Bureaucracy, statesmen and Terrorists

-- An Empirical Study on international Terrorism

Abstract

In our paper, we find relationship between the terrorism and democracy is positive. We also find that state capacity has negative effect on terrorism. We also find in democracy, better government capacity can be translated into lower terrorism loss while in autocracies the government capacity gets larger, the possible terrorism loss would increase. IV estimation verified that the estimations of OLS are effective.

Keywords: Terrorism, Democracy, State capacity

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I. Introduction and literature review

Since 9.11, terrorism has become one of the main focuses of international polity. Most of politicians, media and part of academics believe poverty is the root of terrorism. (See Joseph Kahn and Tim Weiner, 2002 and Stern, 2003) Academies on civil conflict did confirm positive correlation between domestic war and poor level of economic development. (Alesina 1996) Miguel used rainfall as an instrumental variable to rule out other channel of causality and find growth shock has dramatic causal effect on civil war. (Migual 2004)

Although it seems beyond dispute that poverty is the root of civil conflict, the correlation between poverty and terrorism is challenged by many economists and political scientists.

Krueger and Maleckova (2003) pointed out poverty and education has no effect on individual terrorist participants, and the bias of traditional literature is caused by adverse casualty. Afterwards, Krueger and Laitin found repression rather than poverty and illiteracy predicts terrorism best. (Krueger and Laitin, 2008) Sageman provided an explanation using a micro-level dataset of terrorists collected from public information by him and he found most fresh blood of terrorism organizations are relatively more wealthy and better educated.

Piazza's research(2004) is also in contrary to "rooted-in-poverty" theory and his research is based on macro level. He found there is no sufficient evidence to prove poor economic development is correlated with terrorism. In addition, he pointed out that political violence and social cleavage may exert significant effect on terrorism. Diverse society and complex party system give rise to experience of terrorism. "Median voter" theory is used in his paper to explain why political system with fewer parties is more stable and generates less terrorism. With aggregative majority party systems, parties will reach electoral center and achieve inter-party similarity, while with more parties, extremist will dominate in the election and domestic conflict is greater.

Abadie (2006) used instrumental variables and still failed to find correlation

between terrorism and economic performance.

Apart from economic factors, institutional factors also play important role in predicting terrorism. The most popular explanation of terrorism is democracy. Some politician of western countries argued that authoritarianism breeds terrorism. Because of inequality, lack of political right and great divergence in the society, grievances accumulate in such countries. And anger of people will turn into terrorism attack to fight for concession of government. However, we have witnessed that terrorism always happens in those most liberate countries. Philippine, the pioneer of democracy in Asia, has suffered far more terrorism attack than its authoritarian neighbors, say Singapore, Japan, Taiwan and mainland China.

There are contradictory opinions of relationship between democracy and terrorism. Some believe democracy will reduce experience of terrorism and the others argue that democracy actually increases terrorism. Eubank and Weinberg (1994, 1998, 2001) presented a series of research which robustly verifies that terrorism always happens in comparatively more democratic countries. (also see Charter, 1994 and Ross, 1993) Schimd (1992) pointed out democracy has both positive effect (mild violation of policy, free media to express opinions, protection of weak groups) and negative effect(freedom of movement, targets more vulnerable and legal system of “in dubio pro reo”).

Sandler’s rational choice model (Sandler, 1983) can be used to explain the essences of both opinions. Sandler built a theoretical model of strategical negotiation in which terrorist realizes his demand in two ways: legal way and illegal way (terrorism), each with a certain cost. And the total expense of legal activities and terroristic attack is constraint by his total wealth. Income effect and substitution effect appear in the model. Li (2005) found empirical support of Sandler’s model: in democratic countries people face lower cost of legal access (free media and democratic election) while in authoritarian countries people face higher cost of terroristic attack (more rigid regulation).

Similar to trade theory in corporate finance, the effect of democracy also show nonlinear effect on terrorism. Eyerman (1988) borrowed Sandler’s 2-price model and evaluated two schools of thoughts. The strategic school claims that democracy decreases price of illicit behavior, especially terrorism. The political access school argues democracy decreases price of legal political access of satisfying people’s political demand, thus decreasing terrorism. With both lower price of legal activities and of illegal attacks, the balance of substitution effect and income effect decides whether democracy is more or less vulnerable to terrorism. And he found established democracy less likely to be targeted by terrorists compared with newly built democracy. Abadie (2006) has similar conclusion that the relationship between terrorism and democracy is quadratic. He added measurement of democracy and its square into his model and he found a non-monotonic relationship. The countries with extremely democratic regime and the countries with extremely autocratic regime are less vulnerable to terrorism attack. His hypothesis is that country is most likely to be jeopardized through transition from authoritarian to democracy.

Hendix’s work (2014) is also related to Sandler’s theory while his focus is state capacity rather than democracy. He defined state capacity as combination of military capacity and bureaucratic capacity. He found military capacity is positively correlated with terrorism and bureaucratic capacity is negatively correlated with terrorism. His

explanation is that bureaucratically strong state will perform better to accommodate grievances and military forces will generate even more grievances that it can repress. Though theoretical hypothesis of the relationship between democracy and terrorism seems convincing, empirical confirmation of causal effect lefts to be done. And current literatures are confined to institution concerning political right and democracy. Other forms of institution are neglected in their discussion, including vanguard of public security, censoring potential risks and settling conflict with armed force. We noticed that countries with strong state are usually free from terrorism, for instance, east Asian countries and Scandinavian countries. The interaction between democracy and state capacity may also be interesting.

In this paper, we use record of terrorism activities from Global Terrorism Database (GTD) from 1985 to 2017. We find positive correlation between terrorism and democracy and negative correlation between state capacity and terrorism, which verifies the findings of other academics. What's more, our paper points out that state capacity will exert heterogeneous influence on countries with different level of democracy, strong state decrease terrorism in democratic countries but increase terrorism in autocratic countries. Our contribution also includes measuring causal effect of democracy on terrorism using IV estimation, which greatly supplements the given theory of democracy and terrorism.

Next section will present data description and summary statistics. In section 3 the findings of fundamental regression will be discussed. Section 4 includes the IV regression. Section 5 is the robustness check part. Conclusion will be given in section6.

II. Data, Variables and Summary Statistics

Following our logic on terrorism, authoritarianism, government capacity, and cultural segments, we utilize several existing datasets which have been widely used in the literature, additionally define a set of new variables, and combine them together to obtain our final sample.

A. Terrorism Factor

For terrorism data, we utilize the Global Terrorism Database (GTD). The GTD contains detailed information on all terrorism incidents for 205 countries and areas from 1970 to 2018, including date and location, perpetrator, weapon, casualty, consequences, etc. The data collection of the GTD relies on publicly available, unclassified source materials, including media articles and electronic news archives, and is maintained by the National Consortium for the Study of Terrorism and Response to Terrorism (START) at the University of Maryland.[1] The GTD defines a terrorist attack 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. This definition distinguishes terrorism from common crimes by emphasizing its profound objectives, which we think can easily interact with political and cultural forces.

