Strategic Risk of Terrorist Targets in Urban vs. Rural Locations

Working paper

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Abstract

What determines the target types of terrorism? Previous studies suggest that the ideology and aims of a terrorist groups determine who their legitimate targets are. We argue that target selection is not only a function of preferences, but also opportunities. This article examines the opportunity structures that physical and human geography create for terrorist groups. Moreover, we posit that urban locations increase the opportunities against civilian targets whereas rural locations facilitate attacks against better protected targets. This study uses disaggregated geographical data to observe the relative risk of different target types in urban vs. rural locations. We find that civilian targets are at a higher risk of terrorism in urban areas in comparison to governmental targets.

Keywords: Terrorist targets, Terrorism location, Urban areas, Rural areas, Geography

1 Introduction

The September 2013 attack on the Westgate Shopping Mall in Nairobi by the Islamist terrorist group al-Shabaab epitomise our understanding of contemporary terrorism. The attack took place in the capital of Kenya, in a busy urban location, targeting civilians indiscriminately. The attack killed 67 people and generated a mass chaos and fear. The perpetrators claimed that the attack was a retaliation of the presence of Kenyan troops in Somalia. Whilst the attack sparked a discussion about the effectiveness of Kenyan troops in Somalia, six months on, the Kenyan troops are still in Somalia fighting alongside the Somali government in expelling the terrorist group al-Shabaab.

A few months after the Westgate mall attack al-Shabaab kills five police officers on a road from the Dadaad refugee camp to the border town of Liboi. This is a remote and rural location for a group that is known for its attacks in Kampala, Nairobi and Mogadishu. The question this article highlights is how human and physical geography affect the target types of terrorism.

Recent advances in geographical data analysis have facilitated the identification of terrorist attack locations and terrorism hot spots (Nemeth *et al.* , 2014; Findley *et al.* , 2014). These studies offer important insights to which types of geographical areas experience more terrorism, but do not specify the relative risk of different target types in these locations. Building onto the previous literature on locations of terrorism, this study investigates who is at a higher risk of terrorism in different geographical locations. More specifically, we focus on the risk of urban vs. rural areas for civilian, military, police and governmental targets.

Previous literature on terrorism treats target types as a function of the ideology and aims of the terrorist group (Drake, 1998; Engene, 2004; Hinkkainen, 2013). Other studies suggest that limitations in the resources and capabilities, as well as counterterrorism efforts, may lead terrorists to substitute their preferred target types in order to carry on with their campaigns (Enders & Sandler, 1993). We argue, however, that strategic terrorists would rather substitute the location of the planned attack to preserve their preferred target type. Moreover, attacking governmental targets may be increasingly difficult in urban centres, but less logistically challenging in rural locations where they do not enjoy the same level of protection.

Governments primarily respond to terrorism in two ways; with soft line and hard line measures. Hard line measures consist of raiding terrorist training sites, infiltrating groups and targeted killings. Soft line responses consist of variety of non-military measures often intended to harden the targets of terrorism. The so called passive responses are not aimed at reducing terrorism in the long run, but to make it harder for terrorists to conduct successful attacks. The soft line measures aim to reduce the opportunities for terrorism by for examples protecting crowded places, installing metal detectors etc. In order to tailor effective responses, it is important to investigate which geographical locations increase the risk for different targets. This study is the one of the first systematic geographical analysis of how locations influence terrorist targeting. The analysis incorporates information about infrastructural complexity in the world to approximate urban locations.

Terrorism and urban locations are linked in multiple ways. Urbanism is suggested to facilitate terrorist anonymity, recruitment, communication and variety of targets (Grabosky, 1988). Even though urbanism has provided terrorist a multitude of targets in a relatively condensed geographical space, we argue that this primarily benefits those interested in attacking the civilian population. Certain targets are well protected in urban spaces and therefore attacking those targets is logistically easier in more rural areas. Modern mass communication techniques have aided the flow of information from the terrorists to a wide audience regardless of not conducting their attacks in populous areas.

Terrorists are considered as strategic actors in this study. Moreover, the location influences the target selection due to calculation about the probability of success. The likelihood of success is dependent on not only the capabilities of the terrorist and their resources, but also on the effectiveness of the counterterrorism efforts. Certain types of targets are better protected (i.e. military, government and police officials) and therefore it is unlikely that the terrorists have the ability to wage and attack against such targets in their headquarters that are most often located in urban areas. Such targets, however, might be more vulnerable in rural areas due to having less protection and terrorists would capitalise on such vulnerability. This study posits that urban locations make attacks against civilian targets more likely, whereas rural areas increase the likelihood of attacks against the police and governmental targets. Such findings are important in terms of counterterrorism responses. Firstly they highlight the strategic risk of terrorism in different locations. Secondly, knowing which target types are at higher risk in different areas can point out the need for better protection. More specifically, if governmental targets increase the attacks in remote locations, they must have better protection during transfers from one urban location to another.

The first part of the article provides a working definition of terrorism, followed by a literature review focussing on location of terrorism and target choices. The third section outlines the theoretical framework of the study. The fifth section provides detail about the geographical method and data analysis and the final section concludes the study.

2 Defining terrorism

For the purposes of this investigation, an instrumental view of terrorism is used. The instrumental approach highlights the difference between intended audiences and immediate targets. This is considered important in separating terrorism from other forms of violence, where the target of violence is the same as the intended target (Schmid & De Graaf, 1982; Lapan & Sandler, 1993; Engene, 2004; Arce & Sandler, 2007). The following definition of terrorism is adopted in this study: premeditated use, or threat of use, of violence by individuals or subnational groups to obtain a political or social objective through intimidation of a target audience, beyond that of the immediate victims[1].

