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Résumé:

Cet article analyse l'influence du terrorisme sur la volatilité de la politique budgétaire dans les pays en développement. En faisant usage d'un panel de 66 pays sur la période 1970-2012, nous observons que l'augmentation du nombre d'attaques terroristes augmente la volatilité de la composante discrétionnaire de la politique budgétaire. Par ailleurs, l'analyse montre que les dépenses d'investissement sont plus sensibles aux attaques terroristes que les dépenses de consommation. Nous nous intéressons par la suite au rôle des règles budgétaires qui semblent réduire l'effet du terrorisme sur la volatilité de la politique budgétaire. Les résultats obtenus sont robustes à la causalité inverse, le biais d'endogénéité et la présence d'un éventail large de variables explicatives. Cette recherche complète et étends la littérature existante en montrant que le terrorisme augmente substantiellement l'incertitude qui entoure la conduite de la politique budgétaire.

Mots Clés: Terrorisme, politique budgétaire, règles budgétaires

Abstract:

This paper investigates the effect of terrorism on fiscal policy volatility in developing countries. Using panel data analysis of 66 countries from 1970 to 2012, we find that an increase in the number of terrorist incidents raises the volatility of the discretionary component of fiscal policy. In addition, the analysis shows that investment is more responsive to terrorist attacks than consumption. We then turn to the role played by fiscal rules which appears to reduce the effect of terrorism on fiscal policy volatility. Our results are robust to reverse causality, endogeneity bias and the presence of various controls. This paper complements and extends the previous literature by providing the evidence that terrorism substantially increases the uncertainty surrounding the conduct of fiscal policy in developing countries.

Key words: Fiscal policy; Terrorism; Fiscal rules

1. Introduction

In 2013, a total of 9,707 terrorist attacks occurred worldwide, resulting in more than 17,800 deaths and more than 32,500 injuries (START[1], 2013). The consequences of terrorism are particularly severe in developing countries which are more vulnerable to external and domestic shocks. Although there is a long tradition in the economic profession to assess the economic consequences of conflicts, terrorism has still received little attention. However, the 2001 terrorist attacks triggered a new wave of studies aiming to assess the economic cost of terrorism. In this line, Gupta et al (2004) highlight the fiscal consequences of terrorism in low and middle income countries. Their findings show that terrorism is associated with lower tax revenues, higher government spending on defense and changes in the composition of government spending. Recently, Drakos and Konstantinou (2014) show that terrorism significantly increases the subsequent trajectory of public order and safety spending in European countries. However these studies fail to address the effect of terrorist incidents on the uncertainty surrounding the conduct of fiscal policy.

In this study, we explore the potential effects of terrorism on the volatility of the discretionary component of fiscal policy in developing countries. In fact terrorism attacks raise the uncertainty on both local and foreign investments, deteriorate business climate and drive out tourists and potential revenues (Abadie and Gardeazabal, 2008; Bandyopadhyay et al, 2014). Since tax revenues are likely to be affected by the level of both domestic and foreign investment, terrorism may result in greater fiscal instability. Likewise, in response to terrorist attacks, governments increase public spending on homeland security. This comes at the expense of fiscal stability because terrorism negatively affects the tax base and lowers the efficiency of tax administration (Gupta et al, 2004; Bloomberg et al, 2004). In addition terrorist incidents can undermine consumer and investor confidence. This may reduce incentives to spend or invest. The uncertainty associated to consumption and investment behavior will result in swings among different fiscal policies, especially if the polarization of social preferences is high (Woo, 2011).

The contribution of this paper is threefold. (i) We provide empirical evidence of the relationship between terrorism and fiscal policy volatility on a panel of developing countries. (ii) We propose an identification strategy to deal with the issue of endogeneity and

[1] National Consortium for the Study of Terrorism and Responses to Terrorism.

measurement error in addressing the effect of terrorism on fiscal policy. We build upon the existing literature on the determinants of conflicts in order to provide a source of exogenous variation for terrorist incidents (see Miguel et al, 2004; Hsiang, Burke and Miguel, 2014). We argue that terrorism is more likely to occur in countries characterized by scarcity of economic resources due to long lasting economic shocks and higher initial level of conflict. Specifically, we build our instrument of terrorist incidents by multiplying the initial level of terrorism in a specific country by the variation in rainfall. Furthermore, we check the robustness of our findings by using an alternative identification approach that exploits the change in state's position toward the US-led liberal order as a source of exogenous variation for terrorist attacks. (iii) We test the effectiveness of fiscal rules in reducing the impact of terrorism on fiscal policy volatility. This is of great interest because there is a controversy about the effectiveness of fiscal rules in achieving fiscal stabilization in developing countries

Using a sample of 66 developing countries spanning the period 1970 to 2012, the paper leads to the following findings: (1) terrorism is associated with the increase of fiscal policy volatility in developing countries. (2)Disaggregation by type of spending suggests that the investment volatility is more affected by terrorism shocks than consumption volatility. (3) The effect of terrorism on fiscal volatility is lower in countries which have adopted a higher number of fiscal rules.

The structure of the article is as follows: Section 2 sets out the methodology used to identify the effect of terrorism on fiscal volatility. Section 3 discusses the results and performs the robustness checks. Section 4 investigates the role of fiscal rules in dampening the effect of terrorism on fiscal volatility and Section 4 offers conclusions.

2. Empirical analysis

This section is articulated around three main areas. First, we describe how terrorism and fiscal policy volatility are measured. Second, the econometric model is described. Finally, we discuss the identification strategy used in order to uncover the causal effect of terrorism on fiscal volatility.

2.1. Data on Terrorism and fiscal policy volatility

2.1.1. Terrorism incident dataset

Terrorism data used in this paper are drawn from the Global Terrorism Database-GTD hereafter- which is maintained by the National Consortium for the Study of Terrorism and Responses to Terrorism (START) based at the University of Maryland.[2] The START uses various sources for data collection including media articles, unclassified documents, electronic news archives, existing data sets, books and legal documents. The GTD records incidents of terrorism from 1970 to 2012 for over160 countries. Terrorism is 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***.

In order to be considered as a terrorist incident, the following conditions should be satisfied: (1) the incident must be intentional: the result of a conscious calculation on the part of a perpetrator. (2) The incident must entail some violence or threat of violence, including violence against property or/and against people. (3) The perpetrator of the incident should be sub-national actors. Therefore, GTD does not include acts of state terrorism. In addition, the action undertaken should be outside the context of legitimate warfare activities. It is worth mentioning that GTD records both national and transnational terrorism incidents. [3] The GDT also reports other information like the day, month and year of the terrorist incident, the duration of the incident, the incident location, the type of attack, the type of weapon used, the target and perpetrators (if known), total number of fatalities.

In this paper, we focus only on the frequency of terrorist attacks. Therefore, we computed the number of terrorist incidents by country and by year. Since our main focus is on developing countries, we use a final sample of 66 developing countries covering the period 1970-2012. A brief look at the data suggests that the average number of attacks per country over the entire period stands at 8. The minimum number of terrorist incidents is 1 while the maximum recorded is 275 (see Table 1).

[2] Data are available free of charge at http://www.start.umd.edu/gtd/

[3] Note that this is a plus compared to ITERATE (International Terrorism: Attributes of Terrorism Events) which record only transnational terrorism. The list of countries is provided in appendix.

2.1.2. Measuring fiscal policy volatility

To build the measure of fiscal policy volatility, we focus on government spending. As suggested by Woo (2011), government spending is a policy variable that is influenced by policy decisions and widely used in the implementation of government policy. Another justification often put forward is that unlike government spending, tax revenue and budget deficit are outcome of government policies[4]. Moreover cross-country data on government spending are more available and less subject to measurement error than tax revenues data. There are two ways to measure the volatility of fiscal policy (Woo, 2011; Cevik and Teksoz, 2014). The naïve approach consist on using the standard deviation of the annual growth rate of fiscal spending/tax revenue/primary budget balance, for the period of study. Then, it is worth mentioning that this method does not isolate the exogenous component of policy changes. However as shown by Woo (2011) and Agnello and Souza (2014), it is important to distinguish fiscal volatility from adaptability to sudden changes of economic conditions because the latter is more likely to stabilize the economy while the former may discourage growth.

In this paper, we are interested in the discretionary component of fiscal policy that does not represent reaction to changes in economic conditions or reflect exogenous changes in political preferences. Therefore, following Fatas and Mihov (2006), Woo (2011) and Agnello and Souza (2014), we estimate the subsequent model for each of the countries for the entire time span:

$$\Delta\log(G_{it}) = \alpha_i + \beta_i\Delta\log(G_{it-1}) + \gamma_i Growth_{it-1} + \delta_i X_{it} + \tau_i trend + \varepsilon_{it} \qquad (1)$$

Where G_{it} is the real general government expenditure, $Growth_{it-1}$ is the one lag of GDP growth, X_{it} is a vector of control variables including lagged inflation and inflation squared; $trend$ is the time trend. The measure of the discretionary fiscal policy volatility is the logarithm of the standard deviation of the residuals recovered from equation (1). Another interesting approach would have been to use a GARCH model or innovations derived from a VAR model. However, the low data frequency and the fact that the panel is not balanced make difficult the use of such methods. Descriptive statistics presented in Table 1 show that

[4] As robustness check, we alternatively use government consumption and government spending on investment. We also take into account countries which do not report any incident of terrorism by using log(1+terrorism)

the fiscal policy volatility ranges between a minimum of 0.01 and a maximum of 48.79 with an average value of 0.38 over the sample period. Likewise, consumption expenditures are less volatile than investment expenditures.

