, a gap between expected and achieved welfare creates collective discontent. This theory also applies to individuals who find their own welfare to be inferior to that of others to whom they compare themselves. In this paper, I examine how relative deprivation theory has been used to explain different kinds of political violence, and whether it might also account for terrorist attacks. Gurr explains political violence as the result of collective discontent caused by a sense of relative deprivation. He writes, "'Relative deprivation' is the term... used to denote the tension that develops from a discrepancy between the "ought" and the "is" of collective value satisfaction, and that disposes men to violence." This gap between an individual's expected and achieved welfare results in collective discontent.

The concept of relative deprivation dates back to ancient Greece. Aristotle articulated the idea that revolution is driven by a *relative* sense or feeling of inequality, rather than an *absolute* measure. According to Gurr, "For Aristotle the principal cause of revolution is the aspiration for economic or political equality on the part of the common people who lack it, and the aspiration

of oligarchs for greater inequality than they have, i.e. a discrepancy in both instances between what people have of political and economic goods relative to what they think is justly theirs." Consider the modern day example of a millionaire living in Beverly Hills with an Olympic sized swimming pool. One would look at this man's life and likely conclude that he could not possibly feel "deprived." However, let us suppose that the millionaire's next-door neighbor has *ten* Olympic sized swimming pools. Though the millionaire is objectively wealthy, he might feel *relatively* deprived. Gurr says this "perceived discrepancy between value expectations and value capabilities" is what leads to discontent, not the millionaire's *absolute* economic standing.

Walter Garrison Runciman (1966) defines the preconditions of "relative" deprivation as follows (where Person A feels deprived of object X): Person A does not have X; Person A wants to have X; Person A knows of other people who have X; Person A believes obtaining X is realistic.

How might feelings of relative deprivation translate into terrorism? Ted Robert Gurr provides a psychological approach to explain how collective discontent is manifested as political violence: "The primary source of the human capacity for violence appears to be the frustration-aggression mechanism... the anger induced by frustration... is a motivating force that disposes men to aggression, irrespective of its instrumentalities." However, Gurr was not the first in his field to propose a link between frustration and aggression. Dollard, Millard, et al. (1939) were the first to propose the theory, postulating that frustration leads men to act aggressively. According to my hypothesis, this frustration is caused by relative deprivation, and the resulting aggression is manifested as terrorism.

I hypothesize that levels of terrorism may be explained in part as an expression of country conditions conducive to relative deprivation. To examine this theory empirically, I

examine whether high unemployment rates, *dependent on there also being higher rates of enrollment in tertiary education*, are positively correlated with terrorism.

When a large group of highly educated individuals enter the work force and levels of unemployment are high, the individuals may feel over-qualified and disappointed relative to what they expected to gain from their education. Presumably individuals pursue higher education with the expectation that additional studies or training will help them find better jobs. As a result, well-educated individuals may feel greater discontent from unemployment than those who did not expect such grand employment opportunities. This socioeconomic discontent, in turn, may result in political violence.

While individual economic indicators alone do not appear to be strongly correlated with terrorism, the interaction effect of an economic variable (unemployment) and a social variable (education) may provide better insight into understanding terrorism.

Part B: Review of Literature

Quantitative studies of terrorism have increased dramatically in the past decade. Many articles in this body of literature sought to explain terrorism as the result of poor economic development and lack of education in a country. However, it soon became clear that this is not the case. Krueger and Malecková (2003) write, "eradication of poverty and universal secondary education are unlikely to change these feelings. Indeed, those who are well-off and well-educated may even perceive such feelings more acutely." In fact, terrorists tend to be better-educated and wealthier individuals than average. J.P. Azam (2008) notes, "The emerging picture is that terrorists are men and women in their twenties with some post-secondary training, mostly in technical or engineering education." For example, biographies of Al-Qaeda members recorded

by Marc Sageman (2004) reveal that they are generally highly educated, mostly in scientific or technical disciplines.

More recent studies of terrorism have focused on individual determinants rather than any interaction effect of economic and social variables. One study examines relative deprivation in Northern Ireland, but finds little support for the theory. Below, I discuss how these findings relate to my research.

Studies of Terrorism and Economic Determinants

Economic factors such as poverty, employment, and development are employed frequently in empirical terrorism research.

Although "Deprivation and Political Violence in Northern Ireland," by J.L.P. Thomson (1989), is the oldest study of terrorism I review, it is also the most relevant to my research. Thomson attempts to model relative deprivation in Northern Ireland by examining unemployment. He uses a time series analysis to show the immediate effects of changes in unemployment on political violence in Northern Ireland. However, Thomson measures both unemployment and violence using a rather indirect method; he measures violence by the number of deaths, as opposed to all attempts (including failures, injuries only, etc.), and by government unemployment benefits distributed in a given year. This measurement does not reflect the entire unemployed workforce accurately in countries with governments that do not provide extensive social services. In addition, the data uses changes halfway through the time series, as Thomson notes that there were changes in the criteria for unemployment benefits eligibility. Most importantly, Thompson does not look at the interaction of unemployment and education on terrorism. My research observes a larger scale by examining all countries with available data. I

revisit relative deprivation using more straightforward measurements of the determinants he intends to examine.