We construct the terrorism factor (TR) for a certain country and year using the following methodology. First, we collapse data by country and year to get number of success incidents (NTI_1), number of failed incidents (NTI_2) , number of killed people

[1] The GTD is publicly available to search, browse, and download on the GTD website. For more details, please visit the website.

(DHP_1), number of wounded people (DHP_2), and total property damage (DP). Here NTI, DHP and DP refer to "number of terrorism incidents factor", "degree of harm in person factor", and "damage of property factor", respectively [Figure 1, Table 1]. After normalization, the country-year TR is defined as:

$$TR = (\ NTI_1) * 1 + (\ NTI_2) * 0.5\ + (DHP_1) * 3\ +\ (\ DHP_2) * 0.5\ +\ (DP) * 2$$

In basic analysis, we use $TR_{-1,-5} = mean\ of\ TR\ in\ the\ former\ 5\ years$.The lag-5-year average approach tries to capture the continuation effect of certain shocks (including coup d'état, civil war and other types of political violence, more introduction below). [Figure 2]

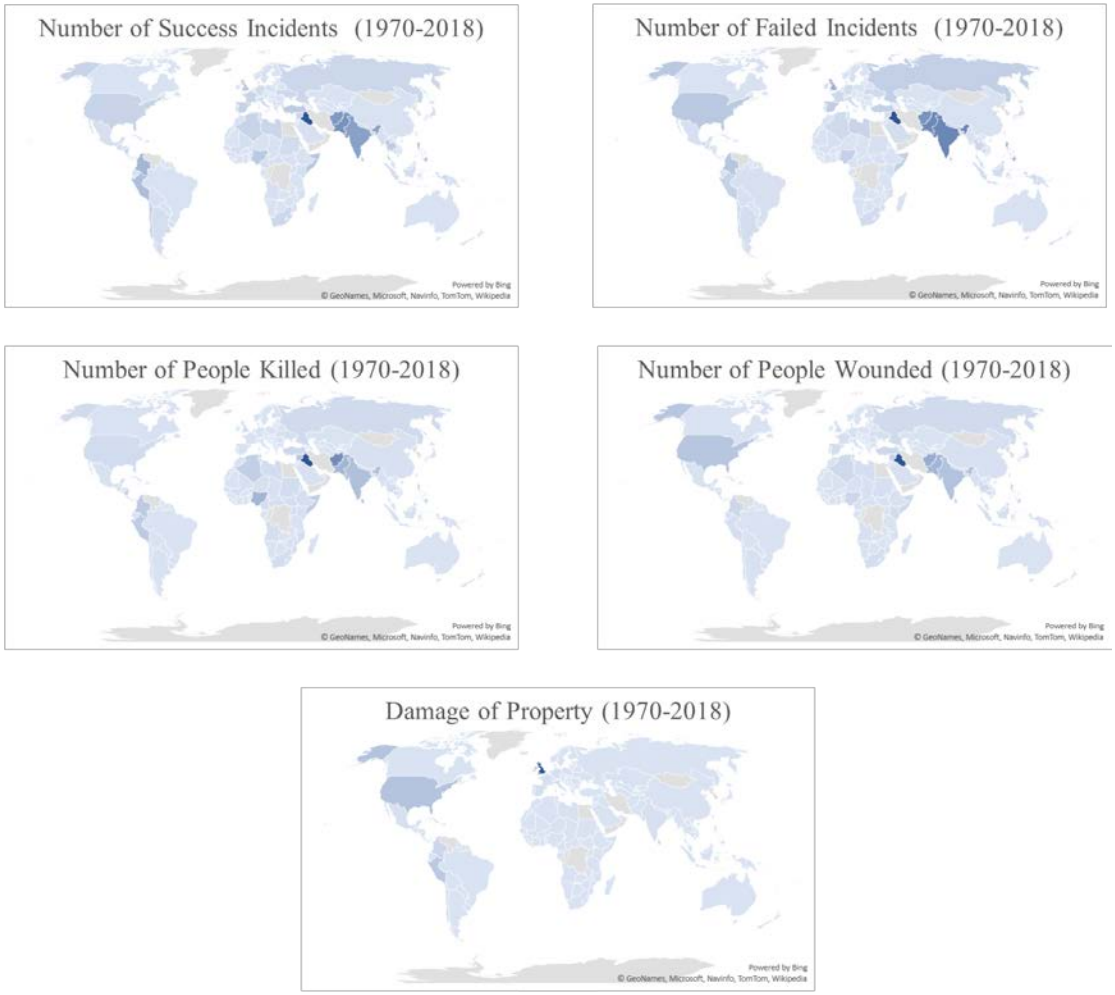

Figure 1: This figure presents the recorded terrorism incidents in GTD database - number of success incidents (NTI_1), number of failed incidents (NTI_2), number of killed people (DHP_1), number of wounded people (DHP_2), and total property damage (DP). The index is calculated as the sum of the index in the recorded time range, from 1970 to 2018. Countries and regions deep in blue color underwent more incidents or greater loss in this time period.

	NTI_1	NTI_2	DHP_1	DHP_2	DP
NTI_1	1				
NTI_2	0.797	1			

DHP_1	0.857	0.668	1		
DHP_2	0.760	0.563	0.814	1	
DP	0.035	0.036	0.008	0.016	1

Table 1: This table describes the correlation between five construction variables. Most of them are highly correlated, with the correlation efficient higher than 0.5. The correlation between DP and other variables is not strong due to zero values in the GDP database. In Figure 1, it is indicated that most of non-zero records on DP are focused on the UK and the US.