2.2. Econometric Model

This section emphasizes on the empirical strategy which is adopted to identify the effect of terrorism on the fiscal policy volatility. The economic relationship we are interested in is the following:

$$\log(volatility)_{it} = constant + \gamma_i + \alpha \log(terrorism)_{it} + X'_{it}\beta + \mu_{it} \quad (2)$$

In equation (2), X'_{it} is a set of control variable and μ_{it} is an unobserved error term. In line with the existing literature (see Woo, 2011; Agnello and Souza, 2014; Cevik and Teksoz, 2014), we use two set of control variables: macroeconomic controls and institutional controls.

Table 1: Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Fiscal Volatility	261	0.3881972	3.235649	0.011986	48.79124
Consumption volatility	226	0.6583591	5.880951	0.0047985	82.42039
Investment volatility	226	0.7093238	6.292679	0.012983	88.83358
Number of terrorist attacks	261	8.166922	22.27763	1	275.75
Number of fiscal rules	226	0.3106195	0.6829821	0	3.8
Number of fiscal national rules	226	0.2238938	0.5690966	0	2.6
Log(GDP growth instability)	261	3.177359	2.086936	0.4662542	15.48403
Log(inflation instability)	261	62.427	398.4394	0.0420599	5107.9
Trade openness	261	65.22441	37.64371	10.31958	206.8792
Financial openness	261	0.3708888	0.2977134	0	1
Log(population)	261	9.602538	1.49517	6.394372	13.93222
Democracy	261	4.260089	5.067341	-9	10
Major government crisis	261	0.1817369	0.3326156	0	2
Checks and balances	261	3.050447	1.63061	1	17
Size of the cabinet	261	23.09042	6.906814	9.6	50
Opposition fractionalization	261	0.4690242	0.2758221	0	1
Government fractionalization	261	0.1852818	0.2391341	0	0.9221599
Income inequality	261	44.81961	8.186243	24.55673	67.6332

The first group of controls includes growth volatility, logarithm of inflation volatility, trade openness, financial openness, logarithm of population and income inequality. The growth volatility is measured as the five years rolling standard deviation of the GDP growth. It is included to control for potential effects of macroeconomic shocks on fiscal policy. In

fact, the government could be forced to adjust the budget in response to sudden change in growth prospects. We therefore expect a positive effect of growth volatility on the volatility of fiscal policy. Likewise the consumer price inflation volatility is the five years rolling standard deviation of the inflation and is included to control the destabilizing effect of external shocks such as terms of trade shocks or a depreciation of the real exchange rate[5]. Due to the fact that the high volatility of inflation increases the uncertainty in the conduct of fiscal policy, we expect a positive relationship between these two variables. Trade openness is measured as the sum of import and export in percentage of GDP. Following Rodrik (1998) and Woo (2011), we expect a positive relationship because greater openness exposes the country to more external shocks and greater exposure to external shocks induces important fluctuations in public spending. Similarly, financial openness measures the degree of capital account's openness and the extent to which the restrictions on international financial transactions are low. The total population enters regression to control for country size effects. As shown by Afonso et al (2010), larger country size helps to insure against idiosyncratic shocks, but spreads the cost of financing government expenditure on more taxpayers. We therefore expect a negative effect of population on fiscal policy volatility. Finally, income inequality is included in regression to take into account the potential effect of polarization on fiscal policy. As shown by Woo (2011), a high degree of polarization may lead to more volatility. Data related to growth, inflation, trade openness and population are drawn from the World Development Indicator of the World Bank. Data on financial openness are from Ito and Chinn (2013). The income inequality is measured by the Gini coefficient of gross income obtained from the Standardized World Income Inequality Database (SWIID).

Concerning the institutional controls, we use a measure of democracy, major government crises, check and balances, size of the cabinet, opposition fractionalization and Government fractionalization. As a measure of democracy, we use the variable Polity2 from the Polity IV project. This variable ranges between -10 (strongly autocratic) and +10 (strongly democratic) and measures the extent to which a country is democratic. Democracy implies more control on the executive and prevents the ruler to use excessive public spending to remain in power. The level of democracy should therefore be negatively correlated with fiscal policy volatility. Data on major government crises captures any rapidly developing situation

[5] Note that the results qualitatively remain unchanged when we control for the volatility of oil rent which might be a potential source of fiscal volatility in resource rich countries. The main drawback is that the inclusion of this variable may reduce the explanatory power of inflation which intended to capture price shocks of various sources.

(excluding revolts) that threatens to bring the downfall of the current regime. Likewise the size of the cabinet refers to the number of "cabinet rank" at the end of the year. These data are provided by the Cross National Time-Series Data Archives (CNTS). Government crisis is more likely to generate political instability. We then expect a positive relationship with fiscal policy volatility. At the same time, increased size of the cabinet leads to excessive expenditure and more volatility. The check and balances captures the extent to which the action of the executive can be controlled. This measure is provided by the Database of Political Institutions (DPI) of the World Bank. The effect of check and balances on fiscal policy volatility is controversial. According to Fatas and Mihov (2006) political constraints have a negative and significant impact on the volatility. However, using a full set of controls, Agnello et al (2014) find a positive but not significant effect. The fractionalization measures the probability that two deputies picked randomly from the legislature/opposition will be of different parties. We expect a positive relationship with fiscal volatility because more fractionalization induces greater infighting between various political groups (Acemoglu et al, 2003).

In equation (2), we are interested in identifying the coefficient α, the effect of terrorism on fiscal policy volatility. We test the hypothesis that terrorism positively affects fiscal volatility in developing countries. In fact, an intensification of terrorist attacks induces a rise in public spending allocated to domestic security. This also drives the spending away from investment and reduces the tax base. Likewise terrorist incidents lead to higher uncertainty which affect the business climate and push the entrepreneurs to invest in activities for which they can easily and quickly withdraw their capital (Acemoglu et al, 2003). The descriptive statistics related to the control variables are presented in Table 1.

2.3. Identification strategy

The simplest strategy to estimate the effect of terrorism on fiscal volatility is to use ordinary least square regression. However, this approach may raise three distinctive issues. Although terrorist incidents are less predictable, they are deeply rooted in economic and social deprivation. Therefore, terrorism can be considered as endogenous. Thus, by using ordinary least squared, we may be capturing reverse causality or the effect of some omitted characteristics that are correlated with terrorism. In addition terrorist incidents may be measured with error. In this context, OLS estimates will be biased and the effect of terrorism on fiscal volatility will not be interpreted as causal.

In this research, our strategy is to instrument terrorism building on the existing literature on the determinants of conflicts. We argue that terrorism is more likely to occur in countries characterized by scarcity of economic resources due to long lasting economic shocks and high initial level of conflict. Specifically, we build our instrument of terrorist incidents by multiplying the initial level of terrorism in a specific country by the variation in rainfall. The formula used is the following:

$$Inst_{it} = iter_i * rain_{it} \quad (3)$$

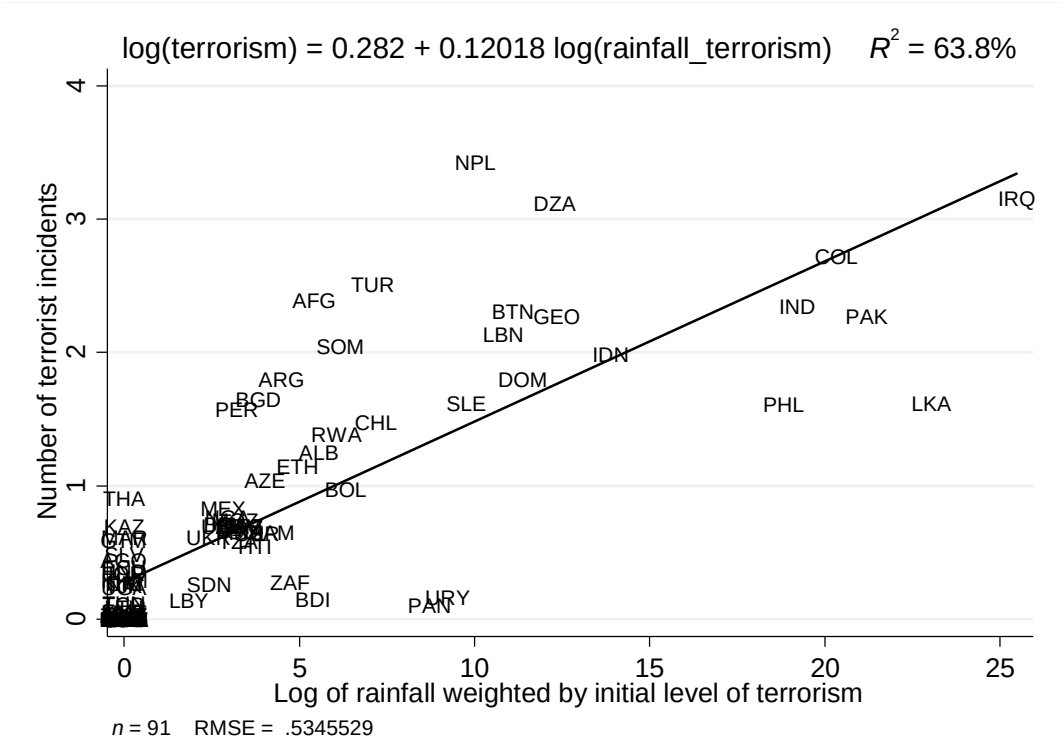
In this equation, $Inst_{it}$ is the exogenous determinant of terrorism, $iter_i$ is the initial level of terrorism, the number of terrorist incidents at the beginning of the sample period, $rain_{it}$ measures rainfall shock and is calculated as the five years rolling standard deviation of rainfall.