"Economic Globalization and Transnational Terrorism: A Pooled Time-Series Analysis," by Quan Li and Drew Schaub (2004), asks whether economic globalization increases or decreases transnational terrorist incidents inside countries. Globalization may be tied closely to relative deprivation, in the sense that greater access to information about people in other countries increases awareness of one's relative standing in the world. Li and Schuab hypothesize that increased globalization leads to greater levels of international terrorism because trade makes it easier for terrorists to carry out attacks across borders. Based on a sample of 112 countries from 1975 to 1997, their findings show that the economic development of a country and greater trade openness reduce the number of terrorist incidents inside the country. Their finding that economic development decreases the likelihood of terrorism is an interesting example of an economic indicator's effect on terrorism.

The main empirical results from James Piazza's "Rooted in Poverty? Terrorism, Poor Economic Development, and Social Cleavages" (2006) suggest that unemployment is not a significant indicator of terrorism. Piazza finds no relationship between any of the economic-development variables he examines (poor economic growth, inflation, unemployment, inequality, malnutrition, and poverty) and terrorism. However, he takes the average from 1986-2002 for each variable instead of examining country-year data. He also does not consider the interaction between any of these economic variables and other social determinants. Piazza's research also measures terrorism by the intensity of terrorist activity (the difference between death, injury, and kidnapping, for example) rather than an overall number. I believe that the outcome of a terrorist attack is less important than this measurement assumes. While an incident

may result only in injuries, the terrorist's intent of causing major damage is presumably the same as that of an incident where many people die.

Brian Burgoon's "On Welfare and Terror" (2006) examines how social welfare policies affect international and domestic terrorism. He approaches the subject from a rational-choice perspective, noting that social policies may diminish preferences for terrorism. He looks at both terrorist incidents occurring in a nation and the terrorism perpetrated by the nation's nationals. Burgoon finds that social welfare, measured by social spending as a percent of GDP, reduces the incidence of terrorism. He measures terrorism using both the "International Terrorism: Attributes of Terrorist Events" (ITERATE) and the MIPT-RAND databases, the latter of which I also employ for my dependent variable.

In "Kto Kogo?" (2008), Alan Krueger and David Laitin expand the literature on economic determinants of terrorism by examining both target countries and countries of origin for terrorist events. To describe terrorist attacks, they look at who, to whom, and where. Their results suggest that economic status is of little importance for terrorist national origins, but an important characteristic of terrorist targets. Targets are generally better off economically, while political repression is a better determinant for the national origins of terrorism. "Those who are repressed politically tend to terrorize the rich, giving international terrorist events the feel of economic warfare […] The *kto* [who] is political; the *kogo* [to whom] economic." These findings serve as a useful point of departure from which to examine the economics of target countries. Additionally, the research reminds us that different factors may determine who becomes a terrorist and where attacks are perpetrated.

S. Brock Blomberg and Gregory D. Hess (2008) provide a more nuanced empirical analysis of economic development as a determinant of terrorism. They find that economic

development is positively correlated with transnational terrorism, particularly in higher income countries. However, in lower income countries this trend reverses, and economic development is negatively related to transnational terrorism. The authors point to the importance of considering terrorist groups' political motivations. They say "interestingly, radicalism, separatism, and other ideological motivations for terrorism that appear to be intrinsically noneconomic may actually stem from underlying economic conditions." They make the case that economic factors are important in different ways for higher- and lower-income countries. This could be due to a phenomenon similar to relative deprivation theory, in which those of different economic brackets view changes in economic factors differently. The authors provide two theories for this phenomenon. The "take-off" effect suggests that good policies deter terrorism for the most disadvantaged. As countries develop, Blomberg suggests that terrorism becomes a "luxury good" enjoyed by dissident groups for political purposes. However, the authors do not look at economic changes within a given country.

Studies of Terrorism and Education

I now turn to the literature that examines educational variables as possible determinants of terrorism. Since terrorists tend to be highly educated, these articles provide some interesting insight into how education affects the likelihood of terrorism.

"The Quality of Terror," by Ethan Bueno de Mesquita (2005), suggests that terrorists are more likely to be highly educated and wealthy because terrorist organizations select only the most highly qualified "applicants" to carry out terrorist attacks. It is not the case that lower educated and poorer people would be any less likely to be terrorists, but rather that they are not sponsored by organizations. This theory of supply and demand greatly skews empirical analyses,

as it suggests that the pool of terrorists is hand picked by powerful terrorist organizations. Bueno de Mesquita also finds that economic downturns should be positively associated with increased terrorist mobilization. However, Bueno de Mesquita's research is entirely theoretical, and he does not use real data in his model.

Jean-Paul Azam and Veronique Thelen's "The Roles of Foreign Aid and Education in the War on Terror" (2008) examines the interaction between foreign aid and education. They find that recipient countries of foreign aid with higher levels of education are associated with a reduced number of terrorist attacks. Azam also assumes that terrorists may be motivated by inter-generational altruism. "The effect of education on the opportunity cost of putting one's life at risk might be offset by its positive impact on inter-generational altruism." That is to say, terrorists may consider the compensation they receive from terrorist organizations when calculating their preferences. The paper also suggests that governments will adjust their levels of repression "optimally as a function of the impact of education," suggesting that a nation's educational level is an important variable in determining political behavior. Azam also discusses other possible explanations, such as the idea that well-educated people may be more sensitive to social pressures. This supports my hypothesis that highly educated individuals may be more sensitive to social determinants, such as the loss of employment prospects.

