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Does poverty rate increase terrorism in a country?: An analysis from 1970-2019 ★

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ABSTRACT. While terrorism has been a constant product of society, its determinants have been sporadic at best and inconclusive at worst. With the scientific community failing to arrive at a common consensus in reference to poverty as defined by GDP per capita, I hope to find a concrete conclusion by taking a different approach and examining the relationship between poverty rate and terrorism. In order to define the impact of poverty rate on terrorism, I utilized the Quality of Government Index Standard Time Series Dataset and the Global Terrorism Database. Further analysis was conducted by performing an OLS regression on the data via the negative binomial regression and Prais-Winsten models. This study deviates from the general consensus on poverty and terror by concluding that a negative relationship exists between poverty rate and terrorism; although, it does not retain significance when more impactful variables are compared. The findings suggest GDP per capita, state fragility, unemployment rate, and linguistic fractionalization as alternative, significant, determinants of terror. Of these, the most intriguing relationship exists between GDP and terrorism. In the presence of increased security measures after 2005, a positive relationship forms and alludes to wealthier countries being more susceptible to terror attacks despite funding counter measures. This provides an explanation to the increase in terrorism seen in the early 21st century, while suggesting that poverty rate exerts influence over terrorism rates. However, when the additional security precautions are considered, state fragility or unemployment overshadow poverty rate as variables of significance.

SARAH DI STEFANO became involved in a faculty-mentored undergraduate research project after being encouraged to do so by her senior seminar professor, Dr. Placek. Sarah's interest in determinants of terror stemmed from an earlier class focused on Middle Eastern politics, which provided the foundation for her research. This project is unique in that it includes an abbreviated timespan to account for recently measured variables and increased national security measures employed after 2005. This consideration allowed for a more in-depth relationship between the variables to be uncovered, and a more detailed conclusion to be drawn.

Sarah's favorite part of this project was being able to collaborate with Dr. Placek and discuss the results of our research. Discovering new relationships and interpreting data is always exciting but having the opportunity to work with someone who is as passionate about the research as she is, made this one of the most rewarding and satisfying experiences of her life. To any students interested in conducting research, Sarah's advice would be to find a topic that makes you curious and jump in headfirst. Getting started is the hardest part, but nothing is worse than missing an opportunity because you were too scared to take that first step.

After graduation, Sarah plans on attending law school and am contemplating pursuing a career in international law. This experience has allowed her to realize an area that she is passionate about and outlined a career path that she had not previously consider. Until then, you can find Sarah with a book in hand or at a coffee shop with friends, debating their next vacation destination. Words cannot express the amount of gratitude that Sarah has for Dr. Placek, her family and friends. She is grateful for their belief and encouragement which allowed her to accomplish more than she ever thought possible.

MATTHEW PLACEK is originally from Bridgeport, AL, a small town in the Southern Appalachians near Chattanooga, TN. Upon graduating high school,

he got his B.A. from the University of South Alabama and then received his Ph.D. in Political Science from the University of Mississippi. He has been at the University of South Carolina Upstate since 2015. Dr. Placek's current research focuses on public attitudes and behavior in new democracies and nondemocracies. Specifically, he is interested in the effect of mass media, especially the Internet, on support for democratic norms and governance. Dr. Placek has most recently published peer-reviewed articles in Democratization and East European Politics and has recently presented research at The American Political Science Association's annual conference in 2020.

Sarah's paper is the product of a lot of hard work over several semesters. It began as a literature review in my Middle East Politics class and finished as her project in senior seminar last fall. I am extremely proud of how hard she worked to locate and manage data, test the results, and apply the findings to the broader literature of terrorism and political violence. She is an outstanding student, and her ability to engage readers while contributing to scientific inquiry is on full display throughout the article.