There is an increasing body of the literature highlighting the effect of economic condition on the likelihood of conflict. In a well know paper, Miguel and al (2004) shows that negative growth shocks increase the likelihood of conflict and that this effect remains unchanged whether we consider a more democratic, richer or more ethnically diverse country. They also show that variation in rainfall can be considered as a source of exogenous variation of income growth. Recently Hsiang, Burke and Miguel (2014), drawing from various disciplines including economics, political science, geography and archeology, find a strong causal evidence of climate events on human conflicts. This effect holds for all major regions in the world and across time. We build upon these evidences to argue that variation in rainfall is a potential exogenous source of variation in the incidents of terrorism. However, this effect is more likely to be amplified by the initial level of terrorism. In fact, extreme initial level of terrorism may reveal the inability of society to solve issues such as conflict of ideas, land conflict or address political complaints peacefully (OECD, 2013). In addition, prolonged unresolved conflicts provide a fertile ground to the spread of terrorism (Fink and Barakat, 2013; Kis-Katos et al, 2011). Using a sample of 159 countries covering the period 1970-2007, Kis-Katos et al (2011) clearly show that terrorism increases with experiences of domestic conflict. Likewise, Drakos and Konstantinou (2013) provides evidence that terrorism risk is positively influenced by past terrorism risk. This analysis suggests that rainfall shock weighted by the initial level of conflict can be used as an instrument for the current incidence of terrorism. The use of initial values of variables as instrument also follows the suggestion of De la Croix and Doepke (2003), Bloomberg et al (2004). The rationale underlying this

instrumentation approach is that economic shocks as measured by the variation in rainfall increase the likelihood of terrorist attacks in the context where the culture of violence is deeply rooted[6]. Specifically, extreme variability in rainfall may exacerbate conflict over economic resources. In the context where the culture of violence is widespread, these conflicts are not solved through peaceful means and translate into terrorism. Figure 2 displays the first stage relationship between our instrument and the number of terrorist incidents on the whole sample period.

The figure shows a strong positive relationship between our instrument and the number of terrorist incidents. This suggests that rainfall is clearly a useful source of variation for identifying the causal effect of terrorism on fiscal volatility.

Figure 1: Average number of terrorist incidents versus the rainfall weighted by initial terrorism



A main issue in this type of exercise relates to the validity of exclusion restriction. A potential violation of the exclusion restriction may arise if rainfall instrument affects fiscal volatility through channels other than terrorism. We do not think that this is the case. In fact, the exogeneity of the instrument is intuitively plausible because there is no reason to believe

[6] Note that here we use the initial level of terrorism as a proxy of the culture of violence.

that fiscal volatility drives the variability in rainfall. In addition, the current state of fiscal volatility is less likely to affect the initial level of terrorism. In this sense, our instrumental approach helps to rule out the issue of reverse causality. Nevertheless, the variability in rainfall can affect fiscal policy volatility through its effect on other determinants of conflict including GDP growth and inequality. To substantiate the validity of our identification strategy, we control for the volatility of growth and for inequality in the econometric model. We also show that the results are robust to the introduction of regional dummies that permit to take into account spillover effects and common regional effect. Besides, to address the issue of measurement bias which is also a potential source of endogeneity, we use five-year non-overlapping mean in the panel data analysis

We follow in this line Woo (2011) and Agnello and Souza (2014). In addition to the use of an instrument, we control for a full set of macroeconomic and institutional variables to avoid the omitted variable bias. In addition, we use the Fuller's modified Limited Information Maximum Likelihood (LIML) which is more robust to weak instrument (Stock and Yogo, 2004; Davidson and Mackinnon, 2006a).

3. Empirical findings

3.1. Graphical evidence and baseline regressions

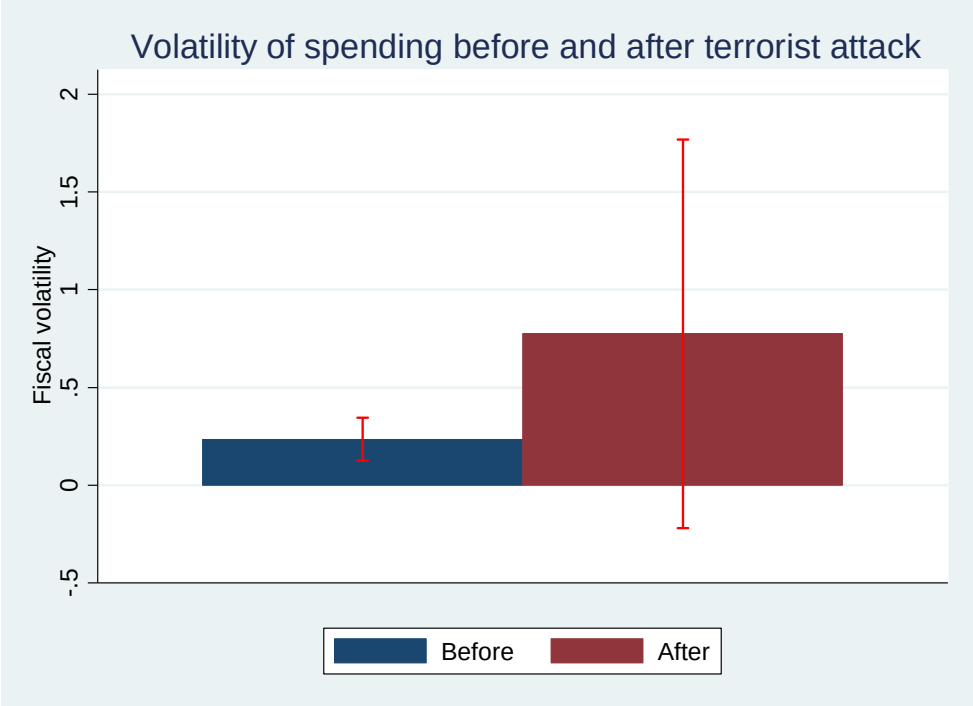
The first step of our investigation consists of comparing the magnitude of the volatility before and after a major episode of terrorist attack. We define a major episode of terrorist attack as the maximum number of terrorist incidents faced by a country over the sample period. We drop from the sample[7] countries whose the highest number of terrorist incidents occurs at the beginning of the sample period. The reasoning underlying this test is that fiscal policy responds to the change in the frequency of terrorist attacks. Therefore, we expect that on average the volatility of fiscal policy will be greater after a major terrorist incident. Figure 2 presents the level of volatility before and after a peak year of terrorist attacks.

The figure shows that after a peak year of terrorist attacks, the volatility of fiscal policy is more than twice as the corresponding level observed prior the attack. In the same manner, we split the sample around the median of the distribution and compare the volatility above and below the median. On average countries above the median experiences 14 terrorist

[7] Only in this specific test.

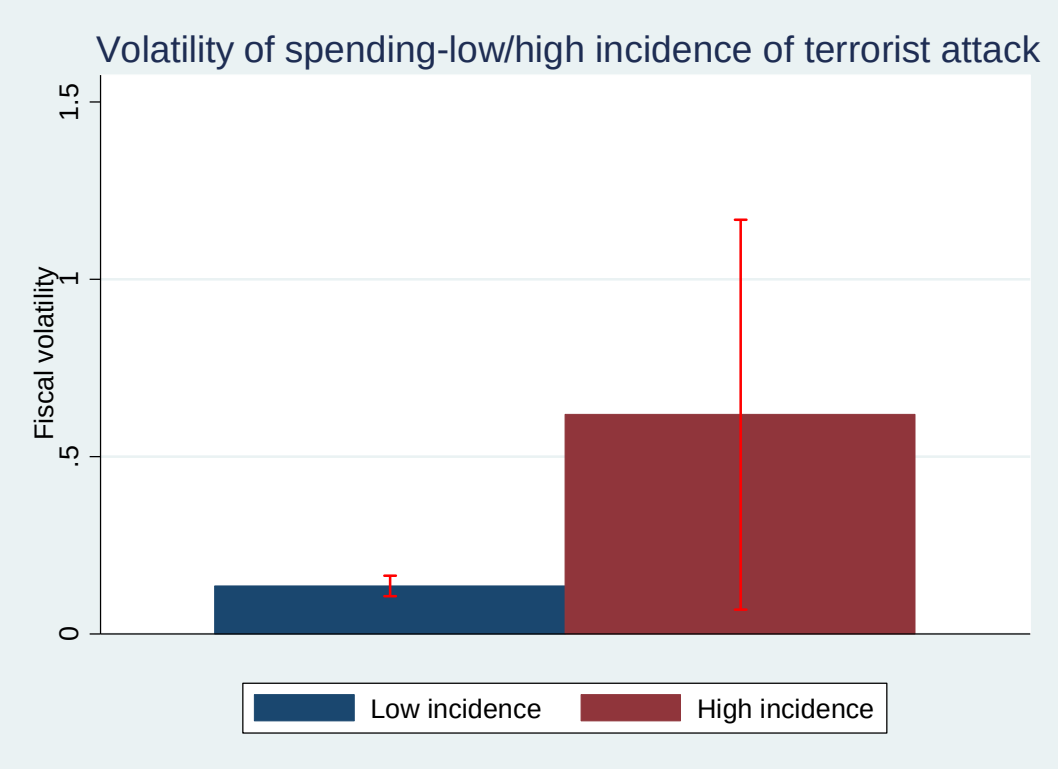
incidents. This is almost fourteen times the number of terrorist attacks faces by countries that are below the median. Figure 3 presents the results.