Studies of Terrorism and Both Education and Economic Variables

A few studies have dealt with both economic and educational variables in their quantitative analyses of terrorism. However, none of the following examine the interaction between the two.

"Economic Returns to Schooling in the West Bank and Gaza Strip," by Joshua Angrist (1995), examines trends in unemployment and school enrollment. The article serves as a case study for my research by examining Palestinian and Israeli schooling groups to see whether an increase in the size of the educated labor force is associated with a fall in wage differences between schooling groups. The question Angrist tries to answer is whether pursuing a higher education is worth the cost when large numbers of new graduates enter the labor market. He finds, in this instance, that the low returns to schooling (poor employment prospects for graduates) were likely to have contributed to the frustrations that lead to the 1987 Palestinian Uprising. Although this civil unrest was not considered a terrorist incident, I would like to see whether the same causes of frustration Angrist studies among the Palestinian workforce also may be root causes for terrorist activity in other regions of the world. Angrist's findings may not be unique to this situation.

Alan Krueger and Jitka Malecková's "Education, Poverty, and Terrorism: Is There a Causal Connection?" (2003) is also an important case study of terrorists' educational and income levels. Their findings confirm my core assumption that terrorists tend to be better educated and from wealthier backgrounds. Krueger and Malecková find that Palestinian suicide bombers are less likely to come from impoverished families and more likely to have completed high school and attended college than the rest of the Palestinian population. They also find that poverty is inversely related with whether someone becomes a Hezbollah member, and education is positively correlated with whether someone becomes a Hezbollah member, suggesting that wealthier, more highly educated people are more likely to join this particular terrorist organization. However, their study also frequently is cited for its finding that there is little to suggest a direct connection between poverty or education and participation in terrorism. While

the article provides useful background information, it is limited in scope as it only looks to Palestinian terrorist activity. My research looks at worldwide incidents of terrorism, examining the effect of unemployment conditional on education, and whether high levels of unemployment among a highly educated labor force significantly affect the likelihood of terrorist activity.

In "Evidence about the Link between Education, Poverty, and Terrorism Among Palestinians," Claude Berrebi (2007) finds that standards of living and higher education are positively correlated with participation in the terrorist groups Hamas and the Palestinian Islamic Jihad. Berrebi expands on Krueger and Malecková's research, considering many different possible theories for this variation. He considers the possibility that highly-educated individuals become frustrated when they find themselves over-qualified for any available employment. Berrebi notes, "It could be during times of intifadas that highly educated individuals would be particularly frustrated by the loss of economic opportunities and the alternative economic cost of their risking arrest or worse would be lower." The idea here is that a terrorist's alternative economic cost is lower when their opportunity cost of holding a good job is also lower. Although Berrebi examines the effect of each of these variables on the incidence of terrorism, he does not examine the interaction between the two. Rather than using a time series analysis, he examines only one example. My research expands on Berrebi's theory by looking at many different places across different time spans, not just Palestinian intifadas.

While several of these studies have examined education and income or employment as possible variables, none of them have looked at the interaction between the two. Additionally, with the exception of Thomson's study of Northern Ireland, there has been no research that empirically studies relative deprivation theory. While there have been case studies that provide

strong foundations for my research, only J.L.P. Thomson's study examines relative deprivation as a possible theory of terrorism.

Part C: Empirical Analysis

I am not the first to use education and poor employment prospects as indicators of relative deprivation. Johan Galtung (cited in Cranmer, 2005) says that "feelings of deprivation arise when one has inconsistent rankings: i.e. high education but low salary; if one is uniformally low, they there is not much of a problem, but inconsistent rankings breed dissatisfaction." Therefore, to represent relative deprivation using available country data, I look at levels of tertiary education (some post-secondary education or more) and unemployment levels. According to relative deprivation theory, there should be greater collective discontent (and an increase in the number of terrorist attacks) in nations where the population is highly educated and unemployed. Specifically, I examine whether the levels of terrorism in a nation each year are positively correlated with decreased employment, dependent on increased enrollment in tertiary education. This reflects the hypothesis that individuals who obtain a higher education are more likely to feel a greater sense of deprivation from unemployment than those who did not necessarily expect to find work.

Gurr (1970) suggests that collective violence emerges as a result of relative deprivation theory. Specifically, he holds that "the greater the intensity and scope of relative deprivation, the greater the magnitude of collective violence." To test whether this theory also holds true for terrorism, I use the following hypotheses to run an ordinary least squares regression:

H^o: There is no significant correlation between total terrorist attacks and the interaction between an increase in unemployment rates and an increase in tertiary education enrollment in a nation.

H_0: There is no significant correlation between unemployment, tertiary education, and levels of terrorism.

H^a: There is an increase in the number of terrorist attacks in a country when unemployment begins to increase, dependent on tertiary education enrollment also increasing.

To test this null hypothesis, I formulate an equation to analyze my data:

Total terrorist attacks = $a + B^1$ (unemployment) $+ B^2$ (tertiary education) $+ B^3$ (unemployment x tertiary education) $+ B^\square X + e$

Ordinary Least Squares Multivariate Regression Expectations

Coefficient	Explanation	Expectation
B^1	effect of change in unemployment when there is no change in tertiary education.	No effect
B^2	effect of change in tertiary education when there is no change in unemployment.	No effect
B^3	additional effect of change in unemployment as tertiary education changes in year t, relative to year t-1. Change in unemployment *because* of the interaction effect.	Positive coefficient. Increases in unemployment begin to increase terrorism as country also experiences increases in tertiary education.
$B^\square$	effect of all control variables. The vector X includes all potentially significant predictors of terrorism.	