1. Introduction

The early part of the 21st century has seen a dramatic increase in terror attacks [1]. From al-Qaeda's re-emergence to ISIS and right wing-extremists, new and increasingly dangerous groups have been forming and inciting fear worldwide. Which countries terror groups choose to target might seem sporadic, but what if there was a method to the supposed madness? Are there certain characteristics that make a nation more appealing to terrorists and are certain determinants more efficacious than others? By identifying notable factors, vulnerable country profiles can be constructed and result in a more prepared nation. It is my goal to analyze further the total percent of a population living in poverty to see if any binding ties to terrorism are revealed. Upon reviewing a plethora of academic studies as the foundation for this study, I found an intriguing lack of research analyzing how the percent of impoverished people within a country relates to terrorist activity. Instead, the common representative variable of poverty appears to be GDP per capita. To fill the gap from previous literature, this study will explore the relationship between poverty rate and terrorism while controlling for other confounding factors. I will examine previous research and published literature on the relationship between the two variables before conducting regressions to draw my conclusions.

2. Causes of Terrorism

In a study conducted by [2], the suggestion is made that it is "common wisdom that poverty breeds terrorism". However, upon further examination of additional research, it appears as though this piece of "common wisdom" is not so common at all. The viability of poverty as a significant determinant of terrorist activity is the subject of much contradiction, with no cohesive conclusion reached by any number of studies [3]. Therefore, it is highly plausible that poverty rate will also yield a similar conclusion: "an individual's economic circumstances have a nonlinear effect" on illegal activity [2]. Even so, a direct contradiction to this mainstream explanation is found in a study conducted by [4]. They concluded that both "living above the poverty line… [is] positively associated with participation" in terrorism [4]. They go on to state that although "participation in terrorism and political violence is unrelated," it can be "positively related to individual's income" since "terrorism resembles a violent form of political engagement" [4]. These findings effectively connect a smaller impoverished population to a decrease in terrorist activity since those who are not living in poverty are perpetrating acts of terror. In contrast, according to [2], "aggregate

poverty… within society does [negatively] affect the amount of domestic terrorism a country suffers," which translates to higher levels of poverty leading to lower terrorism rates. An effect which coincides with the poverty gap having a "very strong influence on domestic terrorism and a small, but significant, effect on transnational terrorism" [2].

Although it is noted that nations with a smaller impoverished population are unlikely to be subject to terrorist activity, this finding is partially refuted in a separate study. Countries that boast higher economic development tend to have a lower poverty rate; however, [5] conclude that, while economic development is an important terror deterrent when considered as a sole factor, it "does not appear to discourage terrorism production". Similarly, [6] suggests that terrorism is not the result of a single factor, but rather becomes more likely when certain conditions are present. These conditions appear to be "political, rather than economic," as "poverty on the national level does not" influence the probability of terrorism [6]. Other studies have followed suit by dismissing poverty rate as a lone determinant of terrorism in favor of alternate variables, such as political elements and GDP per capita [7]-[8]. This is illustrated by mapping the movement of terrorism clusters over time, and the resulting path of clusters "shift[ing] greatly toward the poorer countries"; since a terrorists' country of origin is more likely to have a low GDP per capita, while the target country is more likely to have a higher GDP per capita [9]. A conclusion which is echoed by [8], who states that "countries with more capable governments tend to experience more terrorist incidents".

This might seem contradictory since capable governments should have stable and or prospering economies, which would allow the country enough resources to defend against terrorism. However, [8] addresses this by stating that it is because of these resources that countries with capable governments "are more attractive and salient for publicity-seeking terrorists". This specific target is chosen so terrorist groups "receive more media coverage, wider influence, and better recruits" [8]. This conclusion reinforces the relationship between poverty and terrorism. Countries with a higher GDP per capita are more likely to be targeted by terrorists than those with a low GDP per capita [9]. A separate study cites the occurrence of terror "negatively affect[ing] per capita GDP" in low-security countries [10].