Figure 2: Volatility of fiscal policy, before and after major episode of terrorist incident



Source: Author's calculations

Figure 3: Volatility of fiscal policy, most affected versus less affected



Source: Author's calculations

To further the analysis, based on the previous results, we perform a difference in difference treatment effect estimation. Specifically, we built our treatment variable by splitting the sample between most affected and less affected countries according to the median of the distribution. Thus we generate a variable taking the value 1 for countries that record a number of terrorist incidents above the median, and 0 otherwise. In order to construct the variable of policy change, for each country we record the year corresponding to the maximum number of terrorist attacks undergo over the sample period. Therefore, our policy variable takes the value 1 for the years following the major episode of terrorist attacks. The results of the difference in difference estimates are presented in Table 2 and confirm the positive effect of terrorism on fiscal policy volatility. A one percent increase in the number of terrorist attacks induces a rise of volatility of 0.24 to 0.31 percent. Although, this result cannot be claimed as causal because there is no evidence that the parallel path assumption holds in this case, it provides a preliminary evidence while allowing to control for a wide range of explanatory variables.

Table 2: Terrorism and fiscal volatility, difference in difference estimates

Dependent variable: employment	(1)	(2)	(3)	(4)	(5)	(6)
After terrorist attack=1	-0.0465	0.0686	-0.0633	0.00718	0.0140	0.0622
	(0.0605)	(0.0449)	(0.0669)	(0.0751)	(0.0750)	(0.0900)

Most affected country=1	-0.600***	-0.247***	0.162	-0.450	0.429	0.313
	(0.110)	(0.0846)	(0.292)	(0.327)	(0.361)	(1.227)
Difference in Difference	**0.245***	**0.201****	**0.281*****	**0.278****	**0.261****	**0.313****
	(0.138)	**(0.101)**	**(0.107)**	**(0.120)**	**(0.119)**	**(0.132)**
Log(GDP growth instability)		Yes	Yes	Yes	Yes	Yes
Log(inflation instability)		Yes	Yes	Yes	Yes	Yes
Trade openness		Yes	Yes	Yes	Yes	Yes
Financial openness		Yes	Yes	Yes	Yes	Yes
Log(population)		Yes	Yes	Yes	Yes	Yes
Democracy			Yes	Yes	Yes	Yes
Major government crisis			Yes	Yes	Yes	Yes
Checks and balances				Yes	Yes	Yes
Size of the cabinet				Yes	Yes	Yes
Opposition fractionalization					Yes	Yes
Government fractionalization					Yes	Yes
Income inequality						Yes
Number of casualties						
Intercept	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies			Yes	Yes	Yes	Yes
Observations	1,199	1,179	1,143	982	975	806
Adjusted R squared	0.039	0.474	0.587	0.604	0.612	0.619

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

Table 3 presents the OLS estimates of the effect of terrorism on fiscal policy volatility. In the first three columns, in addition to the traditional controls, we add region fixed effects and time effects.

Table 3: Terrorism and the volatility of fiscal policy, OLS-Fixed Effect

	(1)	(2)	(3)	(1)	(2)	(3)
	OLS			OLS		
Dependent variable	Log(fiscal instability)			Log(fiscal instability)		
Log(number of terrorist attacks)	**0.113*****	**0.150*****	**0.136*****	**0.0452**	**0.0709****	**0.0661***
	(0.0439)	**(0.0432)**	**(0.0438)**	**(0.0355)**	**(0.0335)**	**(0.0346)**
Log(GDP growth instability)	0.0361**	0.0307**	0.0480**	0.0398***	0.0353***	0.0516***
	(0.0149)	(0.0156)	(0.0194)	(0.0121)	(0.0126)	(0.0162)
Log(inflation instability)	0.407***	0.419***	0.442***	0.408***	0.422***	0.441***
	(0.0817)	(0.0754)	(0.0850)	(0.0770)	(0.0719)	(0.0774)
Trade openness	0.00379**	0.00419**	0.00400**	0.00366***	0.00377***	0.00354***
	(0.00182)	(0.00166)	(0.00187)	(0.00138)	(0.00125)	(0.00130)
Financial openness	-0.137	-0.127	-0.0320	-0.127	-0.135	-0.0201
	(0.202)	(0.195)	(0.217)	(0.168)	(0.163)	(0.168)
Log(population)	-0.0582*	-0.0936***	-0.0752**	-0.0696*	-0.100***	-0.0804**
	(0.0347)	(0.0316)	(0.0298)	(0.0368)	(0.0349)	(0.0348)
Democracy	-0.0222**	-0.0245***	-0.0224**	-0.0278***	-0.0270***	-0.0274***
	(0.00960)	(0.00875)	(0.0101)	(0.00806)	(0.00744)	(0.00912)

Major government crisis	0.0193	0.00332	-0.000409	-0.0807**	-0.0804**	-0.0893*
	(0.0906)	(0.0858)	(0.100)	(0.0378)	(0.0383)	(0.0481)
Checks and balances	0.0662**	0.0302	0.0316*	0.0630***	0.0388**	0.0421***
	(0.0262)	(0.0205)	(0.0189)	(0.0216)	(0.0184)	(0.0159)
Size of the cabinet	-0.00279	-0.00292	-0.00155	-0.00538	-0.00582	-0.000650
	(0.00542)	(0.00516)	(0.00497)	(0.00648)	(0.00632)	(0.00662)
Opposition fractionalization		0.358**	0.309		0.322***	0.287**
		(0.151)	(0.197)		(0.0947)	(0.134)
Government fractionalization		0.499**	0.424**		0.457***	0.375**
		(0.196)	(0.212)		(0.147)	(0.147)
Income inequality			0.00173			0.00929
			(0.0105)			(0.00802)
Intercept	-2.984***	-2.862***	-3.229***	-2.750***	-2.642***	-3.446***
	(0.538)	(0.476)	(0.777)	(0.380)	(0.338)	(0.725)
Continent fixed effect	Yes	Yes	Yes			
Country fixed effect				Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	296	296	261	296	296	261
R-squared	0.526	0.554	0.559	0.505	0.532	0.541
Number of groups	66	66	65	66	66	65
Number of years	7	7	7	7	7	7

Note: Robust standard errors in parentheses. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

According to the estimates, terrorism increases the volatility of fiscal policy by a magnitude ranging between 0.11% and 0.15%. The main macroeconomic controls are also significant with the expected sign. When fixed effects are introduced in the model, the effect of terrorism drops by more than a half, implying that a 100 percent increase in terrorist attacks raises the volatility by 6%.

Table 4 reports the estimates of the instrumental variable regression. Columns (1) to (3) present the results with region and time effects. The Driscoll & Kraay standard errors are reported to account for cross-sectional and temporal dependence (Driscoll & Kraay, 1998; Hoechle, 2007). According to these estimates, a one percent increase in the number of terrorist attacks leads to 0.33% rise of fiscal volatility. In other words, doubling the number of terrorist attacks will increase the volatility of fiscal policy by 33%.

In the next three columns we add country fixed effects in the model. As observed in the OLS case, the magnitude of the coefficients of terrorism drops by more than 50%. This may be an insight that specific country characteristics explain an important part of the observed variability of fiscal policy. Concerning the validity of our identification strategy, the

first stage regression suggests that our instrument is not weak as the first-stage F-statistics are far above the critical values of Stock and Yogo (2005).

Table 4 also shows that the main macroeconomic controls enter in regression with the positive expected sign and most of them are significant at the 1% level. Specifically, the fiscal volatility is positively correlated with growth instability, inflation and trade openness while it is negatively affected by the size of the population.

The observed negative effect of population confirms the findings of Agnello and Souza (2014) and suggests that smaller countries face more volatility due to their wider exposure to idiosyncratic shocks. Likewise, our results are in line with those of Cevik and Teksoz (2014) showing that the GDP growth volatility has a positive and significant effect on fiscal volatility. However, contrary to ours results, they did not find a significant effect of the volatility of consumer price inflation. Two main reasons may explain this difference in the results. First, their paper focuses on emerging and developed countries while our focus is on developing countries. Second they control for the volatility of natural resource rent which can sometimes translate into inflation. In regards to the institutional variables, an increase in the level of democracy reduce the volatility of fiscal policy by 3%. This result is consistent with the previous empirical literature (See Acemoglu et al, 2003; Agnello et Souza, 2014). In the same time, the higher the fractionalization within the government and within the opposition, the higher the volatility of fiscal policy. Our results do not support the hypothesis of a positive effect of income inequality on fiscal policy volatility. This contrasts with the finding of Woo (2011).