Engene (2004) expands this view by suggesting that violence by terrorists contains a political message, which is aimed for various different groups in the society. The goal of the political message is to affect bonds of loyalty and allegiance between the different groups in the society, either strengthening or weakening them. One of these groups can be the state, the public or other groups within the society, i.e. ethnic groups. The aim of the organization determines who they perceive as their loyalty group and they

[1]This definition has been adopted from Arce & Sandler (2007).

have animosities against. The targets are therefore strategically chosen in order to signal the message to different groups in the society. Terrorist may not, however, be able to attack their preferred target types all the time and some substitutability is likely to occur. This study proposes that terrorists primarily substitute the locations of the attack before considering the change of targets. If the substitutability of targets occurs for example from government officials to civilians, the civilians would still fall outside the loyalty bonds of the terrorist groups.

This study acknowledges that communication is an important element of instrumental terrorism, but rather focuses on the communicative purposes of target selection.

3 Location of terrorism

Whilst the literature in civil wars and crime have paved the way for using geographical data to analyse spatial determinants of crime and rebellion, the terrorism literature has been slower in adopting such methodological advances. Theoretically some early studies have identified the diffusion of terrorist events across space and time (Midlarsky *et al.* , 1980; Heyman & Mickolus, 1980). The subsequent empirical studies have largely focussed on analysing the spatial and temporal patterns of transnational terrorism.

The more recent literature has looked at the regional distribution of transnational terrorist attacks using countries as unit of analysis. The findings suggest that there is indeed regional variation in concentration of terrorism as well identifiable patterns of diffusion towards attacks to the Middle East since 9/11 (Li & Schaub, 2004; Enders & Sandler, 2006). From the country level analysis, recent studies have moved towards disaggregation and analyzed the terrorism hot spots using the Geographical Information Systems (GIS) data.

The first advances in terrorism literature using geo-referenced information of terrorist attacks were case studies in different countries (Berrebi & Lakdawalla, 2007; Johnson & Braithwaite, 2009; Webb & Cutter, 2009; LaFree *et al.* , 2012; Braithwaite & Johnson, 2012). Recently these studies have extended to a global coverage of both transnational and domestic terrorism locations using geographical data and methods.

Mountainous terrain, close proximity to a state capital, large population, high population density, and poor economic conditions have been linked to increase the likelihood of domestic terrorism at the grid cell level (Nemeth *et al.* , 2014) . In addition to these findings, human and physical geography influences domestic terrorism differently in autocracies and democracies. In autocracies the closer to the capital, the more likely domestic terrorism is, whereas in democracies the higher the number of ethnic groups, population and economic deprivation increases the occurrence of domestic terrorism.

Findley *et al.* (2014) classify grid cell locations according to value and vulnerability to terrorists. They find that transnational terrorist attacks are most likely closer to the capital cities, in and international borders, in mountainous terrains, low levels of forest coverage and locations with with recent civil war. In addition areas with larger populations and higher levels of economic activity are more likely to experience transnational terrorism.

These recent studies are important in identifying which locations are more likely to experience terrorism, however, they do not account for the variation of targets in different locations. This current study adds to the extant literature by observing the strategic risk for different targets of terrorism in urban and rural locations. Such information is important in tailoring effective soft line counterterrorism measures.

3.1 Tactical choices and counterterrorism

The selection of terrorist targets in the existing literature has been linked to the group's or the individual's ideology. Moreover, the ideology of the terrorists determines who are within the legitimate target range and who fall outside that (Drake, 1998; Engene, 2004; Hinkkainen, 2013). As an example of this a terrorist group fighting for its freedom against perceived foreign oppressors would not deliberately target individuals from its own ethnic kin group. These individuals are likely to be considered within the group of allegiance in the given society and do not therefore belong to the justified targeting group. Some existing case studies of terrorism suggest such selectivity of targets (De la Calle & Sanchez-Cuenca, 2006; Eggen & Roislien, 2010). The ideology determines the preferred target types, however, terrorists face a number of constraints in their ability to attack the preferred target types. The following literature review focusses on such constraints and opportunities in terms of urban vs. rural locations and counterterrorism.

Two somewhat related processes of modernization and urbanization have been attributed as opportunities for terrorism by Crenshaw (1981). Modernization has created better communication and transportation networks that are both important logistically for terrorists. Communication is vital in gaining publicity and transportation advances such as the airplanes have given the opportunities for hijackings. Urbanization on the other hand facilitates targets and methods of terrorism (Crenshaw, 1981). The mechanism for such facilitation is the communication, audiences, anonymity, mobility and multitude of targets. In addition, cities are often fruitful recruiting ground for more operatives (Grabosky, 1988). This current study focuses on how locations affect the strategic calculus of targets.

For as long as there has been terrorism, there has been counterterrorism. One of the core debates in counterterrorism literature is the issue of negative externalities, such as casualties from military type of counterterrorism. The concern is that these negative externatlities may deepen existing grievances (Bueno de Mesquita & Dickson, 2007; Huddy *et al.* , 2005; Powell, 2007). The dominant approach in counterterrorism literature has been formal analysis of the cost and benefits of particular responses, or empirical evaluation of overall policies for specific countries (Brophy-Baermann & Conybeare, 1994; Cauley & Im, 1988; Chauncey, 1975; Frey, 1987; Sederberg, 1995)[2].

Counterterrorism measures can be crudely divided into two categories; passive and active responses. Active responses are also knows as proactive measures and primarily consist of military actions directed against the terrorists. These can involve methods such as targeted killings, infiltrating a terrorist group, retaliatory raids, covert actions and preemptive strikes. Passive responses, known as defensive measures, on the other hand are non-military measures such as instituting stricter laws and penalties and increasing the cost of the attacks by creating technological barriers, for example, in terms of border

[2]For more recent studies also see Malvesti (2002); Luft (2003); Nevin (2003); Frey & Luechinger (2004); Rosendorff & Sandler (2004); Bueno de Mesquita (2005a,b); Enders & Sandler (2005); Faria & M. (2005); Byman (2006); Siqueira & Sandler (2006); Trager & Zagorcheva (2006); Zussman & Zussman (2006); Arce & Sandler (2007) and Jacobson & Kaplan (2007)

controls (Enders & Sandler, 1993; Sandler & Arce, 2005). Counterterrorism is intended to influence the ability of the terrorists to conduct attacks and should feature into terrorist decision making. Enders & Sandler (1993) suggest that counterterrorism can create a substitution effect where terrorists change targets and tactics in response to counterterrorism affecting their abilities. This would mean, for example, that terrorists are less likely to be able to conduct attacks in airplanes due to the increased airport security, but might instead bomb busy market squares in city centres. This current study builds on this literature by factoring the hardening of targets into the calculus of terrorists when making a decision on where to attack.