As James and Brenda Lutz (2004) point out, terrorist attacks increased in number and became more lethal in the 1980s. Therefore, I conduct a time series analysis of country-year data from the years 1980 to 2008 (the most recent year with available data) across fifty-six countries. The country-year data shows the number of terrorist attacks per year per country. The Data

Appendix includes descriptive statistics and definitions of the data I use in my estimating equation.

Although academics argue over the best definition of terrorism, the U.S. State Department provides the most widely accepted definition: "premeditated, politically motivated violence perpetrated against noncombatant targets by subnational groups or clandestine agents, usually intended to influence an audience." I measure the incidence of terrorism in a given nation using RAND's Database of Worldwide Terrorism Incidents (RDWTI). The RAND database is publicly available and includes over 36,000 descriptions of incidents of both international and domestic terrorist attacks. RAND defines terrorism by "the nature of the act, not by the identity of the perpetrators. Specifically, terrorism is violence calculated to create an atmosphere of fear and alarm to coerce others into actions they would not otherwise undertake, or refrain from actions they desired to take. Acts of terrorism are generally directed against civilian targets. The motives of all terrorists are political, and terrorist actions are generally carried out in a way that will achieve maximum publicity."[1] The RAND dataset incorporates two earlier datasets. Incidents from 1968-1997 were recorded by the RAND Terrorism Chronology Database and include only international terrorism, defined as "attacks committed by someone other than a citizen of the country in which the attack occurred, or those requiring attackers to cross international borders." From 1998-2008, the RAND-MIPT Terrorism Incident Database began recording both domestic and international terrorist incidents. New data collection includes both domestic and international terrorism. As discussed in my review of previous literature, this dataset is used frequently in empirical research on terrorism (see Burgoon, 2006).

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[1] The data excludes state-sponsored terrorism, which presumably is driven by government orders (through the military or secret service agencies, for example) rather than by relative deprivation.

I measure a nation's incidence of terrorism by the total number of attacks per year that take place in a country. For the majority of my regressions I use the log of the total number of attacks, although I include regression results using the total number of attacks in Table III. Rather than coding terrorist attacks by their severity or the number of fatalities, I use the absolute number of attempted terrorist attacks as my dependent variable. Factors outside of a terrorist's control, such as failed explosive devices, law enforcement intervention, or other interruptions, do not affect his or her initial decision to become a terrorist. The intent and actions taken toward committing an act of terrorism, regardless of the resulting damage, is sufficient to assume the individual is a terrorist. I therefore include attacks with fatalities, attacks with injuries only, as well as recorded failed attempts in my data. I also include all the tactics available from RAND in my dataset, such as armed attacks, arson, assassinations, hostages, bombings, hijackings, kidnappings, unconventional attacks, "other," and "unknown" in order to maximize my sample size. Likewise, I include all available targets (airports, government, military, private citizens, telecommunication, etc.), except for abortion-related terrorism.[2] All weapons are included.[3] Each attack is coded for the country in which it occurred, rather than the nationality of the individual terrorist. Unfortunately, it is difficult to determine a terrorist's nationality, and measurements that attempt to do so are often error-prone. Additionally, a terrorist's nationality does not necessarily indicate which terrorist organization sponsored the attack.

I measure unemployment, defined as the total unemployment as a percent of the total civilian labor force, using data from the World Bank Development Indicators. The data I use for tertiary education, or the proportion of the labor force that has completed some post-secondary

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[2] Full list of targets: Airports/Airlines, business, diplomatic, educational institutions, government, food or water supply, journalists/media, maritime, military, NGOs, police, private citizens and property, religious figures/institutions, telecommunications, tourists transportation, unknown utilities, and "other."
[3] This includes remote-detonated explosive, fire or firebomb, explosives, firearms, knives and sharp objects, biological agents, chemical agents, radiological agents, "other," and unknown.

education (such as universities or technical training institutes), is also from the World Bank Development Indicators.

I use these two datasets to construct an interaction variable, defined as the product of unemployment and tertiary education. The interaction variable illustrates the magnitude of the effect of tertiary education dependent on the level of unemployment. This variable demonstrates to what degree the two variables multiply the effect of each other. If unemployment increases by one, keeping tertiary education constant, the interaction variable also increases. Even if unemployment and tertiary education were insignificant predictors alone, the combined effect (reflected by the interaction variable) could still be significant.

The vector X in my equation denotes all the variables that might affect the incidence of terrorism. I control for these factors to see the effect of unemployment, tertiary education, and the interaction of unemployment and education without the additional effect of confounding variables. Unfortunately, adding control variables to a regression equation has the effect of decreasing the overall sample size. I therefore run several regressions employing a combination of these variables to maximize my number of observations. I only include variables that other quantitative studies of terrorism have employed and found to have a significant effect on the number of terrorist attacks. These factors include a nation's population size, political regime characteristics, levels of rights protections, foreign development assistance received, GDP per capita, and the equality of income distribution.