Two surprising results emerge from Table 4. First, the coefficient of the check and balances does not have the expected sign. The reported effect is positive and significant, especially in the fixed effect model. This contrasts with previous evidences suggesting that more control on the ruler is associated with lower fiscal policy volatility. A potential explanation of this result is that in the context where both the government and the opposition are made up of political parties coming from different background, the higher their power on the executive the higher the difficulty to reach an agreement on the conduct of the fiscal policy.

Table 4: Terrorism and the volatility of fiscal policy, Instrumental variables estimates

	(1)	(2)	(3)	(1)	(2)	(3)
	Log(fiscal instability)			Log(fiscal instability)		
Log(number of terrorist attacks)	**0.283****	**0.341*****	**0.331*****	**0.126****	**0.205*****	**0.259****
	(0.111)	**(0.117)**	**(0.120)**	**(0.0538)**	**(0.0770)**	**(0.109)**
Log(GDP growth instability)	0.037*	0.029	0.050*	0.0452***	0.0407***	0.0630***
	(0.022)	(0.021)	(0.026)	(0.0143)	(0.0138)	(0.0193)
Log(inflation instability)	0.464***	0.482***	0.501***	0.449***	0.470***	0.488***
	(0.087)	(0.080)	(0.089)	(0.101)	(0.0922)	(0.0959)
Trade openness	0.005***	0.006***	0.006***	0.00488**	0.00521**	0.00535**
	(0.002)	(0.002)	(0.002)	(0.00227)	(0.00223)	(0.00235)
Financial openness	-0.096	-0.044	0.082	-0.178	-0.156	-0.0117
	(0.172)	(0.167)	(0.180)	(0.154)	(0.156)	(0.166)
Log(population)	-0.070*	-0.115**	-0.091*	-0.0653	-0.113***	-0.108**
	(0.041)	(0.046)	(0.050)	(0.0482)	(0.0416)	(0.0441)
Democracy	-0.025***	-0.029***	-0.025**	-0.0335***	-0.0337***	-0.0336***
	(0.009)	(0.009)	(0.010)	(0.00801)	(0.00844)	(0.0106)
Major government crisis	-0.087	-0.102	-0.097	-0.177**	-0.199**	-0.230*
	(0.125)	(0.130)	(0.135)	(0.0691)	(0.0843)	(0.120)
Checks and balances	0.061**	0.022	0.017	0.0595***	0.0307*	0.0256*
	(0.026)	(0.025)	(0.027)	(0.0186)	(0.0164)	(0.0142)
Size of the cabinet	-0.010	-0.011	-0.009	-0.0118	-0.0122	-0.00569
	(0.008)	(0.007)	(0.008)	(0.00791)	(0.00825)	(0.00908)
Opposition fractionalization		0.473***	0.442**		0.421**	0.433*
		(0.175)	(0.188)		(0.169)	(0.258)
Government fractionalization		0.581***	0.473**		0.490***	0.356***
		(0.206)	(0.229)		(0.141)	(0.137)

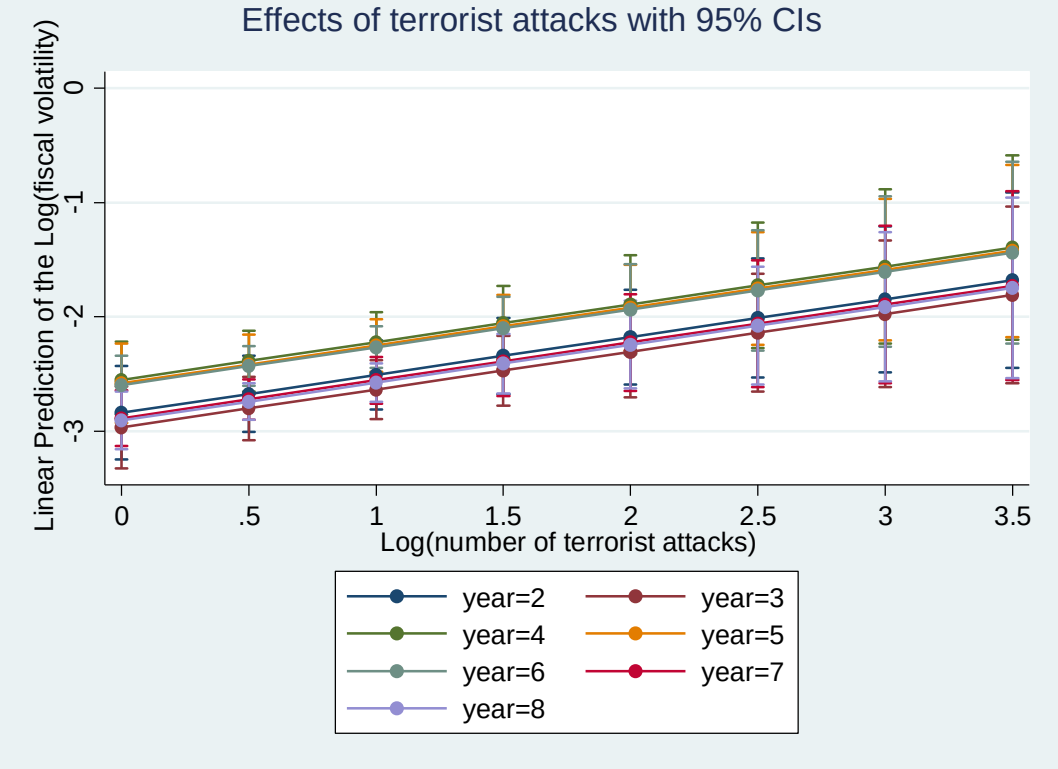
Income inequality			0.001			0.0112
			(0.008)			(0.00823)
Intercept	-2.950***	-2.839***	-3.362***	-3.001***	-2.785***	-3.501***
	(0.490)	(0.453)	(0.581)	(0.571)	(0.485)	(0.801)
Continent fixed effect	Yes	Yes	Yes			
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects				Yes	Yes	Yes
First stage						
Log(rainfall weighted by initial terrorism), t-1	**0.064*** **	**0.062*** **	**0.060*** **	**0.064*** **	**0.062*** **	**0.060*** **
	(0.010)	**(0.010)**	**(0.010)**	**(0.003)**	**(0.004)**	**(0.006)**
Observations	257	257	230	257	257	230
No of countries	66	66	65	66	66	65
R squared	0.53	0.55	0.57	0.53	0.55	0.56
F-stat for weak identification.	41.877	39.607	36.304	288.21	168.93	90.90

Note: Robust standard errors in parentheses. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

This obviously leads to more fiscal policy volatility. Our findings also suggest that once the model is controlled for fixed effect, the number of major economic crises reduce fiscal volatility. A possible interpretation of this result is that when both the government and the opposition are divided on the way of conducting fiscal policy, major crises allow returning to a more orthodox fiscal policy.

In order to have a better understanding of the main findings of the panel data regression, figure 4 shows the predictive effect of terrorist attacks over the entire sample period.

Figure 4: Linear prediction of the effect of terrorism over years

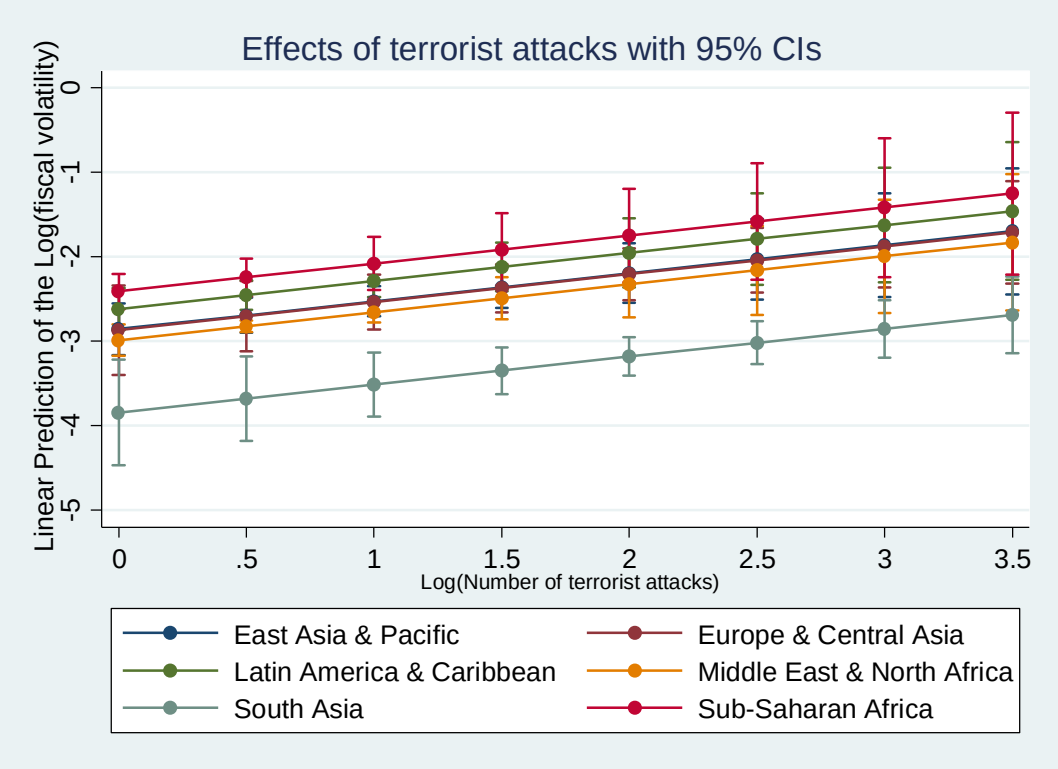


Source: Author's calculations

We allow the number of terrorist incidents to vary from the minimum value to the maximum while keeping the other controls at the mean. The figure shows that fiscal volatility indeed increases with the number of terrorist attacks. At the same time, the effect of terrorism seems to decrease over time. The speed of the decrease is lower at the upper level of the distribution of terrorist attacks. For countries at the lower level of the distribution, the effect of terrorism drops by 6.51% while the corresponding fall is 4.63% at the upper level of the distribution, implying that the most affected countries take more time to recover.