4 Theory of terrorist targeting and tactics

The theoretical framework builds on the strategic choices by the terrorists. Assuming strategic action means that terrorists engage in a cost benefit calculation prior to acting. In terms of terrorism this would entail a deliberation of resources and capabilities translating into a successful attack. Successful attacks in turn would apply pressure to the target group and move the terrorists closer to their ultimate goal. The goal of the group could be to address any perceived grievance, such as lack of political participation, unemployment, social exclusion etc. (Ross, 1993). Terrorism aims to obtain goals through intimidation of a large audience, therefore the media attention is essential in achieving these goals. On top of media attention, popular support, political instability, intimidation and fear help in achieving their goal. These means to achieve the goals are also known as basic commodities. Every terrorist group has certain sources of finance, personnel, buildings, weapons and entrepreneurial abilities. All these constitute a finite set of resources. Given the resources, the terrorist organizations choose activities that maximise the likelihood of success. The value of the resources and the relative prices of the basic commodities equal to the overall price of an attack. The value of resources can be measured as the probability of apprehension, loss of group members via deaths, severity of the punishments, likelihood of infiltration and the resources used to plan and execute the attack. In order to make strategic choices all these costs must be calculated prior to any attack (Enders & Su, 2007).

Acting strategically feeds into the selection on targets by the terrorists. Opportunities play an important part of this decision making process. Terrorist groups are more likely to attack targets that maximise their utility. Which types of targets maximize the utility is dependent on the goal of the group. This might, for example, mean attacking a prominent government official generating the most media attention and consequently putting the most pressure on the government to negotiate or give outright concessions. If the aim of the attack is to release terrorist prisoners, it may be that a well known person or a foreign citizen provides the leverage needed for opening communication with the given governments. This intermediary goal may not be the ultimate aim of the group, but can be instrumental in achieving it in the future. If the group becomes known for kidnappings and hostage takings, the government acting strategically, is likely to respond by hardening such target types. This might involve in extra security at embassies and government buildings. In turn a terrorist group must pencil in the added cost of attacking difficult targets and probability of failure in such cases. Most terrorist groups adopt their modus operandi accordingly. If a given target type becomes too costly, rather than substituting the symbolic value of that target type, terrorist calculate the vulnerability of such target in a different location. Ideally many terrorist groups would want to attack the representatives of the state in an urban location due to the attention such attack would generate. Also, it would most likely demonstrate the capability of the group and the vulnerability of the state apparatus. These targets, however, are often relatively well secured and therefore strategic terrorists would opt for attacking the state representatives in more rural locations where the security around the targets is likely to be less robust. On the other hand civilian populations is relatively easy to attack in both rural and urban areas, but more likely to create a wider impact in more populous places. If the terrorist group is aiming to create mass casualties of civilians in order to influence the government's decision-making, such attacks are more likely to take place in urban locations.

Urban locations are populous, provide anonymity and logistical advantages that should facilitate all forms of terrorism. However, different targets are not equally vulnerable at urban locations. Civilians are more vulnerable since the governments does not provide similar protection to all civilian targets than they do for government officials. Populous areas also facilitate attacks aimed to create mass casualties. Based on the vulnerability civilians face in urban locations, we hypothesize the following:

H1: *Civilians have a higher risk of terrorist attacks in urban locations than police and governmental targets*

On the flip side of the coin, governmental targets face higher levels of security and protection during their places of work, which are most often located at urban centres. Targeting these targets is logistically much harder in urban centres, whereas they may be more exposed in areas away from the urban centres. Similar logic applies to the police, who most often have their headquarters in city centres, but often face higher vulnerabilities in more remote areas. The example of al-Shabaab killing the police officers on a remote road to a refugee camp illustrates such strategic behaviour.

H2: *Police targets have a lower risk of terrorist attacks in urban locations than governmental targets*

Military bases and large training camps are often located in semi-rural or rural locations. These are the places where military targets enjoy the most protection. When military targets venture outside their bases they are more vulnerable than in heavy security bases. From this we hypothesise that:

H3: *Military targets have a higher risk of terrorist attacks in urban locations than governmental targets*

The following section provides information on how the hypothesis are tested empirically and how target types as well as rural vs. urban locations are operationalized.

5 Empirics

5.1 Data generation

The unit of analysis used in this study is a grid cell. The world is divided into 0.5x0.5 decimal degree cells. In real terms this translates to an area of 3024 square kilometres at the equator (55x55 kilometres). This grid approach is adopted from the PRIO-GRID project by Tollefsen *et al.* (2012). This enables us to examine the geographical occurrence of terrorism at a disaggregated level. Given that the grid cells capture the whole world, not just land areas, we limit the grids in the study into land cells only. This leaves us altogether with 60 094 cells.

The terrorist attack data comes from Findley & Young (2012) and is geographically coded. Originally the attack data comes from the Global Terrorism Database (GTD), the most comprehensive publicly available dataset on terrorism[3]. The data of terrorist attacks covers the years from 1970-2005 and altogether 40968 attacks are covered in our study. Some of the attacks covered in Findley & Young (2012) do not have geographical coordinates leading to some loss of data in the superimposition process. The terrorist attack data includes the target type of each attack and subsequently we created the following categories: civilian, military government and police. The civilian category encompasses various subcategories from businesses, NGO's, journalists to private citizens.

The variable approximating urban locations is infrastructural complexity. Infrastructural complexity is captured through analysing google images and the more complex the image is, the higher the value on this variable. The lowest value on this variable is 0 and the highest 157.9. The values 0 are taken to indicate remote areas. These data are time invariant and therefore makes time variant analysis of terrorism data redundant.