Alternately, "high-level security" has allowed for the enhancement "of per capita GDP, especially in European countries," which allows for continued funding of counter-terror measures [10]. These added security measures are necessary, as economic growth places European nations at a higher risk of terror attacks due to the inflated GDP per capita [9]. Since previous literature links increased terror attacks to wealthy European nations, it is feasible that democratic governance also contributes to this escalated risk. However, additional studies find that, although there is not strong support "for the idea that democracies have been more prone to terrorism…the presence of democratic systems was at least at times negatively associated with more terrorism at marginal levels" [11]. Comparison of global regions indicates that the "conventional wisdom" of the aforementioned negative relationship prominently applies to the Middle East, while also making it "obvious that the communist systems in the Soviet Union and Eastern Europe" are more adept at preventing terror attacks "than the democracies of West Europe" [11]. The inability of democracies to prevent terror attacks when compared to more autocratic regimes can be directly related to the revelation that a large GDP per capita "tends to increase terrorism" [2]. A study conducted by [7] concluded that the degree of democracy can impact terrorism, either positively or negatively, if combined with "the appropriate set of controls". [7] go on to conclude "that population and various measures of democratic freedom" are viable variables for explaining terrorism.

This conclusion is echoed by [2], who also determined that population and various measures of political freedom [e.g., the Polity or Freedom House Index] are robust explanatory variables for terrorism. Additionally, [7] state that economic freedom and terrorism have a negative relationship, which can be translated to mean that countries with low economic freedom, such as the

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autocracies of the Middle East and North African region, are likely to have higher rates of terrorism. Based on this reasoning, the opposite should be true; democratic countries, who have higher levels of economic freedom, should see lower amounts of terrorism. A dissenting conclusion is found in another study [12], which states that "true autocracies… experience very little terrorism, although partial autocracies… have experienced more terrorism… than failed states". According to [13], terrorists operate differently depending on the government circumstances surrounding the weakness of the state; in that, the relationship between state failure and terrorism only becomes statistically significant when the government does not tolerate terror groups but cannot challenge them.

Alternately, the combination of a weak state and a government that is "sympathetic to the presence of terrorist groups" does not result in a significant relationship between the two variables and, among other issues, can severely hinder counter-terrorism measures [13]. It has been argued that both failing and failed states "are theoretically more likely to contain terrorist groups, experience terrorist attacks, have their citizens… perpetrate terrorist acts" [14]. [15] acknowledge that failed states are plagued with terrorist groups and that, as a result of these groups, domestic terrorism in failed states has been given room to grow and allowed for the creation of progressively more violent tactics, such as suicide bombings and improvised explosive devices. These findings are partially supported by [14], who concluded that "states experiencing intense state failures are statistically more likely to be the target of [terrorist] attacks," while also promoting transnational terrorism. A separate study by [13] concurs that "the most destructive terrorist groups are located within weak or failed states;" however, he argues that "most weak or failed states do not host significant terrorist activity". As such, according to the aforementioned conclusions, not only are failed or failing states more likely to promote the formation of terrorist groups, but also have a positive relationship with both domestic and transnational terrorism when the government is apathetic to the cause [13]-[15].

3. Data and Methods

Based on the conclusions of previous literature, I would hypothesize that countries with a higher percentage of the population living in poverty are more likely to see an increase in terrorism when compared to those with a lower percentage in poverty. For the purpose of this study, I will collect data from the Quality of Government Index Standard Time Series Dataset and the Global Terrorism Database with the intention of determining if any statistically significant relationships exist between the dependent and independent variables. Due to the continuous nature of the variables, further analysis of the possible causation between them will be examined via the results of performing an OLS regression on the data. The measures of the incorporated variables are accounted for between the years of 1970 and 2018 with the assistance of two models, negative binomial regression and Prais-Winsten, which were utilized in order to accurately display any resulting outcomes of the data (Table 1). For the dependent variables of success and attempt, a negative binomial regression was conducted; as this model is favorable when the dependent variables are defined as count variables within a time series. Prais-Winsten, a generalized linear regression that controls for autocorrelation in time series data, was used to evaluate the dependent variable Global Terrorism Index. This model is suitable for the aforementioned time series analysis due to the ingrained correction of autocorrelation, which ensures "that the rate for one year would [not] influence the next" [16]. The characteristic of corrected autocorrelation is essential when analyzing the yearly ranked impact of terrorism in a single year; thereby, guaranteeing that the impact rankings remain isolated from previous scores. Regarding the variables displayed, Table 2 includes the additional factors of state strength and unemployment rate, since their data history only extends back to 2005 and not the full time range from 1970.