We run a similar exercise and at the same time analyze the variation of the responses across regions. Figure 5 shows South Asia as the less responsive region and Sub-Saharan Africa as the most responsive one. This result confirms the findings of previous studies on the high vulnerability of Sub-Saharan Africa.

Figure 5: Linear prediction of the effect of terrorism across regions.



Source: Author's calculations

3.2. Robustness check

We propose three tests to check the robustness of our findings. First, we rerun the analysis using alternative measures of terrorist incidents. Second, we propose alternative identification strategies to infer the causal effect of terrorism on fiscal volatility. Finally, we breakdown the fiscal policy variable to see which of the consumption and investment spending is more responsive to terrorist shocks.

3.2.1. Alternative measure of terrorist incidents

In the previous specifications, we excluded the number of countries with zero incidents of terrorism. Actually, the sample of countries which report at least one terrorist attack is less likely to be random. Therefore, we present the estimates using both sample. In

addition, we assume that the causal effect of terrorism on fiscal volatility operates with one lag. The results reported in Columns (4) & (5) of Table 5 confirm the previous findings. Terrorist incidents increase the likelihood of fiscal volatility.

Table 5: Terrorism and fiscal volatility, Robustness alternative measure of terrorism

Dependent Variable: Log(fiscal instability)	(1)	(2)	(3)	(4)	(5)
Log(1+number of terrorist attacks),t-1				**0.254*** **	**0.253*** **
				(0.0943)	**(0.0918)**
Log(number of victimes in% population),t-1	**0.0921*** **	**0.137*** **	**0.139*** **		
	(0.0305)	**(0.0327)**	**(0.0324)**		
Log(GDP growth instability)	0.112***	0.116***	0.124***	0.0620***	0.0573**
	(0.0234)	(0.0310)	(0.0326)	(0.0222)	(0.0233)
Log(inflation instability)	0.389***	0.416***	0.415***	0.499***	0.495***
	(0.0896)	(0.0863)	(0.0881)	(0.0863)	(0.0893)
Trade openness	0.00373**	0.00371**	0.00370**	0.00438**	0.00391
	(0.00182)	(0.00170)	(0.00185)	(0.00222)	(0.00242)
Financial openness	-0.107	0.0534	0.0689	0.0554	0.0276
	(0.120)	(0.127)	(0.129)	(0.183)	(0.199)
Log(population)	0.0191	0.0659	0.0661	-0.123***	-0.122***
	(0.0476)	(0.0477)	(0.0505)	(0.0413)	(0.0414)
Oil rent volatility			-0.0138	-0.0225	-0.0222
			(0.0265)	(0.0300)	(0.0362)
Democracy	-0.0326***	-0.0372***	-0.0375***	-0.0379***	-0.0372***
	(0.00731)	(0.00826)	(0.00908)	(0.0118)	(0.0117)
Major government crisis	-0.298***	-0.355***	-0.358***	-0.252**	-0.232*
	(0.0770)	(0.0672)	(0.0677)	(0.127)	(0.129)
Checks and balances	0.0513***	0.0597***	0.0597***	0.0427***	0.0400***
	(0.0117)	(0.00675)	(0.00706)	(0.0109)	(0.00888)
Size of the cabinet	-0.0233***	-0.0206*	-0.0200*	-0.00287	-0.00181
	(0.00806)	(0.0111)	(0.0110)	(0.00762)	(0.00771)
Opposition fractionalization	0.318	0.242	0.264	0.372	0.365
	(0.206)	(0.229)	(0.236)	(0.241)	(0.246)
Government fractionalization	0.175	0.116	0.105	0.299**	0.304**
	(0.134)	(0.0991)	(0.102)	(0.142)	(0.142)
Income inequality		0.0149*	0.0150*	0.0120	0.0128
		(0.00846)	(0.00869)	(0.00862)	(0.00783)
Foreign direct investment%GDP					0.0160
					(0.0131)
Intercept	-3.277***	-4.521***	-4.555***	-3.801***	-3.824***
	(0.561)	(0.774)	(0.856)	(0.854)	(0.831)
Time & country fixed effect	Yes	Yes	Yes	Yes	Yes
First stage					
Log(rainfall weighted by initial terrorism),t-1	0. 12***	0.11***	0.12***	0. 06***	0.061***
	(0.023)	(0.026)	(0.026)	(0.008)	(0.008)
Observations	184	169	169	230	230
R squared	0.580	0.572	0.571	0.577	0.579
F-stat for weak ident.	29.44	20.05	20.07	57.20	55.30

Note: Standard errors in brackets. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Alternatively we use the number of victims[8] of terrorism as a measure of terrorist threat. The reasoning behind this choice is that the government could be more prone to use fiscal policy in reaction to terrorist attacks if the number of victims is high. The estimates are reported in columns (1) to (3) and show that the effect of terrorism remains robust though the magnitude fall.

3.2.2. Alternative identification strategies

Our main alternative identification approach exploits the change in state's position toward the US-led liberal order as a source of exogenous variation for terrorist attacks. Specifically, the new instrument is built as a measure of state's preference toward United States, weighted by the distance between each country and a pool of countries reporting the highest rate of terrorist attacks in our sample. This is because the countries expressing preference in favor of the USA's neoliberal order are more likely to undergo terrorist attacks as reprisals. However, the furthest the country is from the stronghold of terrorism, the less it is affected. The instrument is constructed as follows:

$$Agreeus_{it} = pus_{it} * (\frac{1}{d_{ij}}) \quad (3)$$

Where pus_{it} measures the preference of state i in favor of USA at year t, and d_{ij} represents the average distance between the country i and the j countries that are the most affected by terrorist attacks in our sample, taking into account the geographical distribution of the incidents. These countries are Afghanistan, Iraq, Pakistan, Colombia, India, Turkey, Somalia and Peru and report on average 36 terrorist incidents per year. This is more than four times the average observed in the sample. State's preferences are measured as the probability to always agree with the United States during the votes in the United Nations General Assembly (UNGA). This measure is an index of agreement which is generated using a dynamic state preference model and United Nation voting data (Bailey et al, 2015). This index ranges between 0 and 1. It takes 1 if a state always agrees with United States. The measure identifies shift in preferences that are independent to changes in United Nation's agenda, the type and

[8] The number of victims is computed as the sum of deaths and injured people in percentage of the total population.

the content of the vote. Data about this indicator are drawn from Bailey et al (2015). The results of the estimates are shown in columns (1) to (3) of Table 6.

Table 6: Instrumental variable estimates, alternative instrument

Dependent Variable:Log(fiscal instability)		Full model		Investment	Consumption
Log(1+number of terrorist attacks),t-1	**0.12840*** **	**0.08429*** **	**0.09633** **	**0.14354*** **	**0.06339**
	(0.04230)	**(0.02767)**	**(0.04268)**	**(0.04604)**	**(0.06515)**
Log(GDP growth instability)	0.04838***	0.02029	0.01996	0.06606**	0.00623
	(0.01103)	(0.03031)	(0.03091)	(0.02765)	(0.01435)
Log(inflation instability)	0.50312***	0.58562***	0.58526***	0.56800***	0.67955***
	(0.06001)	(0.05902)	(0.05836)	(0.07069)	(0.07021)
Trade openness	0.00436***	0.00797***	0.00792***	0.00983***	0.00296***
	(0.00096)	(0.00163)	(0.00167)	(0.00206)	(0.00100)
Financial openness	-0.10732	0.06833	0.06710	-0.08709	0.43432***
	(0.10436)	(0.11154)	(0.11255)	(0.13301)	(0.11138)
Log(population)	0.00724	-0.13148	-0.13573	0.04200	-0.02167
	(0.11033)	(0.16511)	(0.15803)	(0.32932)	(0.55342)
Democracy	-0.00917***	0.00074	0.00084	-0.02504***	0.02784***
	(0.00325)	(0.00303)	(0.00292)	(0.00524)	(0.00605)
Major government crisis	-0.26190***	-0.24368***	-0.2463***	-0.29640***	-0.49010***
	(0.06560)	(0.02718)	(0.02665)	(0.04052)	(0.05933)
Checks and balances	0.05140***	0.00957	0.01024	0.05870***	0.03320***
	(0.00962)	(0.00845)	(0.00843)	(0.01464)	(0.00579)
Size of the cabinet	0.00568	0.00799**	0.00839**	-0.00033	0.00377
	(0.00401)	(0.00399)	(0.00420)	(0.00354)	(0.00612)
Opposition fractionalization		0.39854***	0.39447***	0.30920***	0.00283
		(0.06322)	(0.06719)	(0.06005)	(0.07865)
Government fractionalization		0.23945*	0.23412*	0.31612**	-0.05909
		(0.12630)	(0.11999)	(0.12464)	(0.05219)
Income inequality		0.02710***	0.02705***	0.04483***	0.02169**
		(0.00951)	(0.00943)	(0.00420)	(0.01084)
Intercept	-4.31172***	-4.15889**		-6.37417*	-4.04677
	(0.97105)	(1.84476)		(3.27805)	(4.79922)
First step equation					
	Terrorism	**Terrorism**	**Terrorism**	**Terrorism**	**Terrorism**
AgreeUS	0.84701***	0.64534***	0.67719***	0.95140***	0.84112***
	(0.16628)	(0.16534)	(0.14437)	(0.14559)	(0.15224)
Contigidealpoint			-1.36011		
			(1.18781)		
Time & country fixed effect	Yes	Yes	Yes	Yes	Yes
Observations	254	227	212	229	233