Naturally targets and tactics are not the only things driving the location of terrorist attacks. Information about the grid cells are taken from the PRIO-GRID project. The variable *area* measures the size of each grid cell and *spatial lag* variable deals with spatial correlation. The spatial lag is constructed by observing if there was a terrorist event in the neighbouring cells, adding up the events and dividing them by the number of cells. *Con-*

[3]Global Terrorism Database (GTD), available at: http://www.start.umd.edu/gtd/, last accessed 26/4/2013.

tiguous variable measures the distance in kilometres to the nearest neighbouring country, whereas *non-contiguous* measures the distance in kilometres to the nearest neighbouring border regardless of contiguity. *Capital* variable measures the distance from the centre of the cell to the national capital. *Travel time* on the other hand measures the travel time in minutes to the nearest big city (defined as more than 50 000 inhabitants) from the centre of the cell. *Population* captures the population estimate for the cell in the year 2000, whereas *Infant mortality* measures number of children per 10,000 in a grid cell that die before reaching their first birthday, also for the year 2000. *Ruggedness* codes the degree of ruggedness a certain area has. This variable essentially captures geographical elevation and improves the mountain binary used in prior studies (Pickering, 2012). *Tree cover* variable looks at the percentage of the grid covered by trees. We also include a *forest* variable, which captures a percentage of forestation in the cells. These two variables do capture different things given that their correlation coefficient is 0.66. *Gcp* variable is the average of the gross cell product from years 1990, 1995, 2000 and 2005 measured in billion USD (Nordhaus, 2006). To measure the effect of mountain on terrorism, we include a binary variable *mountain* in the model that captures whether a given cells has mountains or not. *Ethnic fractionalisation* measures the average percentage of the grid cell that is settled by the politically relevant ethnic group (Wucherpfennig *et al.* , 2011). *Polity* variable is taken from the Polity IV project and coded as a binary variable with 1 being democratic and 0 autocratic (cutoff point being 5 on the polity scale from -10 to 10) (Marshall *et al.* , 2002). Table 1 provides the summary statistics for the variables.

All data contained geographical coordinates and were superimposed to each individual grid. Figures 1, 2 and 3 demonstrate the data generating process for infrastructural complexity and official targets vs. civilian targets in these cells respectively. The more infrastructure the area has, the lighter it appears. The terrorist attacks are visualised in yellow dots. The terrorist attacks are superimposed on the infrastructural areas. For illustrative purposes we created official target variable capturing attacks against military, diplomatic, police and governmental targets.

The following section presents the results of the data analysis.