However, all other variables' significance is determined within an identical time frame in order to keep the results fair and precise.

4. Dependent Variables

In order to determine the best measure for terrorism, the dependent variables that are being taken into consideration include the Global Terrorism Index (GTI), success, and attempt. The necessary elements of terrorism, which are included in the GTI, are outlined in [17].

According to [17], terror attacks are defined as "the threatened or actual use of illegal force and violence by a non-state actor to attain a political, economic, religious, or social goal through fear, coercion, or intimidation". Added caveats for inclusion in [17] dictate that "the incidents must be intentional… must entail some level of violence or immediate threat of violence" and the perpetrators "must be sub-national actors". Since [17] "does not include acts of state terrorism," neither will this study; instead, emphasis will be placed on international terror groups. The GTI measures the "direct and indirect impact of terrorism in terms of its effect on lives lost, injuries, property damage and the psychological after-effects of terrorism" [18]. The value of this variable is comprised of an aggregate of data from [17] and the National Consortium for the Study of Terrorism and Responses to Terrorism (START); which results in an ordinal ranking of nations on the negative impact of terrorism. The ranking ranges from 0 to 10, with 0 denoting no impact, while 10 indicates "the highest measurable impact" of terrorism based on the aforementioned criteria included in the GTI [18]. To illustrate, Afghanistan, which suffered a high death and injury toll, large areas of structural damage, and heightened fear of additional attacks, ranks higher on the GTI than a country such as Israel, which suffered a fraction of the after-effects [18]. The remaining dependent variables of success and attempt are defined as the number of successful terror attacks in a country per year, and the number of attempted terror attacks in a country per year, respectively. Data for the previously mentioned variables was attained via [17] and collapsed into a total number of terror attacks in a country per year, before the sum was divided into the respective categories of success or attempt based on the attack fitting either description.

5. Independent Variable

As the primary focus of this study is the percentage of a population in poverty, [19] provides a viable representation of this by defining where the poverty line falls and the corresponding gap. The percent of a country's population in poverty, stipulated by living on less than 3.20 U.S. dollars per day, is manifested into a representative measure by the variable poverty. This variable calculates a nation's poverty gap at 3.20 U.S. dollars per day as the "mean shortfall in income or consumption from the poverty line 3.20 dollars a day" [19]. This shortfall is expressed as a percentage of the poverty line based on the 2011 PPP and counts "the nonpoor as having zero shortfall," in order to reflect the depth and frequency of poverty [19].

6. Controlled Variables

The following variables were controlled for in order to ensure that the societal and economic conditions of various countries were as similar as possible. This will allow for any connections between the dependent variables and a country's population percent in poverty to be emphasized. Additionally, they can all be found in [19]. To begin, a natural log function was applied to the variables of a country's total population and GDP per capita in constant 2010 U.S. These variables were logged in order to prevent the skewing of data due to an extensive range of numbers. In this