Number of countries	65	65	65	65	66
F-stat for weak idententification	25.94756	15.23394	11.34475	42.70224	30.52496
Hansen overidentification test			0.232		

Note: Driscoll-Kraay standard errors in brackets. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Regardless of the specification used, the results point to a positive and significant effect of terrorism on fiscal policy volatility. In addition, in all cases we can reject the null hypothesis that instruments are weak at the standard 5% confidence interval. In column (3), an additional instrument is added to the model. This allows to test for the exogeneity of our main instrument. The new instrument is a measure of country's foreign policy affinities based on state ideal points[9] estimated using votes made in the United Nation General Assembly (Bailey et al, 2015). The ideal point estimates is weighted by a measure of contiguity which takes 1 for the nearest neighbors and 0 otherwise. Results reported in column (3) show that the over identification test cannot reject the null hypothesis that the instrument is uncorrelated with the error term.

In order to substantiate the previous finding, we resort to the general method of moment (GMM) in a dynamic panel data setting. This approach allows addressing the issue of the endogeneity of the main explanatory variable (terrorism) as well as the potential endogeneity of some covariates. We use the two-step system GMM with Windmeijer's (2005) correction of standard errors. In this setting equations in level and equations in differences are combined in a system where lagged variables in difference are used as instruments of the current variable in level. In the same time, lagged variables in level are used to instrument current variables in difference. The Hansen J test is performed to check the validity of the instruments alongside with the first and second order autocorrelation test.

The results are reported in Table 7. Looking at the more complete specification, a one percent increase in the number of terrorist attacks leads to 0.55% increase in fiscal policy volatility. The magnitude of this effect is higher than the upper bound estimate in the baseline IV model. A potential explanation of this result is the fact in the dynamic GMM model, in addition to address the issue of the endogeneity of the interest variable, we control for the potential endogeneity of the explanatory variables. In fact, Acemoglu et al (2001) show that

[9] The ideal point model assumes that the preference of each country on each vote depends on an ideal point which reflects the inclination to vote yes or no.

falling to account for the endogeneity of some controls may lead to downward bias in the coefficient of α (coefficient of terrorism).

Table 7: Terrorism and fiscal volatility, Robustness check-two-step GMM estimates

	(1)	(2)
	Log(Fiscal volatility)	
Log(Fiscal volatility),t-1	0.06720	0.06513
	(0.09619)	(0.08496)
Log(number of terrorist attacks)	**0.55244****	**0.46837****
	(0.24312)	**(0.21108)**
Log(GDP growth instability)	0.05784	0.09133*
	(0.05278)	(0.05383)
Log(inflation instability)	0.42287***	0.39806***
	(0.08862)	(0.08073)
Trade openness	0.00897**	0.00661**
	(0.00454)	(0.00329)
Financial openness	0.01226	-0.09264
	(0.23751)	(0.39316)
Log(population)	-0.04351	-0.00843
	(0.10576)	(0.12404)
Democracy	-0.04743	-0.03043
	(0.03169)	(0.02434)
Major government crisis	-0.24982	-0.31054*
	(0.20699)	(0.18568)
Checks and balances	-0.08291	-0.07577
	(0.05542)	(0.06792)
Size of the cabinet	-0.01678	-0.02420
	(0.01423)	(0.02089)
Opposition fractionalization	0.57188*	0.72668**
	(0.34119)	(0.35259)
Government fractionalization	0.71120**	0.54193
	(0.36012)	(0.48933)
Income inequality	0.00487	
	(0.02776)	
Intercept	-3.49653*	-3.31601***
	(1.79562)	(1.16220)
N	218	243
Number of countries	60	61

Number of intrument	39	38
AR test first	0.03924	0.03776
AR test second	0.62796	0.64370
Hansen test-Pvalue	0.92396	0.71485

Note: Robust standard errors in brackets. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

3.2.3. The breakdown by type of spending

Our previous findings show that fiscal policy is very responsive to terrorism shocks. However, they do not indicate which specific component of public spending is more sensitive to terrorist incidents. Consequently, in columns (4) & (5) of Table 5, we report the estimates respectively for the public investment and public consumption spending. According to these estimates, terrorism shocks positively and significantly affects the volatility of public investment. In contrast, the public consumption is not responsive to terrorism shocks. This result suggests that terrorism may increase the volatility of public spending through the raise of uncertainty about local and foreign investment.

4. Do fiscal rules matter?

Fiscal rules are seen as a powerful mechanism by which the fiscal indiscipline of governments can be prevented. (Fatas and Mihov, 2006; Wyploz, 2012; Bergman and Hutchison, 2015). In this section we assess the efficacy of fiscal rules in dampening the effect of terrorism on fiscal volatility. Following Ebeke and ölcer (2013), we address the potential endogeneity of fiscal rules using 5-years lag of the fiscal rules variable. The fiscal rule is captured by the number of national and supranational rules adopted by a country. Since we are using a five years non-overlapping mean, it is more convenient to use a continuous variable. Moreover, using the number of rules instead of a simple dummy capturing the adoption of rules allow to better take into account the dynamic of the will of the government to ensure fiscal discipline.

Although national rules are likely to be more effective and enforced than supranational rules (Ebeke and ölcer, 2013), Bergman and Hutchison (2014) show that supranational rules are more effective in countries with weak government effectiveness as it is the case in most developing countries. The equation to be estimated is the following:

$$\log(vol)_{it} = c + \alpha \log(ter)_{it} + \alpha_1 \log(ter)_{it} * FR_{i,t-5} + \alpha_2 FR_{i,t-5} + X'_{it}\beta + \mu_{it} \quad (3)$$

Where vol is the volatility of fiscal policy, ter a measure of terrorism incidents and FR a measure of fiscal rules. The effect of terrorism in the presence of fiscal rule is measured by $\alpha + \alpha_1$. We expect the effect of terrorism on fiscal volatility to be lower in the presence of fiscal rules ($\alpha_1 < 0$).

Table 8: Instrumental variable estimates, the role of fiscal rules

Dependent Variable:Log(fiscal instability)	Full model	Investment	Consumption
Log(1+number of terrorist attacks),t-1	**0.14976*** **	**0.15828*** **	**0.09210*** **
	(0.01631)	**(0.03347)**	**(0.01246)**
Log(1+number of terrorist attacks),t-1*Fiscal rule,t-5	**-0.01557*** **	**0.01479**	**-0.01808** **
	(0.00367)	**(0.01543)**	**(0.00851)**
Fiscal rule, t-5	-0.01267	-0.07199	0.05560*
	(0.02142)	(0.04450)	(0.03006)
Log(GDP growth instability)	0.02654	0.05998**	0.00478
	(0.03166)	(0.02808)	(0.01478)
Log(inflation instability)	0.58309***	0.57615***	0.69154***
	(0.06073)	(0.06446)	(0.06284)
Trade openness	0.00899***	0.01009***	0.00365***
	(0.00186)	(0.00199)	(0.00118)
Financial openness	0.16904	0.00241	0.46670***
	(0.12833)	(0.12742)	(0.11151)
Log(population)	0.03802	0.21812	-0.08508
	(0.37014)	(0.42784)	(0.47913)
Democracy	-0.00275	-0.02322***	0.02937***
	(0.00293)	(0.00574)	(0.00632)
Major government crisis	-0.27524***	-0.30926***	-0.48778***
	(0.02950)	(0.04459)	(0.05763)
Checks and balances	0.02338***	0.06884***	0.03618***
	(0.00559)	(0.01750)	(0.00548)
Size of the cabinet	0.00703*	0.00209	0.00367
	(0.00405)	(0.00393)	(0.00564)
Opposition fractionalization	0.37792***	0.26877***	0.00504
	(0.05849)	(0.05411)	(0.07271)
Government fractionalization	0.15612	0.25622**	-0.07624
	(0.09921)	(0.11866)	(0.05290)
Income inequality	0.03245***	0.04008***	0.01897
	(0.00960)	(0.00553)	(0.01260)
Time & country fixed effect	Yes	Yes	Yes
First step			
	Terrorism	**Terrorism**	**Terrorism**
distcapPctAgreeUS	0.98218***	1.07034***	0.96996***