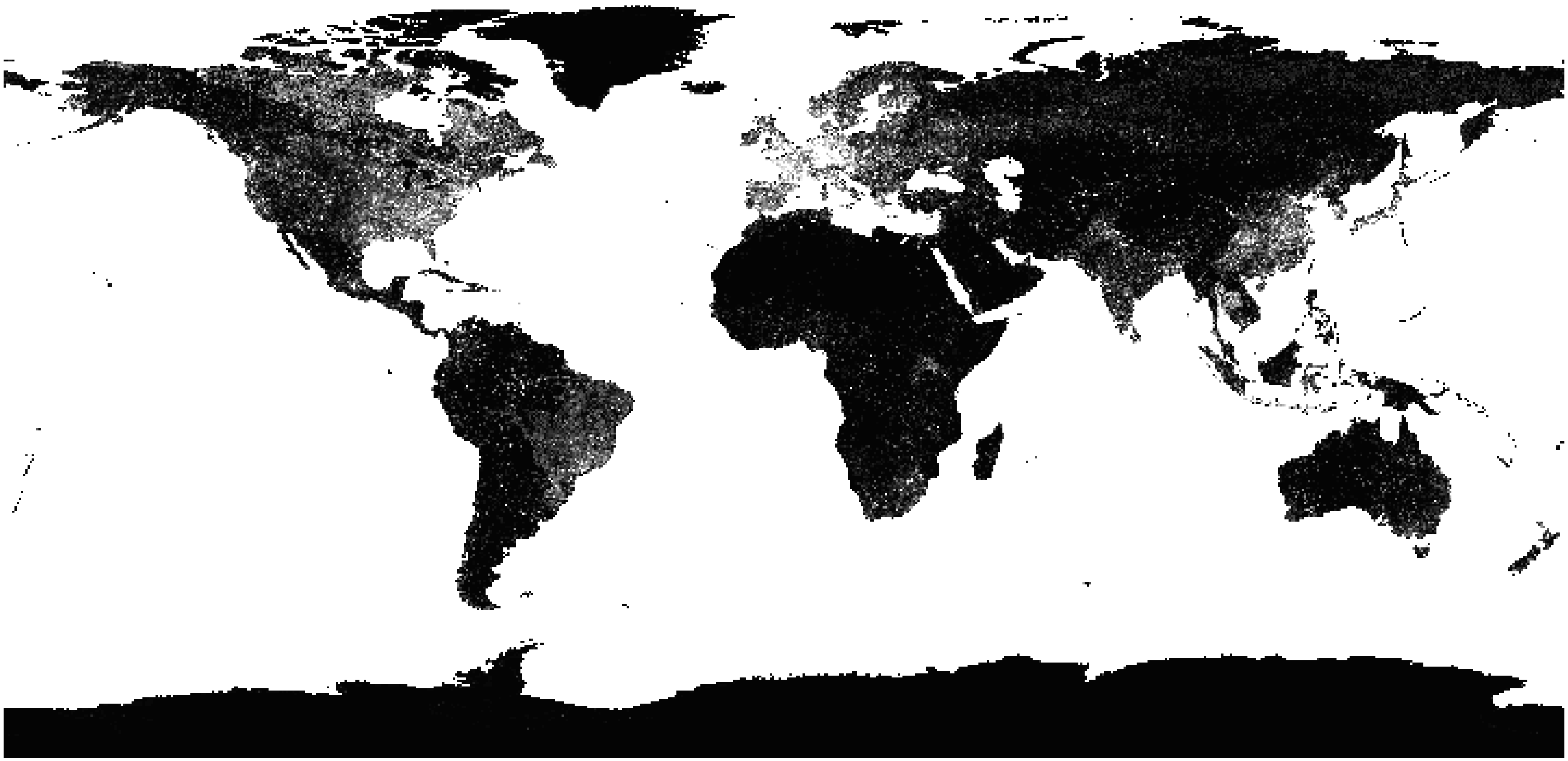

Figure 1: Infrastructural complexity across the world

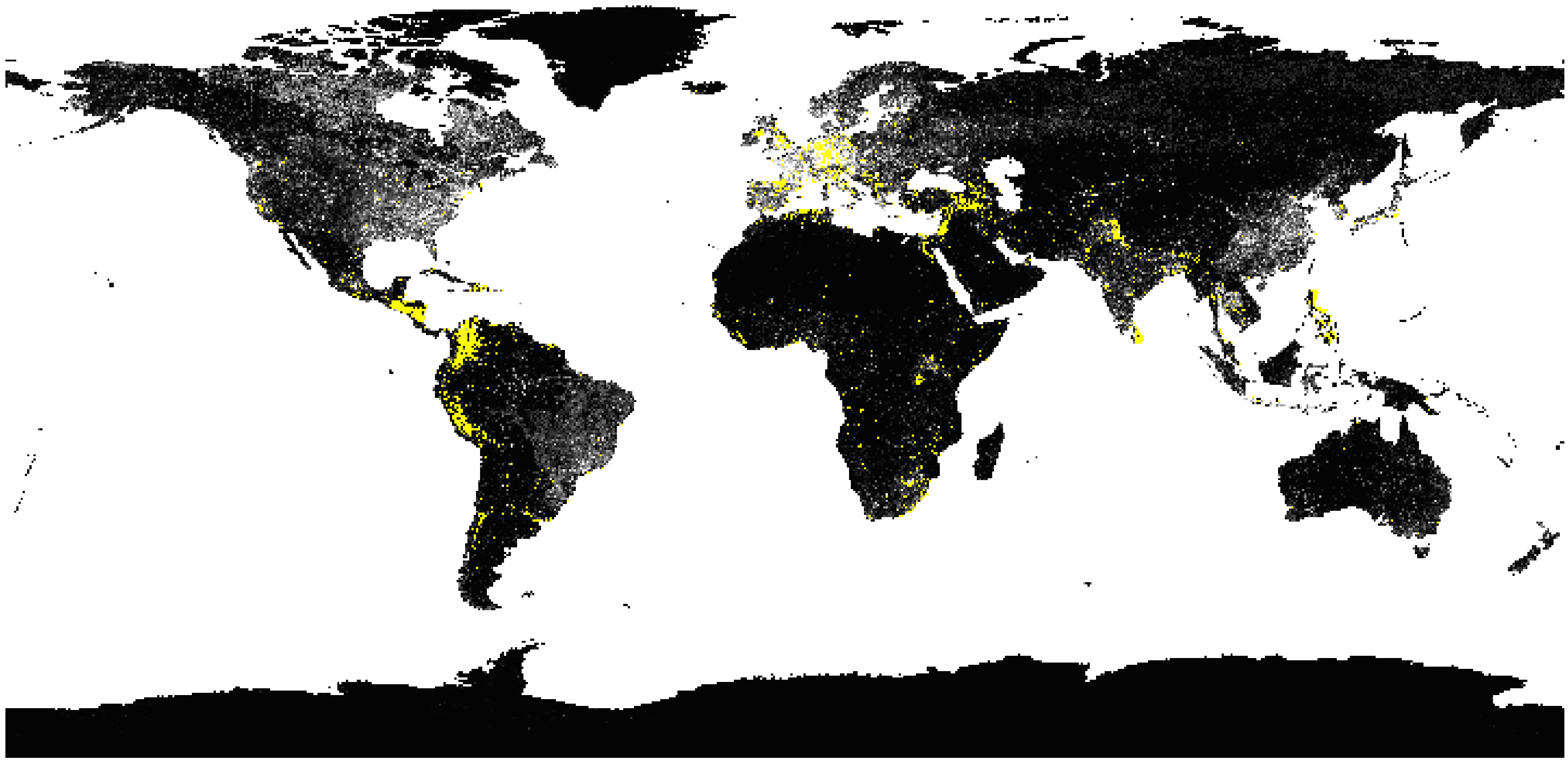

Figure 2: Terrorist attacks against official targets in the world

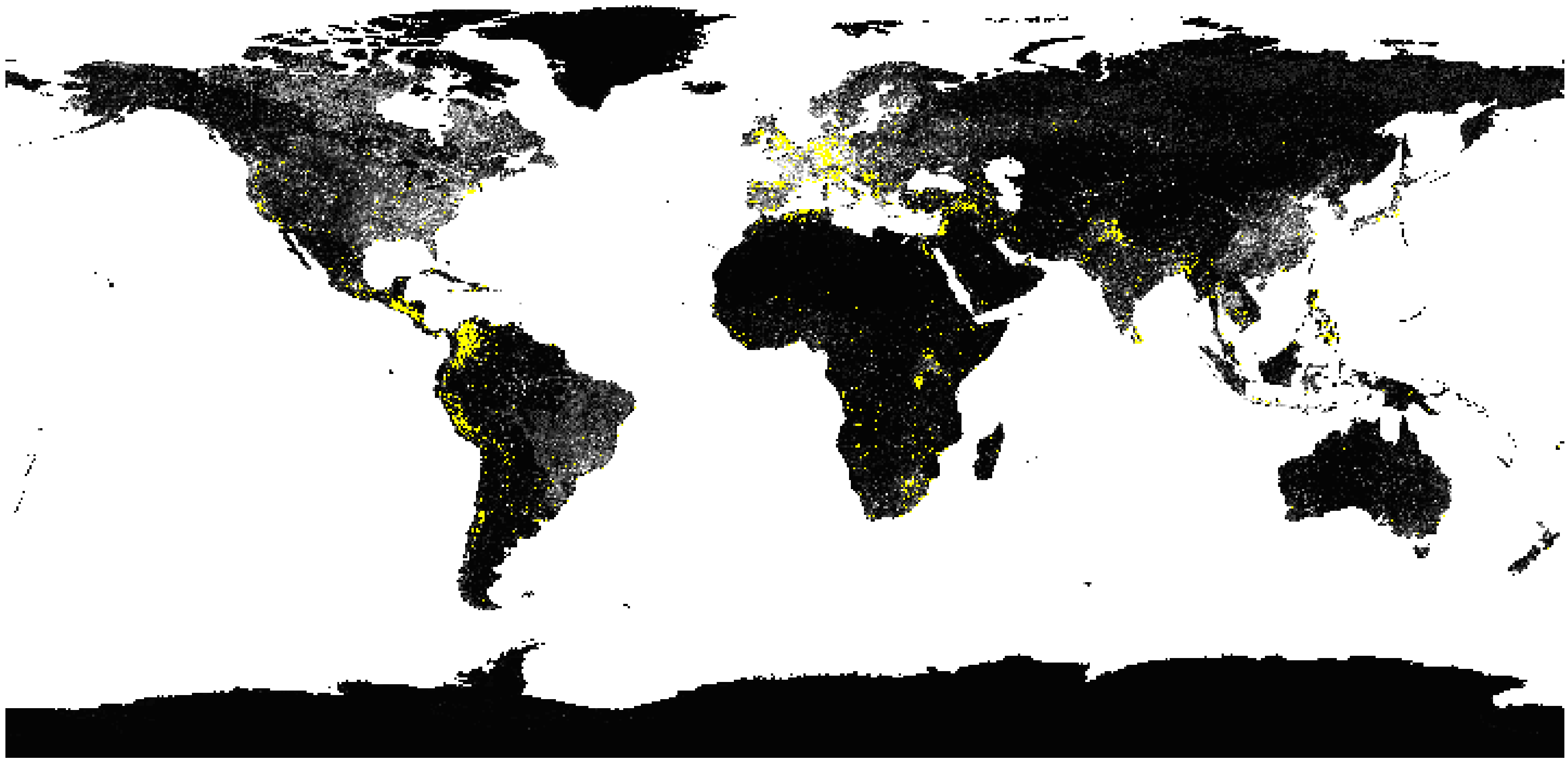

Figure 3: Terrorist attacks against civilian targets in the world

Table 1: Summary statistics

Variable	Mean	Std. Dev.	Min.	Max.	N
urban	5.966	11.325	0	157.927	60094
area	2246.966	695.274	390.17	3091.67	60094
spatial lag	0.043	0.13	0	1	60094
contiguous	560.27	742.923	0	10997	56360
non-contiguous	206.08	220.8	0	1270	60079
capital	1762.111	1600.472	2	7842	60079
travel time	1160.627	1643.672	7	30033	60094
population	688.009	4030.803	0	355365.094	60094
infant mortality	369.413	376.994	30	2031	58291
ruggedness	2.064	2.84	0	29.554	60094
tree cover	20.647	28.156	0	80	60094
gcp	2.591	15.323	0	960.262	60026
forest	39.302	33.812	0.001	100	50049
mountain	0.243	0.36	0	1	60081
ethnic fractionalization	88.048	22.496	0	100	53495
polity	0.785	0.411	0	1	57727

5.2 Models

Table 2 presents the results of the multinomial logit regression. Governmental targets were used as the baseline category to observe the relative risk of civilian, military and police targets comparatively. The first hypothesis is confirmed since attacks against civilian targets are significantly more likely than governmental targets in urban locations. Hypothesis two is not fully confirmed given that the coefficient lacks statistical significance, however, the sign of the estimate is negative indicating that the direction of the relationship is as predicted. Finally, hypothesis three equally fails to reach statistical significance, but the sign indicates that the relationship between urban locations and the likelihood of military targets is a positive one. Smaller grid cells seem to be predictors of higher likelihoods of attacks against civilians and the police, whereas having less attacks in neighbouring cells seem to also increase the likelihood of attacks against all targets. The greater the distance to the neighbouring country's border is a positive predictor of attacks against civilian and military targets. Interestingly the smaller the distance to the non-contiguous neighbouring border increases the likelihood of attacks against the military. Finally, the further away the urban area is from the capital city increases the probability of attacks against civilians.