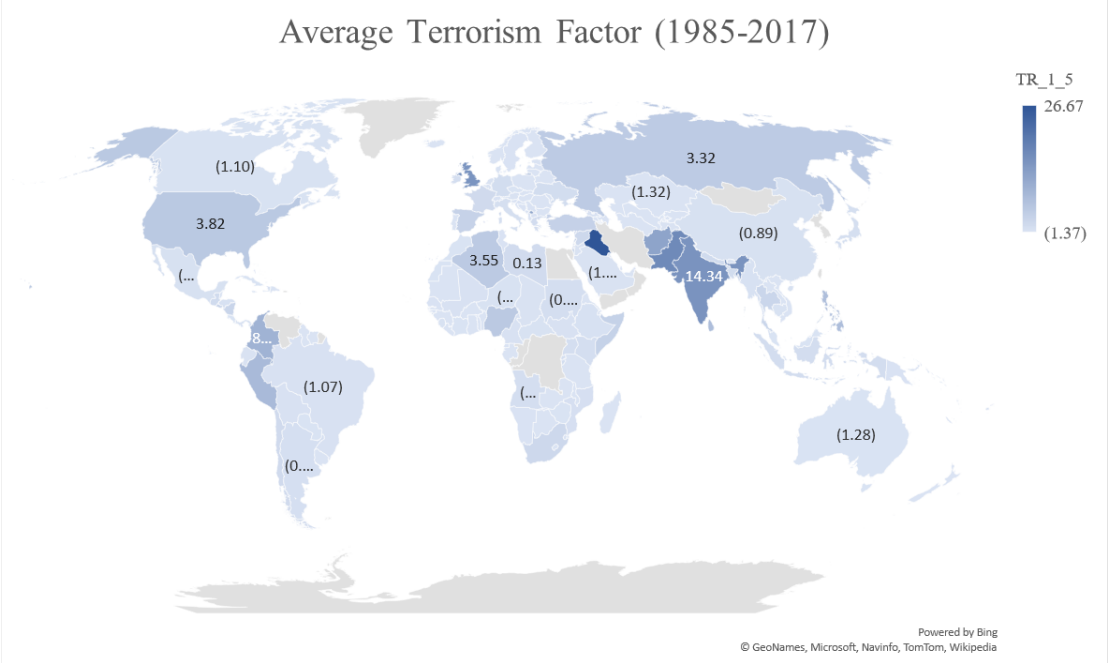

Figure 2: This figure presents the allocation of terrorism around the world. The level of terrorism is measured by the average $TR_{-1,-5}$ in the sample period from 1985 to 2017. When the level of terrorism is high, more terrorism incidents happen and more victims harmed in this country on average. Some countries are not included in our database, thus left blank in grey. Namely the average index could be negative because of the normalization.

B. Government capacity

There are many ways to measure different dimensions of government capacity. Aside from domestic credit to private sector as a share of GDP (a widely used indicator), we utilize the International Country Risk Guide (ICRG) Researchers Dataset (Table 3B) released by Political Risk Service (PRS) Group[2] and State Fragility Index (SFI) powered by the Fund for Peace. The ICRG dataset (Table 3B) provides one of the most well-known national political risk indices as a proxy for the situation of a country's political risk (Moser et al., 2008; Berggren et al., 2012; Hammoudeh et al., 2013). We calculate the "government quality" factor as the sum of corruption score, law-order score, and bureaucracy quality score. The SFI scores countries on both effectiveness

[2] ICRG: https://epub.prsgroup.com/index.php/products/icrg/researcher-dataset-icrg-t3b-political-risk

and legitimacy in four performance dimensions: Security, Political, Economic, and Social. A country's fragility is "closely associated with its state capacity to manage conflict, make and implement public policy, and deliver essential services, and its systemic resilience in maintain in system coherence, cohesion, and quality of life, responding effectively to challenges and crises, and sustaining progressive development."[3]

C. Authoritarianism and Democracy

We also combine different sources of data and criteria in this part. The Freedom House publishes an annual assessment of civil liberties and political rights for 195 countries and 14 territories worldwide, both of which are included as proxies for democracy. [4] The Polity5 database consists of six component measures that record key qualities of executive recruitment, constraints on executive authority and political competition.[5] We choose the institutionalized democracy and autocracy score from Policy5 as complements.

D. Political Violence and Coup d'état

This part is used for causal inference. The data on political violence is from Major Episodes of Political Violence (MEPV) dataset, which includes scores for international, civil and ethnic violence and warfare.[6] The data for coup d'état is from Center for Systemic Peace, Coups d'états (1946-2018), which includes successful, attempted, plotted, and alleged coup events reported in Keesings Record of World Events and other sources;

E. Cultural variables

Country-specific cultural variables used in this research include cultural segment code and 6 cultural dimensions proposed by Geert Hofstede. The culture segments are divided by the culture-specific feature, including tradition, history and religion. We define 5 cultural segments as follow [Figure 3]:

(1) East Asian cultural segment (Confucian cultural segment), including China, Japan, Korea, Korea, Singapore, Hong Kong and Taiwan

(2) South Asian cultural segment (Indian cultural segment), including India, Bangladesh, Myanmar, Nepal, Sri Lanka, Thailand, Laos and Cambodia

(3) Western cultural segment (Latin cultural Segment), divided into 3 sub-segments

Predominantly Catholic countries, including Italy, France, Belgium, Luxembourg, Austria, Ireland, Poland, Czech, Hungary, Slovakia, Lithuania, Croatia, Slovenia, Spain, Portugal, Liechtenstein, Monaco, SAN Marino, Malta and Andorra

Predominantly Protestant countries, including United Kingdom, United States, Australia, New Zealand, Denmark, Norway, Sweden, Iceland, Finland, Estonia and Latvia.

Countries with comparable Catholic and Protestant powers, including Germany,

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[3] SFI: https://fragilestatesindex.org/

[4] Countries are coded from 1 to 7, with 1 being the most free and 7 being the least free. (Freedom House. 2018. Freedom in the World, 1973-2018)
Download data: Edgell, Amanda B. 2018. "Stata Friendly Freedom House Data, 1973-2018." Available at www.acrowinghen.com/data.

[5] Polity 5: https://www.systemicpeace.org/polityproject.html

[6] MEPV: http://www.systemicpeace.org/inscr/MEPVcodebook2018.pdf

The Netherlands, Switzerland and Canada.
(4) Islamic cultural segment (Arab cultural segment), including Malaysia, Gabon, guinea Bissau, Cameroon, Uganda, Brunei, Indonesia, Pakistan, Bangladesh, Afghanistan, Iran, Iraq, Syria, etc. (45 countries and regions)
(5) Eastern European cultural segment (Slavic cultural segment), including Russia, Ukraine, Belarus, Romania, Moldova, Bulgaria, Serbia, Montenegro, Macedonia, Greece, Armenia and Georgia