	(0.20345)	(0.21120)	(0.23412)
distcapPctAgreeUS*number of national rules,t-5	-2.02522**	-2.09061**	-1.97109**
	(0.59814)	(0.61799)	(0.59792)
	Terrorism*fiscal rule	**Terrorism*fiscal rule**	**Terrorism*fiscal rule**
distcapPctAgreeUS	0.09456	0.01286	0.04371
	(0.32861)	(0.34240)	(0.31361)
distcapPctAgreeUS*number of national rules,t-5	-4.28380***	-4.22320***	-4.24828***
	(0.78956)	(0.78569)	(0.75928)
Intercept	-6.18226*	-8.19303**	-3.41848
	(3.74242)	(4.07098)	(4.10069)
N	225	226	231
Number of countries	64	65	65
F-stat for weak ident.	12.76447	15.369	13.772

Note: Driscoll-Kraay standard errors in brackets. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 8 reports the estimates. Column (1) presents the results for the volatility of the total spending whereas columns (2) and (3) respectively show the estimates for investment spending and consumption spending. According to the results reported in column (1), the coefficient of the interaction term between terrorism and fiscal rules is negative and significant, suggesting the existence of a dampening effect. However, the strength of this effect is very low. Potential explanations are the lack of enforcement, compliance and low government effectiveness (Ebeke and ölcer, 2013; Bergman and Hutchison, 2014). Turning to the effect on the composition of public spending, the results show that the dampening effect of fiscal rules is only present for consumption expenditures.

5. Conclusion

Over the recent years, especially in the post September 11th period, scholars have devoted more attention to understand the economic cost and consequences of terrorism. Although there is a wide consensus on its negative effect on growth, there is little evidence about the key channels through which this effect occur. This paper argues that by increasing the uncertainty surrounding the conduct of fiscal policy, terrorism negatively affect growth. Therefore, we empirically document the effect of terrorism on the fiscal policy volatility in developing countries. Terrorism is measured by the number of terrorist incidents by year faced by a specific country including domestic and transnational terrorism. The fiscal policy volatility is captured by the standard deviation of a measure of discretionary fiscal policy following Fatas and Mihov (2006).

Using a panel data analysis for a sample of 66 developing countries, for the period spanning from1970 to 2012, we show that terrorism increases fiscal policy volatility in developing countries. While assessing the effect on the volatility of disaggregated public spending, the estimates show that terrorism positively and significantly raises the volatility of the investment spending. In contrast, consumption spending are not responsive to terrorism shocks. The analysis also shows that fiscal volatility is positively influenced by the volatility of output growth, the consumer price inflation volatility, the degree of fractionalization of both the government and the opposition. The results also show that the volatility is higher in countries of small size and lower in more democratic countries. Looking at the effect of fiscal rules on the terrorism-volatility nexus, the findings suggest that the effect of terrorism is lower in countries which have adopted a higher number of fiscal rules. However, the magnitude of the effect is almost negligible.

Our results are robust to reverse causality, endogeneity bias and the presence of various controls. Moreover, the results stand for the use of alternative identification strategies. In addition, the findings are qualitatively unchanged when we use disaggregated spending and an alternative measure of terrorism.

This paper complements and extends the previous literature by shedding light on a new source of fiscal policy volatility and by providing a new economic channel to substantiate the negative relation between terrorism and growth. This paper shows that after controlling for the traditional determinants of fiscal volatility, terrorism substantially increases the uncertainty surrounding the conduct of fiscal policy in developing countries.

The paper therefore points to more policy efforts to circumvent terrorist threat and put in place tight fiscal rules to ensure a sustainable and stable fiscal policy.

APPENDIX

Table A: List of countries

Country			
Albania	Ecuador	Madagascar	Rwanda
Algeria	El Salvador	Malaysia	Senegal
Angola	Ethiopia	Mali	Sierra Leone
Argentina	Fiji	Mauritania	South Africa
Bangladesh	Gabon	Mexico	Sri Lanka
Bolivia	Ghana	Mongolia	Tanzania
Botswana	Guatemala	Morocco	Thailand
Brazil	Guinea	Mozambique	Togo
Bulgaria	Guyana	Namibia	Tunisia
Burundi	Honduras	Nepal	Turkey
Cambodia	India	Nicaragua	Uganda
Central African Republic	Indonesia	Niger	Uruguay
Chad	Jamaica	Pakistan	Zambia
Colombia	Jordan	Panama	Zimbabwe
Costa Rica	Kenya	Paraguay	
Cote d'Ivoire	Lesotho	Peru	
Dominican Republic	Liberia	Philippines	

References

Abadie, A and Gardeazabal, J., (2007), Terrorism and the World Economy. *European Economic Review*, 52, pp.1-27

Acemoglu, D., Johnson, S, Robinson, J. and J. Thaicharoen, (2003), Institutional Causes, Macroeconomic Symptoms: volatility, crises and growth, *Journal of Monetary Economics*, 50, pp. 49-123

Afonso, A., Agnello, L, and D. Furceri, (2010), Fiscal policy responsiveness, persistence and discretion, *Public Choice*, 145, pp. 503–30.

Agnello, L. and R. Souza, (2014), The Determinants of the Volatility of Fiscal Policy Discretion, *Fiscal Studies*, 35, pp.91-115

Anderson, T.W., and H. Rubin. (1949), Estimation of the Parameters of a Single Equation in a Complete System of Stochastic Equations, *The Annals of Mathematical Statistics*, 20, pp. 46–63.

Bandyopadhyay, S.; Sandler, T. and J. Younas, (2014), Foreign Direct Investment, Aid and Terrorism, *Oxford Economic Papers*, 25, pp.25-50

Bergman, M. and M. Hutchison, (2015), Economic Stabilization in the Post-Crisis World: Are Fiscal Rules the Answer? *Journal of International Money and Finance*, 52, pp.82-101

Bloomberg, S.B., Hess, D.G., and A. Orphanides, (2004), The Macroeconomic Consequences of Terrorism, *Journal of Monetary Economics*, 51, pp.1007-1032

Cevik, S and K. Teksoz, (2014), Deep Roots of Fiscal Behavior, International Monetary Fund (IMF) Working Paper /14/45

Drakos, K and Konstantinou, T.P. (2014), Terrorism, Crime and Public Spending: Panel VAR Evidence from Europe, *Defence and Peace Economics*, 4, pp.349-361

Drakos, K and A.M. Kutan, (2003), Regional Effect of Terrorism on Tourist in Three Mediterranean Countries, Journal of Conflict Resolution, 47, pp.621-647

De La Croix, D., Doepke, M., (2003), Inequality and growth: why differential fertility matters, *American Economic Review*, September, PP; 1091–1113.

Driscoll, J and Kraay, A.C., (1998), Consistent Covariance Matrix Estimation with Spatially Dependent Data, *Review of Economics and Statistics* 80, pp. 549-560

Ebeke, C. and Ölcer (2013), Fiscal Policy over the Election Cycle in Low Income Countries, International Monetary Fund (IMF) working papers, 13/153/

Fatas, A. and I. Mihov, (2006), The Macroeconomic Effects of Fiscal Rules in the US States, *Journal of Public Economics,* 90, pp.101-117

Fink, C.N and Barakat, W.R. (2013), Preventing Conflict and Terrorism: What Role for Security Council, Policy Brief, Spring 2013, Center on Global Counterterrorism Cooperation

Gupta, S., Clements, B., Bhattacharya, R. and Chakravarti, (2004), Fiscal Consequences of Armed Conflicts and Terrorism in low-and middle-income countries, *European Journal of Political Economy,* 20, pp.403-421

Hoechle, D. (2007), Robust Standard Errors for Panel Regressions with Cross-Sectional Dependence, *The Stata Journal,* 3, pp.281-312

Hsiang, S.M., Miguel, T. and M. Burke, (2014), Climate and Conflict, NBER Working Paper 20598, National Bureau of Economic Research

Ito, H and Chinn, M. (2013), Note on the Chinn-Ito Financial Openness Index 2011 Update, available online at http://web.pdx.edu/~ito/Chinn-Ito_website.htm.

Kis-Katos, K., Liebert, H., and G.G, Schulze, (2011), On the Origin of Domestic and International Terrorism, *European Journal of Political Economy,* 27,pp. 17-36

Miguel, E., S. Satyanath, and E. Sergenti. (2004), Economic Shocks and Civil Conflict: An Instrumental Variables Approach. *Journal of Political Economy* 112, pp. 72-753.

Rodrik, D., (1998), Why do more open economies have bigger governments, *Journal of Political Economy* 106, pp. 997–1032.

OECD (2013), Conflict over resources and Terrorism: Two Facets of Insecurity, OECD Publishing, 2013, available at http://www.oecd.org/swac/publications/conflict-over-resources.htm

START. (2013), Global Terrorism Database (GTD) Codebook, National Consortium for the Study of Terrorism and Responses to Terrorism, consulted on March 2015, available at Data are available free of charge at http://www.start.umd.edu/gtd/

Stock, J., and Yogo, M. (2005), Testing for Weak Instrument in Linear IV, *Identification and inference for econometric models: essays in honor of Thomas Rothenberg, 2005*

Woo, J. (2011), Growth, Income Distribution and Fiscal Policy Volatility, *Journal of Development Economics,* 96, pp. 289-313