The first difference estimates for different target types are reported in table 3. For the first difference estimates we used a binary version of the infrastructural complexity variable. All continuous variables were held at their means and binary variables at their median when observing the first differences. The probability of attacks against civilian targets increases by 4% when moving from rural to urban areas, whereas the probability of attacks against governmental targets increases by roughly 8% in urban areas. The confidence intervals for the military and police targets include zeros, therefore we cannot be sure whether these probabilities occur by chance or not.

We also ran several alternative models to test the results given that the data generation process has a number of issues. Firstly, we test whether an aggregate category of official targets have a higher likelihood of attacks in urban areas. This model is reported in the appendix table 1. The estimate for official target types is not statistically significant. However, the sign for the relationship is positive, contrary to our expectations. Secondly, we tested the four target type categories in our multinomial regression as separate binary outcome variables. These results are also reported in the appendix table 1. The standard errors are clustered on grid cells in these models to deal with unit specific heterogeneity. The only binary outcome variable with statistically significant coefficient is the civilian target types that have a higher likelihood of attacks in urban areas. Military, police and governmental targets are all negatively associated with attacks in urban areas, but we cannot say whether these relationships occur by chance.

We also use night light data from year 2000 as a robustness check to capture urban areas. The data were obtained from the DMSP-OLS project where the highest amount of night light in a given grid is 60 and the dark cells take a value of 0. The results of the multinomial logit regression are reported in the appendix table 2. Using governmental target types as the baseline category, none of the coefficients reach statistical significance. Interestingly thought the relationship between nightlight areas and all target types is a negative one- including civilian targets.

Finally, our data generating process involves a lot of grids that never experience any terrorist attacks, therefore we have an issue of excess zeros in our data. Altogether 57 393 grids have no attacks. Table 3 in the appendix includes bias-corrected logistic regression estimates using the Firth method (Firth, 1993). The results are in line with table 1 results in the appendix.