I use a lagged and logged variable for the number of terrorist attacks as an independent variable from the same dataset used for my dependent variable. Following Steven Poe et. al. (1999), I include this variable to control for the effect of autocorrelation. I also log the total number of terrorist attacks to control for dramatic increases in the number of terrorist incidents.

An increase of one terrorist attack in a country that previously experience no attacks is more significant than an increase from 50 to 51 attacks in a country where terrorist attacks are more common. I lag the total terrorist attacks by one year to control for the possible effect that past terrorist incidents may have in influencing future attacks. The likelihood of future attacks may be influenced by the idea that previous attacks have "worked"; successful terrorist attacks may be perceived as an effective tool for garnering public attention and encourage future attacks. Lagging the data by one year helps control for this effect.

James Fearon and David Laitin's robust findings in "Ethnicity, Insurgency and Civil War" (2003) demonstrate that population is an important predictor of terrorism. Empirical studies of terrorism nearly always include some measure of population as a control variable. I use the World Bank Development Indicators dataset for population, which counts "all residents regardless of legal status or citizenship -- except for refugees not permanently settled in the country of asylum, who are generally considered part of the population of their country of origin." Previous research suggests that terrorist attacks are more likely to occur in larger countries. Krueger and Malecková (2003), for example, include population in their cross-country analysis of international terrorist events. I use the log of the population to account for diminishing returns in the effect of larger populations on the incidence of terrorism. An increase in population of 1,000 would be significant in a small country, while negligible in a large country like India. The log is also useful insofar as it demonstrates significant changes that could affect a country's ability to deal with crime. James Piazza (2006) suggests, "a rapid increase in population puts a considerable strain on the economic and political system of a country and may be accompanied by a rise in all criminal activity, including terrorism."

There has been much debate over whether poverty is a significant indicator of terrorism. While my theory holds that this is not necessarily the case, and studies have shown that it is not a main determinant, I control for any possible effect. I use GDP per capita data (in current U.S. Dollars) from the World Bank Development Indicators to control for the effect of poverty. This measure is included as a way of controlling for the effect of countries' wealth. It is calculated by the "gross domestic product divided by midyear population" and is perhaps the most commonly used indicator of development.

Foreign aid also has been cited as an important determinant of terrorism. Azam and Thelen (2008) find that it is "pretty effective" in counteracting terrorism. I use data from the World Bank to control for the effect of foreign aid. The dataset "Net official development assistance and aid (in constant 2008 U.S. Dollars)" records the flow of aid from donors to countries and territories that "meet the DAC definition of ODA."

Abadie (2006) finds that political rights are essential predictors of terrorism. However, different studies use different measures to control for the same effect, employing data from either Freedom House, Polity, and the Gini index. The non-partisan think tank Freedom House's Freedom in the World 2004 Political Rights index rates countries from 1-7, where a higher score represents a lower degree of freedom. It is broken down into a civil liberties index and a political rights index. Krueger and Laitin (2003) use the civil liberties index from Freedom House, while Abadie uses the political rights index. According to the Integrated Network for Societal Conflict Research, Polity IV measures political regime characteristics using "annual, cross national time-series… coding democratic and autocratic 'patterns' of authority and regime changes." Steven Poe et. al. (1999) note that Polity and the Freedom House indexes may be used interchangeably to operationalize democracy. The Freedom House measure has "performed nearly identically

to… the Polity measure." The Gini index, which measures "the extent to which the distribution of income among individuals or households within an economy deviates from a perfectly equal distribution," represents income inequality in a country. The inequality is measured on a scale of 0 to 100, where perfect equality is denoted by a score of 0, and perfect inequality is denoted by a score of 100. Although Gini is used as a control variable in some studies of terrorism, the dataset is very limited (with only 117 total observations).

While I have controlled for the most commonly used variables in empirical articles about terrorism, it is possible that these nation characteristics do not account for all determining factors. For example, I do not include microlevel variables such as an individual's age or marital status. Although these have been shown to be significant indicators, the overall distribution of marriage and age is similar across different nations and therefore cannot be analyzed in a country-year time series analysis.

Cautions

My results draw from a fairly small sample size (a maximum of 115 observations for regression results where terrorism occurred and 289 where all country years are included). However, this is not unusual in empirical studies of terrorism. Krueger and Malecková pool observations of 129 deceased Hezbollah members, Piazza employs 95 observations, and Quan and Li use a sample size of only 112 in their studies. This is due largely to the unavailability of data. Data reflecting terrorism, education levels and unemployment rates are not available from many countries. Unfortunately, this likely includes many countries that produce a significant number of terrorists. Poor data reporting tends to coincide with less developed and more repressive governments, where there may also be a greater number of terrorist attacks.

My research also runs into unavoidable problems of endogeneity. Because my research focuses on terrorism at the country-level, it does not take into account individual determinants. For instance, some studies have shown that married individuals are less likely to become terrorists (see Khan et. al., 2004; Berrebi, 2007). However, given that marriage levels are relatively similar across countries, it is not effective to control for them at the country level.

Perhaps most importantly, Ethan Bueno de Mesquita's theory of supply and demand (2005) may bias my findings. Because terrorist attacks can be costly operations that involve a lot of planning, time, and money, terrorist organizations prefer to recruit the most highly qualified individuals with the greatest chance of success to carry out their missions. As Krueger and Malecková noted (summarized in Campos, 2009), "terrorist groups operate human resources policies which favour better educated or economically better-off individuals." Therefore, it may be the case that the perpetrators of terrorist attacks are not an accurate representation of those who desire to become terrorists. The data may be skewed by this selection bias to inaccurately reflect the motivations of less-educated individuals. This inherent selection bias is problematic for all studies of terrorism, but I do not believe it precludes my findings from being significant.