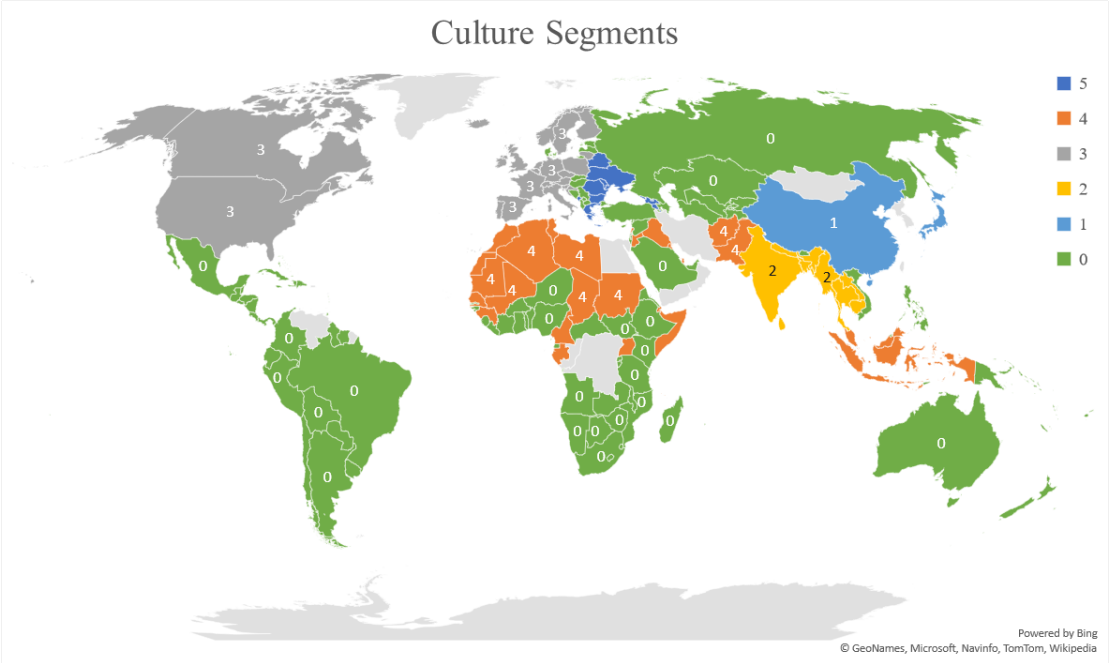


Figure 3: This Figures presents the distribution of different culture groups around the world. Compared with Figure 2, we find most region of interest with high terrorism index can be classified into one of the five culture groups. Namely, two peak of terrorism incident, Iraq and the South Asia, are both adjacent to more than one different culture types.

The 6-D model of national culture refers to 6 issues that society needs to come to term with in order to organize itself, including Power Distance, Individualism, Masculinity, Uncertainty Avoidance, Long-term Orientation and Indulgence. Each of them has been expressed on a scale that runs roughly from 0 to 100.[7]

F. Control variables

We control for 3 sets of other variables which might have effect on terrorism. The first set controls for a country's economic fundamentals, which includes region, income group tier, land area, GDP growth rate, GDP per capita, total population, population growth rate, and share of urban population. The second set controls for a country's "openness", including refugee population by asylum and origin, FDI net inflows and outflows, exports and imports as a share of GDP, and share of individuals using the Internet. The third set controls for income and expenditure of the government, which

[7] The 6-D model of national culture: https://geerthofstede.com/culture-geert-hofstede-gert-jan-hofstede/6d-model-of-national-culture/#content

includes claims on central government, customs and other import duties as a share of tax revenue, tax revenue as a share of GDP, military expenditure, and government final consumption. The data source is World Development Indicators compiled by World Bank[8]

We merge the 6 parts of variables mentioned above together to obtain the final panel, which consists of 182 countries' data from 1970 to 2018

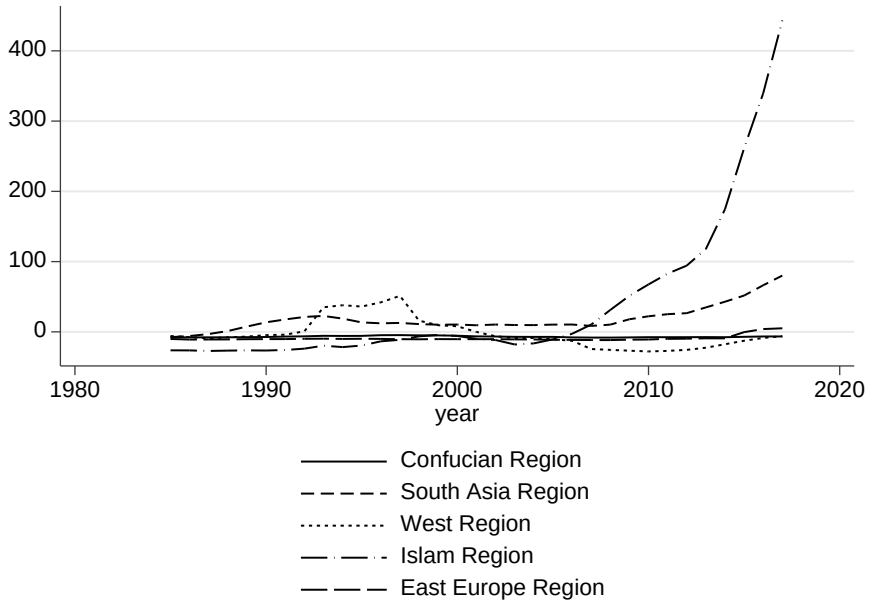


Figure 4: This figure describes the yearly $TR_{-1,-5}$ index for different culture groups. The yearly index is measured by the sum of all countries in the culture region. In the period of interest, the West Region has reached a peak of terrorism attack in 1990s, and after 2000 the index declined until recently, probably due to the anti-terrorism effort. The Islam Region kept the lowest index of all five-culture type, but in the new century the index sored dramatically. During the whole period, the index of South Asia Region is relatively high, while Confucian Region maintained the most stable level around zero.

[8] World Development Indicators: http://datatopics.worldbank.org/world-development-indicators/

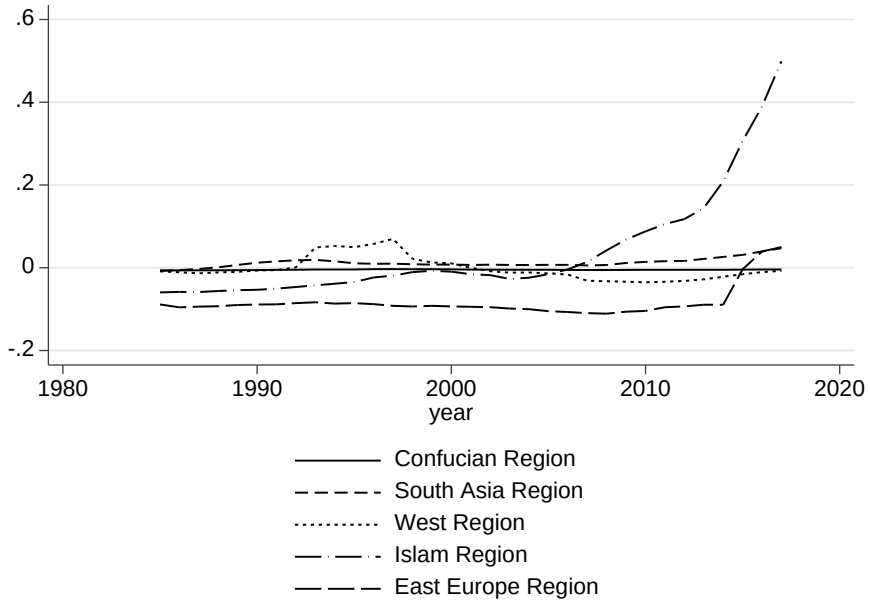


Figure 5: This figure repeats Figure 4 for comparison purpose and describes the terrorism index as an average value for every 1,000,000 population. Most conclusions derived in Figure 4 still hold, except the gap between the index for South Asia and others is narrowed, for the large population scale in this region.