dataset, the total population of a country is a mid-year estimation of all residents, regardless of legal status or citizenship. Similarly, a country's GDP per capita in constant 2010 U.S. dollars is a mid-year estimate based on the total GDP and calculated mid-year population. According to [19] the estimate of GDP is "calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources". An essential component regarding GDP, the unemployment rate as a total percent of a country's population. Also taken into consideration is oil as a main contributor of GDP in nations across the globe. Oil production as a percent of GDP is calculated via oil rents, which are defined as the difference between the value of crude oil production at world prices and total costs of production. Regime type is controlled for in a revised polity score for each country which is coded from the values of -10 for full autocracies to +10 for full democracies. Additional evaluations of a country's regime structure are assessed via overall vulnerability to certain internal and external conflicts through rankings on the Fragile States Index. The Index data corresponds to the year prior to publishing and is meant to identify when states are being pushed toward failure by a variety of indicators. These factors are divided into 12 categories, including social, economic, and political indicators, before each nation is given a score between 0, most stable, and 10, least stable, for each benchmark. A total score is then summed and ranked on a scale of 0 to 120, with the higher sums indicating a more fragile state. The last three variables measure fractionalization in key components of society. According to [19], fractionalization indicates the probability that a certain characteristic is not shared by two randomly selected people in a given area. A higher composite score is indicative of a lower probability of unshared characteristics and equates to more fractionalized society. Ethnic fractionalization is summarized as a combination of racial and linguistic characteristics and is based on data from the year 2000 [19]. Additional measures calculated in 2000, include linguistic fractionalization and religious fractionalization, which reflect the probability that two random people will not belong to the same linguistic group or the same religious group, respectively.

7. Results

Upon completion of the empirical analysis, the yielded results allude to a surprising, and aptly intriguing story of causation. Several noteworthy connections exist. First, there is a negative, statistically significant relationship between a country's poverty and number of attempted and successful terror attacks in a country. In essence, terror attacks are more likely to occur in countries with a less poverty. Therefore, an established nation with a relatively small poverty gap tends to be a viable target for terrorists and yields a significant success rate. Alternately, although there is a negative relationship between poverty percentage and Global Terrorism Index, it is not a statistically significant rate for any measured p value. However, these results are representative of the broader timespan and are not indicative of more current measures which factor in the more recent era of increased controls and security to prevent terrorism in more vulnerable nations. Further analysis of the specific time period referenced can be found below, in Table 2.

The principal addition to Table 2 are the variables State Fragility and Unemployment Rate. The newly included variables were excluded from the primary Table 1 due to no data being collected on the measures until 2005. As such, the incorporation of the supplemental values leaves other variables prone to alteration Although, some are more severely affected than others. Based on the results of Table 2, we can see that when state strength and unemployment are accounted for, the poverty rate loses its significance in relation to all dependent variables, though the negative trend remains. State fragility has a positive, statistically significant relationship with the all measures of terrorism, while unemployment increases both the number of terror attempts and successful attacks. These implications combine to enhance the country profile of one plagued by terrorism as a fragile state with high unemployment rates. The newfound importance of state

strength is in congruence with the recent significance of Polity score, a measure that previously held no significant relationships with the dependent variables. In this specific time period, Polity score shows a positive, significant correlation at the $p<0.01$, $p<0.05$, and $p<0.1$ level for Global Terrorism Index, success and attempt, respectively. An additional variable that displays increased importance is ethnic fractionalization, which maintained a negative significant relationship at the $p<0.01$ level with attempt, but also expanded influence into the remaining dependent variables with a negative connection at the $p<0.01$ value. Alternately, we see Oil rents convert into a negative, statistically significant relationship with success at the $p<0.1$ level. This is a decrease from the positively significant connection between success and attempt at the $p<0.01$ level found in Table 1. A similar story is found in the log of GDP per capita undergoing an intense transformation that changed the trajectory of its influence, with the variable now having a significant, positive impact on terrorism, success, and attempt at the $p<0.01$ level. This finding denotes a pivotal transition, when compared to the variable's previous negative significant relationship at the same level with success and attempt. Some variables, however, did not display any considerable alterations as population size and linguistic fractionalization maintained a positive, significant connection to all three dependent variables at the $p<0.01$ value. Religious fractionalization also remained unchanged with a negative, significant relationship to all dependent variables at the $p<0.01$ level. As such, total population, the log of GDP per capita, linguistic fractionalization, state fragility and unemployment rate are considered main drivers of terrorism for the narrowed time period.