According to Dennis Halcoussis' *Understanding Econometrics* (2005), multicollinearity occurs "when two (or more) independent variables are highly correlated in a linear fashion." I attempt to avoid this problem by not controlling for highly correlated variables. As discussed above, I omit Polity and the Gini coefficient from my main regressions because they measure similar determinants as Freedom House's political rights and civil liberties indexes. In addition, I include the minimum number of controls for each possible confounding variable, based on variables included in previous literature on terrorism.

Part D: Empirics, Results, and Inferences.

I run two main sets of ordinary least squares regressions to analyze my null hypothesis. The first set in Tables I and II includes only country-years where terrorist attacks have occurred. In these regressions, countries with 0 terrorist attacks in a given year are not included. The second set of regressions in Table III includes all countries and years from 1980-1998, even when there were no reported terrorist attacks.

Table I summarizes my main findings using the logged total number of terrorist attacks as the dependent variable. Column 1 shows the results of my main equation, while Column 2 omits the interaction variable to provide a comparative reference point. The most significant results are the effects of the lagged terrorist attack variable, unemployment and population. If a terrorist attack occurred the year before, it is more likely that the level of terrorism increased in the following year. Likewise, if either unemployment or population increases, so does the number of terrorist attacks. The interaction variable is weakly statistically significant.

In all of my regression results the lagged, logged terrorism control variable is highly significant at the 1% level. As discussed earlier, this might suggest that the previous year's attack (t-1) is a significant indicator of whether there will be an incident the following year (at time t). In countries where terrorism is viewed as an effective tool, more attacks may be more likely to occur.

My findings also confirm previous studies (see Piazza, 2006) that suggest population is a likely predictor of terrorism. The log population coefficient is significant at the 1% level, indicating that states with larger populations are more likely to experience terrorist attacks than those with smaller populations. In addition to the increase in any kind of criminal activity that tends to occur when rapid population increase strains a country's economic and political system, Piazza suggests this could be due to the fact that "large populations will have to face higher costs

for counter-terrorism policies… terrorists can use large populations to obscure their operations, escape detection, finance operations, and recruit members."

Although increased education is often trumpeted as an answer to world conflict, Krueger and Malecková's findings suggest little connection between education and terrorism. I find no significant relationship between tertiary education and terrorism in any of my regression results.

In both regressions displayed in Table I, I find the unemployment variable to be highly significant at the 1% level where the interaction variable is included and 5% level where the interaction variable is omitted. Other studies have found unemployment to be a poor indicator of terrorism, but my findings suggest that there is a strong correlation between an increase in unemployment and an increase in terrorist attacks.

Table II presents the comparative results of regressions using different variables to operationalize political rights, including Polity, the Gini index, and two Freedom House indices. The regressions in Columns 1 and 2 result in a very limited number of observations, with only 37 terrorist attacks ultimately included. Once the Gini index and Polity are omitted in Columns 3 and 4, my results draw from a greater sample size. As Linda Keith (2002) notes in her paper, I find little difference between using Polity and Freedom House (Column 3) and using only Freedom House (Column 4). Likewise, while omitting the Gini index (Columns 3 and 4) greatly increases my sample size, it has little effect on the results. Following Poe (1999) and Abadie (2004), I ultimately use only one measure of political rights in order to simplify my analysis, maximize my sample size. I omit the Gini coefficient from my main regression equation. Although a nation's inequality is certainly an important consideration for relative deprivation theory, I employ the unemployment and education interaction variable as a proxy for inequality.

Table III shows regression results when all country-years are included in the dependent variable, regardless of whether or not an attack occurred. Columns 1, 2, and 3 use the same logged data. Columns 4 and 5 include the total number of terrorist attacks on each side of the equation, rather than the log. Contrary to my hypothesis, the interaction effect is insignificant in all of these regression results. Lagged, logged total attacks remain a significant control variable, but population and unemployment lose any significance. This might suggest that while country conditions conducive to relative deprivation do not drive a nation's population to the brink of terrorism, the interaction between unemployment and tertiary education is a good indicator for levels of terrorism in nations that have experienced attacks previously.

Conclusion

Overall, my results support J.L.P. Thomson's conclusion that relative deprivation, when analyzed empirically, does not serve as a strong theoretical explanation for terrorism. Although my research models just one possible approach to examining the theory, I find little evidence to suggest that it is a driving factor of terrorism. However, because the interaction variable appears somewhat significant in regressions that include only recorded instances of terrorist attacks for the dependent variable, this could lend some credence to the idea that relative deprivation exacerbates the likelihood of terrorism in nations that have already experienced attacks.

Interestingly, tertiary education has no significant effect (neither positive nor negative) on levels of terrorism in any of my regressions results. This could suggest that enrollment rates in post-secondary education are neither helpful nor harmful in preventing terrorism. Krueger notes in *What Makes a Terrorist* (2007) that the highly educated are more likely to become politically polarized, either entering into government service or engaging in political violence. These values

at opposite extremes may neutralize any effect of post-secondary education in either direction. This may be troubling for proponents of higher education as a panacea for global conflict.