6 Discussion

We set out to test whether terrorist are strategic actors in substituting the location of their attacks in order to preserve their preferred target types. Previous literature has suggested that target types are a function of preference as well as capabilities of the terrorists. If the capabilities to attack the preferred targets do not exist, the terrorist substitute their target types to an easier, more attainable type. Whilst we agree with this rationalist perspective of terrorism, we claim that locations create differing opportunities for terrorist to attack their preferred target type before substitution. Moreover, we argued that urban locations make official target types less likely to experience terrorism due to the logistical difficulties, whereas civilians are more vulnerable at these urban areas.

Recent advances in geographically coded data and disaggregation of terrorism have produced a number of significant findings regarding the locations of terrorism. These studies find that both human and physical geography matters for transnational and domestic terrorist groups in selecting the locations for their attacks. We add to this extant literature by looking at how physical and human geographic influences the choice of targets by the terrorists. We find that indeed terrorist are strategic in using the opportunities different locations provide in terms of vulnerabilities for certain target types. The results are strongest in observing the risk of civilian targets in urban locations in comparison to governmental targets. In fact, civilians have 4% higher probability to experience an attack in an urban area, whereas governmental targets have an 8% reduction in the probability of being attacked in urban areas.

Our results provide some important implications. Whilst governments protect their officials from terrorism relatively well in urban areas, this is perhaps less the case for rural areas. It seems that police and governmental targets are not in relatively high risk of experiencing attacks in urban areas, but do they enjoy enough protection in more remote areas? Protecting civilians in populous city centres is very difficult, but knowing

Table 2: Multinomial logit regression

	Civilian	Military	Police
urban	0.0108*	0.00348	-0.00192
	(2.47)	(0.43)	(-0.38)
area	-0.000530*	-0.000522	-0.000793**
	(-2.11)	(-1.27)	(-3.09)
spatial lag	-1.464***	-1.398**	-0.581*
	(-5.21)	(-3.01)	(-2.21)
contiguous	0.000850**	0.00113*	-0.000127
	(2.65)	(2.48)	(-0.29)
non-contiguous	-0.00128	-0.00244*	0.000246
	(-1.96)	(-2.17)	(0.33)
capital	0.000233*	0.000155	0.000116
	(2.30)	(0.89)	(1.02)
travel time	0.000124	0.000199	0.000423
	(0.49)	(0.50)	(1.84)
population	0.00000371	-0.0000178	-0.00000301
	(0.34)	(-0.55)	(-0.23)
infant mortality	0.000212	0.000433	0.0000449
	(0.85)	(1.13)	(0.17)
ruggedness	-0.0171	-0.0163	-0.000349
	(-0.73)	(-0.43)	(-0.02)
tree cover	-0.00366	-0.00912	-0.000549
	(-1.23)	(-1.72)	(-0.19)
gcp	-0.00365	-0.0111	-0.00130
	(-1.45)	(-1.43)	(-0.53)
forest	0.00335	-0.00344	0.00170
	(1.08)	(-0.66)	(0.54)
mountain	-0.246	-0.0735	-0.106
	(-1.10)	(-0.21)	(-0.48)
ethnic fractionalization	0.00364	0.00410	-0.00315
	(1.08)	(0.75)	(-1.01)
polity	-0.292	0.484	-0.272
	(-1.26)	(1.16)	(-1.15)
_cons	0.380	-1.128	1.395
	(0.52)	(-0.94)	(1.95)
N	1638	1638	1638

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3: First Different Estimates

	(First Difference Estimate)	(CI Lower Bound)	(CI Upper Bound)
Civilian targets	0.040	0.001	0.078
Military targets	0.013	-0.015	0.034
Police targets	0.023	-0.019	0.063
Government targets	-0.077	-0.135	-0.019

Simulated estimates are based on 1,000 draws from a multivariate normal distribution

CI pertains to confidence interval; bounds are based on 95% confidence intervals.

the aims of a given terrorist group, governments should focus in identifying who their legitimate targets are. If civilians fall into this category, building resilience in urban areas is important in countering the devastation terrorist attacks can create.

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7 Appendix

Table 1: Logistic regressions of target type binaries

	Official targets	Civilian targets	Military targets	Police targets	Government targets
urban	0.000522	0.00527*	-0.00528	-0.00420	-0.000108
	(0.20)	(2.08)	(-1.48)	(-1.34)	(-0.04)
area	0.00116***	0.00111***	0.00140***	0.00112***	0.00122***
	(11.56)	(9.76)	(8.21)	(7.74)	(9.47)
spatial lag	5.304***	4.674***	4.981***	5.198***	4.885***
	(35.24)	(30.08)	(27.43)	(31.38)	(32.46)
contiguous	-0.000652***	-0.000348*	-0.000599*	-0.00102***	-0.000718***
	(-4.23)	(-2.17)	(-2.30)	(-3.97)	(-3.69)
non-contiguous	-0.00152***	-0.00253***	-0.00234***	-0.00111*	-0.00137***
	(-4.39)	(-5.90)	(-4.08)	(-2.32)	(-3.46)
capital	-0.000361***	-0.000250***	-0.000398***	-0.000374***	-0.000420***
	(-5.93)	(-3.69)	(-4.13)	(-4.81)	(-6.04)
travel time	-0.000812***	-0.00108***	-0.000737***	-0.000574***	-0.000931***
	(-5.23)	(-4.55)	(-3.58)	(-3.51)	(-5.75)
population	-0.0000101	-0.00000930	-0.00000301	-0.00000202	-0.00000621
	(-1.86)	(-1.48)	(-0.47)	(-0.34)	(-1.09)
infant mortality	-0.000543***	-0.000872***	-0.000999***	-0.00103***	-0.000510***
	(-4.43)	(-5.62)	(-5.22)	(-6.00)	(-3.75)
ruggedness	0.0147	-0.00337	-0.0263	-0.0112	0.0150
	(1.26)	(-0.25)	(-1.69)	(-0.82)	(1.23)
tree cover	-0.00341*	-0.00439*	-0.00325	-0.00286	-0.00189
	(-2.27)	(-2.57)	(-1.55)	(-1.52)	(-1.16)
gcp	0.00643***	0.00670***	0.00696***	0.00720***	0.00625***
	(4.60)	(5.03)	(5.11)	(5.54)	(5.06)
forest	-0.000460	0.00128	-0.000562	-0.00304	-0.00124
	(-0.31)	(0.73)	(-0.25)	(-1.51)	(-0.72)
mountain	0.448***	0.435***	0.478**	0.562***	0.498***
	(4.08)	(3.41)	(3.08)	(4.12)	(4.13)
ethnic fractionalization	0.000915	0.00296	-0.000409	-0.00282	0.00109
	(0.64)	(1.67)	(-0.19)	(-1.50)	(0.66)
polity	0.441***	0.222	0.282	0.302*	0.468***
	(4.25)	(1.84)	(1.67)	(2.09)	(3.79)
_cons	-6.402***	-6.452***	-7.587***	-6.428***	-6.939***
	(-20.88)	(-18.82)	(-15.48)	(-15.46)	(-18.50)
N	40492	40492	40492	40492	40492