8. Conclusion

Based on the results of the empirical analysis, we can see the emergence of robust positive relationships between terrorism and GDP per capita, state fragility, and unemployment rate. Although poverty rate holds a negative, significant relationship with terrorism in the elongated timespan, the recent implementation of security measures has seen poverty rate cast out of significance and yield to the more powerful impact of state fragility and unemployment rate. This finding is corroborated by [9] who found unemployment rate to be "positive and marginally significant," and [14] who found state failure to be more impactful than poverty rate. The implementation of the aforementioned controls allows for an increased GDP per capita and an overall wealthier population. Therefore, it would not be remiss to conclude that funding of counter-terror measures leads to a more prosperous society, but it does not necessarily result in a safer one. Prosperity and safety should not be equated, as countries with a higher GDP per capita tend to experience more terror, due to the increased targeting of wealthy nations [10]. We find that when security measures are accounted for, GDP per capita has a positive relationship with terror. A result that lends support to the findings of both [9]-[10], who initially uncovered the cyclical reaction of increased security leading to economic growth and, therefore, additional risks of terror. The application of these findings can allow countries to identify themselves as probable targets and rapidly set policy in place for how to best limit the damage of an attack and respond in the aftermath. Additional studies can achieve more precise results by distinguishing domestic and transnational terrorism, as well as, considering additional factors such as education and geographical location.

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9. Figures

Table 1: Negative binomial and Prais-Winsten regression analysis from the years 1970-2018

VARIABLES	Global Terror Index	# of Successful Terror Attacks	# of Attempted Terror Attacks
Percent Impoverished	-0.0144	-0.0249***	-0.0230***
	(0.00913)	(0.00703)	(0.00692)
Polity Score	0.0294	0.0201	0.0209
	(0.0179)	(0.0173)	(0.0171)
Natural log of Population	0.891***	1.002***	0.987***
	(0.0633)	(0.0544)	(0.0532)
Natural log of GDP per Capita	-0.0958	-0.316***	-0.233***
	(0.114)	(0.0802)	(0.0777)
Ethnic Diversity	-1.048*	-0.920**	-0.965**
	(0.579)	(0.420)	(0.417)
Linguistic Diversity	2.833***	1.096***	1.100***
	(0.485)	(0.323)	(0.316)
Religious Diversity	-2.743***	-2.038***	-2.022***
	(0.466)	(0.329)	(0.323)
Oil Rents	0.0154	0.0241***	0.0216***
	(0.0118)	(0.00823)	(0.00812)
Constant	-11.44***	-10.94***	-11.25***
	(1.464)	(1.213)	(1.196)
Observations	927	1,311	1,311
R-squared	0.330		

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

Table 2: Negative binomial and Prais Winsten regression analysis from the years 2005-2018

VARIABLES	Global Terror Index	# of Successful Terror Attacks	# of Attempted Terror Attacks
Percent Impoverished	-0.00682	-0.0125	-0.00973
	(0.00968)	(0.0105)	(0.0104)
Polity Score	0.0774***	0.0626**	0.0502*
	(0.0184)	(0.0268)	(0.0265)
Natural log of Population	0.801***	1.306***	1.304***
	(0.0651)	(0.0806)	(0.0803)
Natural log of GDP per Capita	0.857***	0.994***	0.917***
	(0.162)	(0.194)	(0.195)
Ethnic Diversity	-2.155***	-2.530***	-2.368***
	(0.565)	(0.635)	(0.642)
Linguistic Diversity	2.500***	2.385***	2.184***
	(0.479)	(0.535)	(0.543)
Religious Diversity	-2.139***	-1.439***	-1.713***
	(0.449)	(0.403)	(0.396)
Oil Rents	-0.0122	-0.0224*	-0.0182
	(0.0120)	(0.0125)	(0.0126)
State Fragility	0.0859***	0.0853***	0.0732***
	(0.00842)	(0.0106)	(0.0106)
Percent Unemployed	0.00870	0.0532***	0.0765***
	(0.0135)	(0.0194)	(0.0206)
Constant	-23.89***	-34.28***	-32.56***
	(1.922)	(2.533)	(2.518)
Observations	762	776	776
R-squared	0.434		

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

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