Contrary to the findings of Piazza (2006), my research also suggests that unemployment is a highly statistically significant predictor of terrorism, at least in nations where previous attacks have been recorded. This substantiates the beliefs of those who attempt to alleviate terrorism with market-based solutions, such as encouraging microloans to spur business development. As Nicholas Kristof wrote in an insightful op-ed from November 2010 for the *New York Times*, "The antonym of '"militant' is often 'job.'"

Unfortunately, my analysis has severe limitations, as an overall lack of data due to poor reporting may skew the results. The lack of significant relationship between terrorism and the unemployment-education interaction variable could also result from an inherently flawed application of a psychological theory to country characteristics. The application of a theory intended to explain an individual's propensity toward collective violence may not serve as an appropriate analysis of country conditions. Society-wide conditions may not motivate individuals to perpetrate terrorist attacks. If that were the case, national levels of education and unemployment in a nation would not reflect the psychological effect of these conditions on its population. However, because it is impossible to study relative deprivation at the microlevel without interviewing each individual of a population (as Krueger and Malecková did in their 2003 study of Hezbollah members), it would be impossible to conduct such a large-scale analysis of relative deprivation.

What could compel a terrorist to take his or her own life, let alone that of a stranger? Empirical studies have not yet provided a conclusive answer. I approach this question with the presumption that terrorists are rational actors who calculate that terrorist activity provides them

with the greatest expected utility. As Gurr (1970) points out, "There is little support for pseudo-psychological assertions that most or all revolutionaries or conspirators are deviants, fools, or the maladjusted." However, because terrorists tend to be highly educated and come from a higher socioeconomic bracket, terrorism is problematic for a rational-choice model. These characteristics should greatly increase the opportunity cost of perpetrating a terrorist attack. When the risks of death, arrest, or other forms of punishment are associated with engaging in terrorist activity, rational choice theory assume that the alternative options must have even lower expected utilities. As Azam and Thelen (2008) put it, "higher wealth and education increase the opportunity cost of taking risk in perpetrating a terrorist attack, and still do not deter those who cross the line."

My results provide some evidence that within countries where there are recorded attacks, the interaction between unemployment and higher education may be an important indicator. This could suggest that while the effect is not significant enough to drive individuals in a nation to the point of terrorism, in countries where there is already terrorist activity, an increase in these conditions could further increase the incidence of terrorism.

Going forward, further analyses of relative deprivation as a theory of terrorism might be wise to consider the effect of globalization on countries' levels of terrorism. Because relative deprivation also can be used to describe a discrepancy in what an individual has in economic goods and what he believes he is justly entitled to have, a look into the effect of increased international interactions could serve as a more effective application of the theory. Public awareness of living conditions in nations thousands of miles away might create a new benchmark to which individuals compare themselves. Countries whose citizens previously knew only their fellow nationals as reference points may feel relative deprived compared to citizens of other

nations. It would also be interesting to consider the effect of underemployment on feelings of relative deprivation. While unemployment measures look at those who are entirely out of work, if there is a highly educated work force employed in jobs that do not necessitate their expertise, this might also create a sense of relative deprivation.

Although this study measured terrorist attacks by which country they occurred, it might be helpful to examine the nationality of the individuals or organizations that perpetrated the event. As Krueger points out in "Kto Kogo?" (2008), it may be the case that different determinants affect where an attack occurs than who commits the attack.

A better model for the discrepancy between expected and achieved welfare might look at levels of tertiary education along with levels of unemployment of those with tertiary education. The overall unemployment levels take into account unemployment among the uneducated, and may not correctly reflect a lack of job opportunities for those who have received some post secondary education.

Academics have considered relative deprivation as a possible explanation of terrorism in previous empirical articles. However, further analyses employing a variety of models would be necessary to fully dismiss or accept the theory. While the theory is reflected in regressions including only countries with terrorist attacks, it is an insignificant predictor when all country years are examined. My paper underscores the importance of considering both social and economic factors in empirical studies of terrorism and helps lay the foundations for further research of relative deprivation as a theory of terrorism.

<div align="center">**References**</div>

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Data Appendix: Descriptive Statistics for Variables used in Regression Models

Variable	Description	Obs	Mean	Std. Dev	Min	Max
Lagged, logged terrorist incidents	Natural logarithm, lagged, of RAND Database of Worldwide Terrorism Incidents, 2009	490	1.68	1.45	0	7.99
Interaction variable	Unemployment X Tertiary Education	259	303.54	200.83	4.95	1206.18
Unemployment	WDI - total unemployment as a percent of the total civilian labor force, 2008	432	8.33	3.89	2.1	27.3
Tertiary education	WDI - labor force with tertiary education is the proportion of labor force that has a tertiary education, as a percentage of the total labor force, 2007	360	30.44	21.28	.6	97.98
GDP per capita	WDI - GDP per capita, current US$	646	.0713	.0987	.00069	.7225
Log population	Natural logarithm of WDI - all residents regardless of legal status or citizenship, except for refugees not permanently settled in the country of asylum, 2009	691	16.82	1.55	13.05	20.85
Gini index	WDI - extent to which distribution of income deviates from perfectly equal distribution	117	45.34	10.74	24.85	62.99
Polity	INSCR political regime characteristics, 2009	669	4.32	6.77	-10	10
Foreign aid	WDI - net official development assistance and official aid received (current US$), 2008	538	8.34	1.51	-3.83	2.46
Civil liberties	Freedom House measure of civil liberties on a scale of 1 (high) to 7 (low), 2011	618	4.35	1.86	1	7
Political rights	Freedom House measure of political rights on a scale of 1 (high) to 7 (low), 2011	618	4.59	2.15	1	7