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 2: Multinomial logit regression using nightlight data

	Civilian	Military	Police
nightlight	-0.00874	-0.00312	-0.00779
	(-0.60)	(-0.11)	(-0.51)
area	-0.000728**	-0.000592	-0.000817**
	(-2.84)	(-1.41)	(-3.10)
spatial lag	-1.407***	-1.385**	-0.571*
	(-5.02)	(-2.99)	(-2.16)
contiguous	0.00101**	0.00120**	-0.000101
	(3.11)	(2.58)	(-0.23)
non-contiguous	-0.00151*	-0.00253*	0.000226
	(-2.30)	(-2.24)	(0.30)
capital	0.000202*	0.000145	0.000117
	(2.00)	(0.83)	(1.03)
travel time	0.0000609	0.000176	0.000406
	(0.24)	(0.44)	(1.77)
population	0.00000740	-0.0000163	-0.00000263
	(0.74)	(-0.51)	(-0.19)
infant mortality	0.000118	0.000411	0.0000351
	(0.47)	(1.06)	(0.13)
ruggedness	-0.0183	-0.0165	-0.000298
	(-0.79)	(-0.44)	(-0.01)
tree cover	-0.00364	-0.00914	-0.000666
	(-1.22)	(-1.73)	(-0.23)
gcp	-0.00159	-0.0104	-0.000602
	(-0.54)	(-1.07)	(-0.20)
forest	0.00382	-0.00321	0.00187
	(1.23)	(-0.61)	(0.59)
mountain	-0.315	-0.0984	-0.124
	(-1.39)	(-0.27)	(-0.56)
ethnic fractionalization	0.00384	0.00418	-0.00323
	(1.14)	(0.77)	(-1.03)
polity	-0.260	0.496	-0.278
	(-1.13)	(1.20)	(-1.17)
_cons	1.078	-0.895	1.483*
	(1.44)	(-0.72)	(1.98)
N	1638	1638	1638

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3: Firth regression models on target type binaries

	Official targets	Civilian targets	Military targets	Police targets	Government targets
urban	0.000588	0.00532*	-0.00510	-0.00403	-0.0000150
	(0.24)	(2.13)	(-1.44)	(-1.29)	(-0.01)
area	0.00116***	0.00110***	0.00139***	0.00111***	0.00122***
	(10.54)	(9.01)	(8.16)	(7.70)	(9.43)
spatial lag	5.292***	4.662***	4.964***	5.182***	4.872***
	(36.73)	(31.14)	(27.42)	(31.36)	(32.44)
contiguous	-0.000642***	-0.000338*	-0.000575*	-0.000991***	-0.000704***
	(-4.02)	(-2.06)	(-2.22)	(-3.89)	(-3.63)
non-contiguous	-0.00152***	-0.00253***	-0.00234***	-0.00112*	-0.00137***
	(-4.60)	(-6.49)	(-4.09)	(-2.34)	(-3.48)
capital	-0.000358***	-0.000247***	-0.000389***	-0.000368***	-0.000416***
	(-6.51)	(-4.21)	(-4.07)	(-4.75)	(-6.00)
travel time	-0.000802***	-0.00106***	-0.000712***	-0.000556***	-0.000918***
	(-6.22)	(-6.20)	(-3.46)	(-3.40)	(-5.66)
population	-0.00000960	-0.00000838	-0.00000220	-0.00000148	-0.00000557
	(-1.75)	(-1.49)	(-0.35)	(-0.25)	(-0.99)
infant mortality	-0.000541***	-0.000868***	-0.000990***	-0.00102***	-0.000506***
	(-4.61)	(-5.90)	(-5.19)	(-5.97)	(-3.73)
ruggedness	0.0147	-0.00325	-0.0260	-0.0110	0.0150
	(1.33)	(-0.26)	(-1.68)	(-0.81)	(1.23)
tree cover	-0.00340*	-0.00437**	-0.00323	-0.00284	-0.00188
	(-2.35)	(-2.67)	(-1.54)	(-1.52)	(-1.16)
gcp	0.00639***	0.00664***	0.00694***	0.00716***	0.00622***
	(5.39)	(5.62)	(5.15)	(5.56)	(5.08)
forest	-0.000452	0.00128	-0.000553	-0.00302	-0.00123
	(-0.30)	(0.76)	(-0.25)	(-1.50)	(-0.71)
mountain	0.447***	0.434***	0.475**	0.559***	0.496***
	(4.21)	(3.57)	(3.07)	(4.11)	(4.12)
ethnic fractionalization	0.000885	0.00291	-0.000473	-0.00286	0.00105
	(0.61)	(1.65)	(-0.22)	(-1.52)	(0.63)
polity	0.439***	0.219	0.275	0.297*	0.465***
	(4.19)	(1.77)	(1.64)	(2.06)	(3.77)
_cons	-6.384***	-6.428***	-7.547***	-6.401***	-6.915***
	(-19.79)	(-17.85)	(-15.45)	(-15.44)	(-18.48)
N	40492	40492	40492	40492	40492

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$