III. Estimating Equations and Empirical results

A. OLS Estimates

We begin by estimating the relationship between the government capacity, democracy and the terrorism incidents. Our baseline estimating equation is:

$$(1)\ Terrorism\ \ Incidence_{i,t} = \alpha + \boldsymbol{targeted\ \ factors}_{i,t}{}'\boldsymbol{\beta_1} + \boldsymbol{X^1}_{i,t}{}'\boldsymbol{\gamma_1} + \boldsymbol{X^2}_{i,t}{}'\boldsymbol{\gamma_2} + \varepsilon_{it}$$

where *i* indexes each nation, t indexes years. The variable Terrorism Incidence is a factor which we constructed to represent the average terrorism degree in a given time, given nation(the way to construct Terrorism Incidence is mentioned before), which is expected to captured the relative fierce degree of terrorism attacks from nation to nation.

The Vector ***targeted factors*** include the factors we are interested in, in this part they are variables that describe the government capacity and democracy of nations. For government capacity, we use Domestic credit to private sector and the factual measurement of governments behavior in our regression[9]. For democracy, we employ the Political Rights, Civil Liberties variables in Freedom House database and Institutionalized Democracy, Institutionalized Autocracy in Political Regime

[9] The factual measurement is calculated by adding the corruption variable, the law order variable, the bureaucracy quality variable in ICRG database. This variable is called "government quality" in our regression. The bigger the value, the better the government quality is.

Characteristics and Transitions Database. Our coefficient of interest is $\boldsymbol{\beta_1}$, the estimated relationship between the target factors and the terrorism.

The Vector $\boldsymbol{X^1_{i,t}}$ denotes a set of Economic Fundamental variables which are used to describe the general picture of the nations in a given time. We treat them as necessary control variables in our regression since the economic situation plays an important role in every aspect in term of terrorism. The specific variables we use include the GDP, population, land area, the growth rate of them(expect the land area) and so on in World Bank database.

The Vector $\boldsymbol{X^2_{i,t}}$ denotes the openness of nations. Above the economic fundamental variables, the openness of nation is also a set of control variables which are not to be neglected, since the refugees, exports, imports, foreign populations, Internet are often seen having direct relationship with the terrorist attacks. The specific variables we use include the Refugee population, Foreign direct investment(FDI), Exports of goods and services, Imports of goods and services, Individuals using the Internet in World Bank database

Table 2- OLS Estimates of the Targeted factors effect to Terrorism incidents

Dependent variable: Terrorism incidents	Government quality	Domestic credit to private sector	Civil Liberties	Institutionalized Democracy	Institutionalized Autocracy
Estimated coefficient	-0.30176	-0.00861	1.734041	0.62128	-0.62105
	[0.10384]	[0.00380]	[0.39182]	[0.12706]	[0.12107]
p-value	0.004	0.024	0.000	0.000	0.000
Economic Fundamental controls	Yes	Yes	Yes	Yes	Yes
Nation openness controls	Yes	Yes	Yes	Yes	Yes
Individual controls	Yes	Yes	Yes	Yes	Yes
Geography controls	Yes	Yes	Yes	Yes	Yes
Numbers of observations	2177	2177	2177	2177	2177
Number of nations	182	182	182	182	182
Number of years	20	20	20	20	20
R-squared	0.22	0.22	0.22	0.22	0.22

*The number in square brackets is robust standard errors. The p-value is reported below the coefficient

Estimates of equation(1) are reported in Table2. We list the statistically significant variables in the header of the Table1 (these variables come from the target variables we mentioned before). For the first part, we interpret the coefficient of the Government capacity in the formula: The estimated coefficient for Government quality and Domestic credit to private sector is negative. The outcome is rather intuitive: Better Government capacity will result in less fierce terrorist attacks in average. When we talk about lower corruption, higher law order, higher bureaucracy quality, we also mean a lower loss in terrorism incidents. For the second part, the coefficient of the civil liberties and Institutional democracy is positive, which means that the degree of democracy, whether in civil and institutional level, may mean more terrorism loss. The relationship between the terrorism and democracy is discussed in the Literature part, and our conclusion in OLS regression part shows that more democracy in average would increase the terrorism loss. A stronger evidence is that, the coefficient of Institutional Autocracy is significant negative. In the OLS we can see that the factual relationship between democracy and terrorism is positive: If you are a terrorist, which country would you prefer, the democracy one or the Autocracy one? It seems that you would go to the democracy for some particular reasons.

For a further analysis, we also consider the cross terms in our OLS part. The relationship between the Government capacity and the degree of Democracy is also a hot discussed topic in literature, and we are also interested in the cross terms of them. To be specified, our cross term estimating equation(2) is below:

$$(2)\ Terrorism\ \ Incidence_{i,t} = \alpha + \beta_1 * targeted\ \ factors_{i,t} + \boldsymbol{C_{i,t}}'\boldsymbol{\gamma} + \boldsymbol{X^1}_{\boldsymbol{i,t}}'\boldsymbol{\gamma_1} + \boldsymbol{X^2}_{\boldsymbol{i,t}}'\boldsymbol{\gamma_2} + \varepsilon_{it}$$

The Vector $\boldsymbol{C_{i,t}}$ denotes the possible cross terms in our model. We arrange two model to test the effect of the cross-term: For the first part, we base on the government quality variable and multiply it to the democracy variables and add them to our formulas. For the first part, we base on the Domestic credit to private sector variable and multiply

it to the democracy variables and add them to our formulas. We do two OLS regressions to see each effect of the cross-term.

Table 3- OLS Estimates of the Cross-term effect to Terrorism incidents[10] (1)

Dependent variable: Terrorism incidents	Govquali_civilr	Govquali_democ	Govquali_autoc
Estimated coefficient	-0.5390632	-0.0859479	0.0839416
	[0.247462]	[0.0402568]	[0.0381676]
p-value	0.033	0.013	0.018
Economic Fundamental controls	Yes	Yes	Yes
Nation openness controls	Yes	Yes	Yes
Individual controls	Yes	Yes	Yes
Geography controls	Yes	Yes	Yes
Numbers of observations	2177	2177	2177
Number of nations	182	182	182
Number of years	20	20	20
R-squared	0.25	0.25	0.25

*Target factors' coefficients and significance hold and not change much

Table 4 - OLS Estimates of the Cross-term effect to Terrorism incidents[11] (2)

Dependent variable: Terrorism incidents	Cred_Civil liberties	Cred_Democracy	Cred_Autocracy
Estimated coefficient	-0.02599	-0.00369	0.00414
	[0.01197]	[0.00220]	[0.00217]
p-value	0.03	0.095	0.057
Economic Fundamental controls	Yes	Yes	Yes
Nation openness controls	Yes	Yes	Yes
Individual controls	Yes	Yes	Yes
Geography controls	Yes	Yes	Yes
Numbers of observations	2177	2177	2177
Number of nations	182	182	182
Number of years	20	20	20
R-squared	0.24	0.24	0.24

*Target factors' coefficients and significance hold and not change much

We report the statistically significant variables in Table2 and Table3. To conclude the result, we can find that there is an interesting phenomenon: if the degree of civil liberties and democracy is given, a better government is definitely good news to residents[12], since the better the government capacity, the lower terrorism loss they will face. However, in autocracy, if the government capacity gets larger, the possible terrorism loss would increase[13].