Table I: Ordinary Least Squares Regression with Country Characteristics

Dependent variable: Logged total number of attacks from RAND Database of Worldwide Terrorism

Variables	(1)	(2)
Lagged, logged total attacks	0.709***	0.729***
	(0.0676)	(0.0676)
Interaction variable (unemployment X education)	-0.00452*	
	(0.00240)	
Unemployment	0.178***	0.0742**
	(0.0625)	(0.0295)
Tertiary education	0.0530*	0.00549
	(0.0268)	(0.00923)
GDP per capita	3.661	4.333
	(2.756)	(2.765)
Log population	0.357***	0.288***
	(0.0944)	(0.0881)
Foreign aid	0.0196	0.0140
	(0.0126)	(0.0124)
Civil liberties	0.0293	0.0181
	(0.128)	(0.129)
Political rights	-0.134	-0.107
	(0.100)	(0.100)
Constant	-7.202***	-5.072***
	(2.047)	(1.728)
Observations	116	116
R-squared	0.681	0.671

Standard errors in parentheses

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

Table II: Ordinary Least Squares Regressions with Political Rights Data

Dependent variable: Logged total number of attacks from RAND Database of Worldwide Terrorism

Variables	(1)	(2)	(3)	(4)
Lagged, logged total attacks	0.516***	0.541***	0.703***	0.709***
	(0.132)	(0.131)	(0.0684)	(0.0676)
Interaction variable (unemployment X education)	-0.0119*	-0.0147**	-0.00369	-0.00452*
	(0.00656)	(0.00605)	(0.00247)	(0.00240)
Unemployment	0.407**	0.497***	0.160**	0.178***
	(0.186)	(0.166)	(0.0638)	(0.0625)
Tertiary education	0.137*	0.165**	0.0424	0.0530*
	(0.0708)	(0.0661)	(0.0279)	(0.0268)
GDP per capita	16.15***	15.11**	4.347	3.661
	(5.580)	(5.515)	(2.812)	(2.756)
Gini index	0.0327	0.0311		
	(0.0236)	(0.0236)		
Polity	0.136		0.00399	
	(0.125)		(0.0336)	
Log population	0.383**	0.426**	0.358***	0.357***
	(0.185)	(0.181)	(0.0949)	(0.0944)
Foreign aid	0.117**	0.0873**	0.00747	0.0196
	(0.0474)	(0.0386)	(0.0152)	(0.0126)
Civil liberties	0.00573	0.0332	0.0153	0.0293
	(0.252)	(0.252)	(0.130)	(0.128)
Political rights	-0.292	-0.0688	-0.117	-0.134
	(0.283)	(0.195)	(0.129)	(0.100)
Constant	-12.53**	-14.27***	-6.979***	-7.202***
	(4.657)	(4.391)	(2.096)	(2.047)
Observations	37	37	115	116
R-squared	0.795	0.786	0.666	0.681

Standard errors in parentheses

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

Table III: Ordinary Least Squares Regressions Including Instances with no Terrorist Attacks

Dependent variable: Logged or total number of attacks from RAND Database of Worldwide Terrorism

Variables	(1) Log	(2) Log	(3) Log	(4) Total	(5) Total
Lagged, logged total attacks	0.765***	0.851***	0.851***		
	(0.0630)	(0.0332)	(0.0330)		
Lagged total attacks				0.854***	.857***
				(0.0734)	(0.0733)
Interaction variable	-0.000435	-0.000131		-0.0274	
(unemployment X education)	(0.00121)	(0.000547)		(0.0295)	
Unemployment	0.0351	0.0195	0.0170*	0.838	0.310
	(0.0408)	(0.0140)	(0.00914)	(0.757)	(0.498)
Tertiary education	0.00219	0.000292	-0.00120	0.360	0.0468
	(0.0146)	(0.00711)	(0.00342)	(0.385)	(0.185)
GDP per capita	11.01***	1.891	1.915	0.0357	5.783
	(3.574)	(1.353)	(1.347)	(72.67)	(72.39)
Gini index	0.00415				
	(0.00856)				
Polity	0.0673				
	(0.0433)				
Log population	0.0439	0.0569	0.0554	-1.935	-2.220
	(0.0647)	(0.0358)	(0.0352)	(1.906)	(1.880)
Foreign aid	0.0163	0.00185	0.00156	1.359***	1.296***
	(0.0163)	(0.00616)	(0.00603)	(0.334)	(0.327)
Civil liberties	0.0441	-0.0353	-0.0355	3.873	3.822
	(0.142)	(0.0696)	(0.0694)	(3.762)	(3.761)
Political rights	-0.244*	0.00726	0.00743	-4.351	-4.298
	(0.133)	(0.0509)	(0.0508)	(2.749)	(2.748)
Constant	-0.947	-0.961	-0.907	20.34	31.35
	(1.440)	(0.725)	(0.688)	(38.89)	(37.02)
Observations	100	289	289	289	289
R-squared	0.739	0.733	0.733	0.383	0.381

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1