We can tend to understand this in an intuitive way: In democracy, a well-serving government may result in less inner rebellions which may arise from poor life or crimes

[10] notice that Govquali_civilr = government quality*Civil Rights; Govquali_democ = government quality*Democracy; Govquali_autoc = government quality*Autocracy

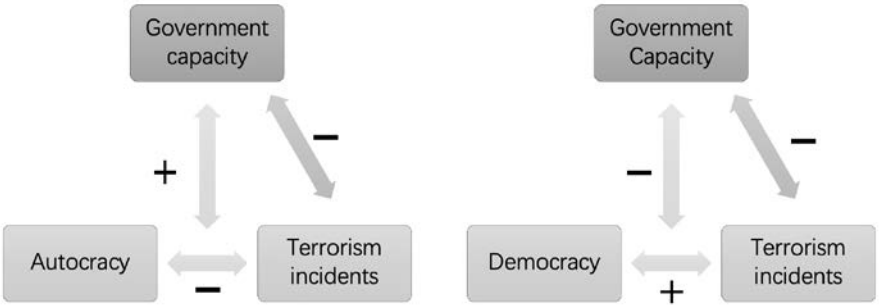
[11] notice that 'Cred' here represent Domestic credit to private sector.

[12] we can see that in each table, the coefficient of the first two cross-term variable is negative, which means that when we hold civil liberties, democracy, higher government capacity leads to less terrorist attacks.

[13] we can see that in each table, the coefficient of the third cross-term variable is positive, which means that when we hold civil liberties, democracy, higher government capacity leads to more terrorist attacks.

and less outer attacks. In this scene, high welfare democracy states and democracy states with sound policy system would face less terrorist attacks. In autocracy, higher government capacity may lead to more terrorism arising from the high pressure, or may induce more terrorist infiltration. In this scene, a highly pressured regime may face more terrorism incidents. Though the real reason behind this result may not totally follows the intuition, it is helpful for us to go a step further in understanding the effect of these variables.

We conclude our finding in fundamental regression into Graph1:



Graph 1 The relationships between targeted concepts

III. Estimating Equations and Empirical results

B. IV Estimates

Our main outcome from the simple OLS estimates is that, under our specification model (1), after controlling for country and year fixed effect, improvement in government capacity (measured by government quality and domestic credit to private sector) is related to less fierce terrorist attacks on average. Compared to autocracy (measured by institutionalized autocracy), countries under democracy (measured by institutionalized democracy, civil liberty and political rights) are more easily suffered from terrorism incidence.

The OLS estimates might be biased because of endogeneity. Firstly, the root of terrorism is extremely complicated. Cultural, historical and religious factors, which are difficult to quantitatively measure and control, can be strongly related to both terrorism factors and our target factors, resulting in omitted variable bias. An easy challenge is that some latent variable in Islam culture determines the political pattern in today's Middle East, while ethnical and religious conflicts, which are common in Islam cultural segments, might also explain the high frequency of terrorist attacks. Secondly, there might be reciprocal causation problem. We only point out the possible causal effect of government capacity and democracy on terrorism. It is also likely that high terrorism incidents can bring an disorder and excess burden on government operation. Powerful terrorism groups might engage in bribery, collusion and other forms of "reciprocal" interactions with government officials, giving rise to corruption of government capacity. Using events on counties' polity change, we construct a set of dummy variables as instruments for our target factors. The Autocratic Breakdown and Regime Transitions Dataset (GWF) constructed by Joseph Wright and Erica Frantz records the regime types

for all countries and years. The regime type are divided into several categories, including democracy, Military, Warlord, Foreign-occupied, Oligarchy, Monarchy, Personal, Party and their mixes, based on polity characteristics. We combine parts of them together to obtain 4 basic categories: Democracy, Military, Oligarchy, and Party. Table 5 shows summary statistics. Prior refers to the polity category before the current polity period.

Table5 GWF Regime Type for Current and Prior Polity Period

GWF Regime Type	Current		Prior	
	Freqency	Percent	Freqency	Percent
None (Stay the same)	0	0.00	1468	43.59
Democracy	1594	47.33	269	7.99
Military (including warlord and foreign-ocupied)	182	5.40	495	14.70
Oligarchy (including monarchy and personal)	765	22.71	541	16.06
Party	479	14.22	299	8.88
Millitary-Oligarchy	83	2.46	190	5.64
Party-Oligarchy	155	4.60	72	2.14
Party-Military	34	1.01	34	1.01
Party-Military-Oligarchy	76	2.26	0	0.00
Total	3368	100	3368	100

There are nearly half (43.59) of the country-year in our sample that don't witness a polity change. The other half went through transformations of regime category. Compared to prior regime type, more countries transform into Democracy-category and Party-category, and there are less countries within the military-category.

We build dummy variables by pair prior regime type with current regime type. For example, dummy_Democracy equals 1 for country-years which are within the Democracy-category through our lens of years. Dummy_Millitary_Democracy equals 1 for country-years which are currently within the Democracy-category but belonged to the Millitary Democracy in the prior polity period, i.e. the currently Democratic regime is transformed from the Millitary regime. For mixed types, related dummy variables are all set to be 1. In all, there are 16 polity-change dummies: Democracy, Military, Party, Oligarchy, and the mutual transformation between them.

Our main idea to construct these dummies is to capture the discontinuity effect when a countries' polity or regime types change. The structural breaks between different categories have few direct relations with terrorism incidence. (Most countries went through transformation of regimes because of coup d'état or sanctions by other countries). However, the change in regime type does bring huge discontinuity to government capacity as well as institutionalized democracy or autocracy. The results of first stage regression are shown in Table 6. Columns are 6 targeted factors. Most of the dummies we construct have highly significant effect on both government capacity and democracy or autocracy. The direction of the impact also fits with literature and intuition. Here are a few other interesting results: countries that stays in the

Democracy–category show higher level of government quality on average. This is also true for countries that transform into the Democracy-category. However, for countries which transform from Democracy-category to the other 3 “less democratic” categories, the change in government quality is not significant.

Table 6 and Table 7 displays our IV estimation of the effect of targeted factors on terrorism factors, with two additional measure of democracy added in Table 7.

The estimated coefficient of government quality remains negative and highly significant. Compared to Table 7, the OLS coefficient understates the hinder effect of government quality by almost 60%. However, the coefficient of domestic credit to private sector is no longer significant.

As for democracy/autocracy, the IV estimates shows that the mainly stimulating effect of democracy should be attributed to higher political rights, while the OLS estimates put more emphasis on civil liberties, (which is also significant in IV estimation but with negative sign). The counteraction of this two elements result in insignificant coefficient of the overall democracy factor. The coefficient for the autocracy factor remains highly significant and negative, with a 28% higher value than the OLS estimation.

Compare OLS estimation with IV estimation, we conclude that both government capacity and democracy have significant effect on terrorism. But the different dimensions of democracy might have heterogeneous effects, which is worth our future investigation.

Table 6 First Stage of IV Regression

Dependent variable	Government Quality	Domestic credit to private sector	Political Rights	Civil Liberties	Institutionalized Democracy	Institutionalized Autocracy
Democracy	3.0387***	21.4315***	-2.0542***	-1.7766***	4.0242***	-3.1570***
	[0.2509]	[3.2210]	[0.1425]	[0.1175]	[0.2373]	[0.1965]
Military	-1.0754***	10.7538	0.4553	0.1223	-1.257***	2.1656**
	[0.5166]	[6.8570]	[0.3996]	[0.3394]	[0.3133]	[0.023]
Oligarchy	0.3474	8.2074***	1.0109***	0.6950***	-2.4916***	3.2712***
	[0.2633]	[2.8430]	[0.1393]	[0.1285]	[0.2401]	[0.2500]
Party	1.3745***	9.7287***	0.0973	-0.0282	-.6704***	0.2477
	[0.1880]	[2.3587]	[0.1353]	[0.1061]	[0.2333]	[0.2179]
Military - Democracy	0.4148**	13.1329***	-0.7227***	-0.3247***	2.2141***	-1.315***
	[0.1894]	[1.8831]	[0.1191]	[0.0942]	[0.2123]	[0.1460]
Oligarchy - Democracy	0.4755***	10.0526***	-0.9851***	-0.7002***	1.9217***	-1.2286***
	[0.1611]	[1.7248]	[0.1066]	[0.0815]	[0.1888]	[0.1318]
Party - Democracy	1.5867***	-3.0563	-1.3794***	-0.9331***	2.9969***	-1.7052***
	[0.2090]	[2.2536]	[0.1335]	[0.1024]	[0.2170]	[0.1715]
Democracy - Military	-0.4070245	11.8023***	1.0198***	0.2875*	-.9752**	0.4367
	[0.3383]	[3.1620]	[0.2028]	[0.1609]	[0.4578]	[0.4552]
Democracy - Oligarchy	-0.2988	3.8217*	1.0157***	0.5489***	-2.4908***	1.2969***
	[0.2555]	[2.0993]	[0.1665]	[0.1449]	[0.2603]	[0.2766]
Democracy - Party	1.7067***	-2.0060	-0.1456	-0.2928**	-0.1757	-0.3544
	[0.2600]	[1.9684]	[0.1726]	[0.1394]	[0.3300]	[0.2843]
Military- Oligarchy	1.0423***	3.8705**	0.5865***	0.2677*	-1.0344***	1.0142***
	[0.3142]	[3.7885]	[0.1849]	[0.1381]	[0.3593]	[0.3006]
Oligarchy - Military	-1.7796***	-6.2931*	0.7985***	0.4469**	-1.2980***	1.7005***
	[0.2998]	[3.7885]	[0.1968]	[0.1892]	[0.3960]	[0.3897]
Military - Party	0.3040	8.1337***	0.8762***	0.7484***	-1.4906***	2.5850***
	[0.3515]	[2.9464]	[0.1763]	[0.1312]	[0.3408]	[0.2817]
Party - Military	-1.2837***	-0.3834	0 .2621	-0.0241	0.3468	-0.6133
	[0.3709]	[2.7633]	[0.1717]	[0.1389]	[0.2856]	[0.3859]
Oligarchy - Party	1.3423***	11.6327***	0.2768	0.1765	-1.2830***	0.1123
	[0.3276]	[3.5619]	[0.1809]	[0.1744]	[0.3684]	[0.3826]
Party - Oligarchy	0.6903***	-1.1927	1.4407***	1.1362***	-3.003***	2.8526***
	[0.2788]	[1.8110]	[0.2768]	[0.1223]	[0.2223]	[0.2718]
Economic Fundamental controls	Yes	Yes	Yes	Yes	Yes	Yes
Nation openness controls	Yes	Yes	Yes	Yes	Yes	Yes
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes
Geography controls	Yes	Yes	Yes	Yes	Yes	Yes
Numbers of observations	2253	2253	2253	2253	2162	2162
Number of nations	182	182	182	182	182	182
Number of years	25	25	25	25	25	25
R-squared	0.74	0.70	0.74	0.76	0.81	0.73

Table 6 Second Stage of IV Estimation

Deprendent variable: Terrorism incidents	Government Quality	Domestic credit to private sector	Political Rights	Civil Liberties
Estimated coefficient	-0.8850***	-0.0308	1.6168***	-3.6248***
	[0.2303]	[0.0199]	[0.5018]	[0.8205]
p-value	0.000	0.122	0.001	0.000
Economic Fundamental controls	Yes	Yes	Yes	Yes
Nation openness controls	Yes	Yes	Yes	Yes
Individual controls	Yes	Yes	Yes	Yes
Geography controls	Yes	Yes	Yes	Yes
Numbers of observations	2253	2253	2253	2253
Number of nations	182	182	182	182
Number of years	25	25	25	25

Table 7 Second Stage of IV Estimation, Including Institutionaled Democracy and Autocracy

Deprendent variable: Terrorism incidents	Government Quality	Domestic credit to private sector	Political Rights	Civil Liberties	Institutionalized Democracy	Institutionalized Autocracy
Estimated coefficient	-0.4968**	-0.0151	4.5498***	-3.2706**	0.7228	-0.8249***
	[0.2041]	[0.0166]	[1.5203]	[1.4639]	[0.4789]	[0.2648]
p-value	0.015	0.362	0.003	0.025	0.131	0.002
Economic Fundamental controls	Yes	Yes	Yes	Yes	Yes	Yes
Nation openness controls	Yes	Yes	Yes	Yes	Yes	Yes
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes
Geography controls	Yes	Yes	Yes	Yes	Yes	Yes
Numbers of observations	2162	2162	2162	2162	2253	2253
Number of nations	182	182	182	182	182	182
Number of years	25	25	25	25	25	25

IV. Robustness Check

In this part, our intention is to give a robustness check to our baseline model in part III. The question is, is our model robust in the changing variable definition, in the changing time period, in the changing nation involved. Our test will be done in the following three parts.

A. Different but similar data source

For our control variables which are used in baseline regression, we consider to replace the ‘openness’ variables with a different system of measuring the openness and globalization. Originally the ‘openness’ variables come from World Bank Dataset, and include foreign direct investment(in), foreign direct investment(out), goods export, good import. We use another widely accepted dataset, KOF globalization index, with is frequently used in policy and economy analysis, to be our new ‘nation openness controls’. In KOF dataset, there are KOF Economic Globalization Index, KOF Trade Globalization Index, KOF Financial Globalization Index, KOF Social Globalization Index, KOF Interpersonal Globalization Index, KOF Informational Globalization Index, KOF Cultural Globalization Index, KOF Political Globalization Index, in all 8 variables to describe the ‘openness’.

Our robustness check OLS result is shown in Table1. Comparing the two OLS

results, we can conclude that it is safe to say that our baseline regression is robust under the different measurement of the 'openness' definition.

Table 8 – robustness check: Change the data source of openness

Dependent variable: Terrorism incidents	Baseline model	openness2 model
Estimated coefficient of gov_quality	-0.197*	0.00086
	(0.09640)	(0.07570)
Estimated coefficient of cred_priv	-0.0108**	-0.00708*
	(0.00349)	(0.00280)
Estimated coefficient of Political Right	0.10600	0.05500
	(0.16700)	(0.17900)
Estimated coefficient of Civil Liberties	1.591***	1.399***
	(0.37800)	(0.31800)
Estimated coefficient of Democracy	0.640***	0.627***
	(0.13100)	(0.13400)
Estimated coefficient of Autocracy	-0.644***	-0.637***
	(0.12600)	(0.13000)
Nation openness controls	Yes	-
Nation openness2 controls	-	Yes
Economic Fundamental controls	Yes	Yes
Individual controls	Yes	Yes
Geography controls	Yes	Yes
R-squared	0.20	0.21

*openness2 model refers to the model changing the data source of openness based on baseline model. The new openness control variables are included in 'Nation openness2 controls', and the origin openness control variables are Included in 'Nation openness controls'

B. Different time range

We are also interested in the performance of the model under different time range, especially when considering many incidents that may structurally change the feature of terrorism incidents. For example, there is really big gap between 9.11.2001 when bin Laden successfully shocked the world by his tragic attack on the World Trade Center. We set the 2001 as the time breakpoint and do regression on both sides to see whether there is some difference between the two-time period. Our OLS result is shown in Table2:

Table 9 – robustness check: Change the time range

Dependent variable: Terrorism incidents	Origin model	Before2001 model	After2001 model
Estimated coefficient of gov_quality	-0.197*	-0.188	-0.196
	(0.0964)	(0.146)	(0.107)
Estimated coefficient of cred_priv	-0.0108**	0.0096	-0.0120**
	(0.00349)	(0.00888)	(0.00369)
Estimated coefficient of Political Right	0.106	-0.0339	0.0087
	(0.167)	(0.198)	(0.205)
Estimated coefficient of Civil Liberties	1.591***	0.31	1.915***
	(0.378)	(0.315)	(0.46)
Estimated coefficient of Democracy	0.640***	0.0582	0.727***
	(0.131)	(0.0397)	(0.153)
Estimated coefficient of Autocracy	-0.644***	-0.0511	-0.731***
	(0.126)	(0.0393)	(0.146)
Economic Fundamental controls	Yes	Yes	Yes
Nation openness controls	Yes	Yes	Yes
Individual controls	Yes	Yes	Yes
Geography controls	Yes	Yes	Yes
Numbers of observations	2177	284	1893
Number of nations	182	182	182
Number of years	20	4	16
R-squared	0.20	0.24	0.21

*Before2001and After2001 model refer to the model changing the time range (before and after 2001) based on baseline model

The result is needed to interpret carefully. It is obvious that after 2001, our model holds in both the coefficient and the significance to a large extent. However, there is no evident that our model can survive before 2001. Data may be the reason since before 2001 there is only 284 sample points and it is a rather small dataset for so many regressors. It is possible that if we have enough data before 2001, we can draw a similar conclusion with the baseline model. What's another possible reason is that after 2001, the government capacity and democracy's effect has just started off. The logic is, just after bin laden showed world the power of terrorism, the world realized the problem and then intentionally increased the government capacity to deter the terrorists. To the terrorists, they may find that it is easier to attack a more democracy-like nation.

Though the assumption above sounds crazy in some level, what we can conclude here is that our model holds after 2001, and we'd better only use our model in the time period after 2001.

C. Different countries involved

In the third part, we would consider the region heterogeneity in our regression model. We can assume that region heterogeneity may be a very unstable features and in each nation the result would vary to a large extent. We try to divide the 182 nations into two group that inside each group, the heterogeneity is not so much to influence the final result. A good partition is OECD or not. OECD stands for 'Organization for

Economic Co-operation and Development'. It involves 38 Market Economies that bear similar political goal, and meanwhile these nations' economy also mostly developed to a relatively high level. We want to test whether our result will hold. The OLS result is shown in Table3:

Table 10– robustness check: Change the nation range

Dependent variable: Terrorism incidents	Origin model	Not OECD model	OECD model
Estimated coefficient of gov_quality	-0.197*	-0.479**	0.238*
	(0.0964)	(0.175)	(0.113)
Estimated coefficient of cred_priv	-0.0108**	-0.0285***	0.00802***
	(0.00349)	(0.00655)	(0.00231)
Estimated coefficient of Political Right	0.106	-0.129	0.908
	(0.167)	(0.198)	(0.499)
Estimated coefficient of Civil Liberties	1.591***	1.512***	1.319*
	(0.378)	(0.449)	(0.534)
Estimated coefficient of Democracy	0.640***	0.602***	-0.311
	(0.131)	(0.124)	(0.172)
Estimated coefficient of Autocracy	-0.644***	-0.598***	-1.583
	(0.126)	(0.116)	(0.914)
Economic Fundamental controls	Yes	Yes	Yes
Nation openness controls	Yes	Yes	Yes
Individual controls	Yes	Yes	Yes
Geography controls	Yes	Yes	Yes
Numbers of observations	2177	1584	593
Number of nations	182	144	38
Number of years	20	20	20
R-squared	0.20	0.21	0.27

*Not OECD and OECD model refer to the model changing the nation range (is or not OECD nation) based on baseline model

A similar problem arises: the non-OECD nations seem to fit the baseline model well, but the OECD nations seem to run out of way. We can notice that OECD nations' sample points are rather small compared to the non-OECD. The same with the time range test we finished before, the small sample reveals a deviation from the baseline. To combine the two results in time range test and nation range test, probably we can blame the lack of sample point when it seems not robust under some scene. Further tests are needed to study the real reason behind the not robust phenomenon. There may exist two stories: one is just lacking data; another is structural change in the world.

What we can conclude here is, our model is still robust inside the non-OECD nations.

V. Conclusion

In our paper, we find the estimated coefficient for Government quality and Domestic credit to private sector is negative while the relationship between the terrorism and democracy is positive. The results confirms to previous researchers. (Eubank and Weinberg, 1994, 1998, 2001; Hendix, 2014)

We also find in democracy, better government capacity can be translated into lower

terrorism loss while in autocracies the government capacity gets larger, the possible terrorism loss would increase. The result also follows Sandler's model (1983) and confirms to Eyerman's theory (1988). High state capacity will increase cost of illicit activities while also increase grievance of people. In democratic countries, price of terrorism is comparatively low and satisfaction level of people is high. So with decreasing marginal effect, the positive effect of higher terrorism price will dominate negative effect of lower satisfaction. And the story is reversed in authoritarian countries and negative effect of stronger state is exerted.

IV estimation verified that the estimations of OLS are effective, though IV emphasis more on political right while OLS emphasis more on liberty.

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