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Terror and its Fiscal Consequences*

Benedict Clements[+] Sanjeev Gupta[$] João Tovar Jalles[#] Saida Khamidova[±]

July 2020

Abstract

We explore the impact of major terrorism shocks on macroeconomic and fiscal variables´ dynamics using an unbalanced panel of 191 heterogeneous countries from 1970 to 2018. By means of the local projection method, we find that a terrorist shock lowers a country's real GDP as well as government tax revenues and raises debt-to-GDP ratio. The composition of government spending shifts in favor of military spending. Low-income countries are affected more than both emerging market and advanced economies. Our results are robust to a battery of sensitivity and robustness tests.

JEL: O15; O23; O55; H56
Keywords: fiscal policy; growth; armed conflict; terrorism; panel data; local projection method; seemingly unrelated regressions

* Any remaining errors are the authors' sole responsibility. The usual disclaimer applies and the positions reflected in this paper are the authors´ and do not reflect their employers´ views.

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1. Introduction

Across the world, the frequency of terrorist attacks increased from 619 in 1970 to 9,060 in 2018, increasing the number of terror-related fatalities from 166 to 22,255 per annum, according to the Global Terrorism Database. The concentration of attacks and fatalities in the Middle East and African regions is evident from the data plotted in Figures 1 and 2. In addition to the human toll, terrorism generates sizeable economic costs. There is a mounting literature on the interactions between terrorism and economic activity, building formal theoretical models and developing quantitative empirics to understand the channels of transmission.[1] From an empirical point of view, most studies exploit a single-country time series approach to identify the economic consequences of terrorism.[2] There are still some that take a cross-section approach. While Tavares (2004) finds no evidence for terrorism having a discernible impact on economic growth, Blomberg, Hess, and Orphanides (2004), Crain and Crain (2006) and Meierrieks and Gries (2012) identify a significant negative effect of terrorism on economic activity.[3]

An immediate consequence of the negative effect terrorism has on economic activity is the deterioration of public finances. Lower growth translates into lower revenues, resulting in wider deficits and the reconstruction effort that follows can lead to a rise in public expenditures and in government debt. There is, however, a lack of papers directly looking at the fiscal implications of terrorism in a comprehensive and systematic way that cover a large panel of countries. Many of the relevant papers have not looked at terrorism per se but, for lack of specific data on terrorism, the effects of a combined measure capturing all types of conflicts, including terrorist acts. Gupta et al.´s (2004) seminal paper provided evidence that that armed conflicts led to lower revenues and higher defense spending. Broadly similar results were found in a recent paper by Cevik and Ricco (2018) with one difference: the effect terrorism has on tax revenue performance is only marginal. Gaibulloev and Sandler (2008) found that acts of terrorism led to an increase in government spending in European countries. Barrett (2018) studied the fiscal costs of conflicts in terms of foregone revenues. More recently, IMF (2019) examined the effects of

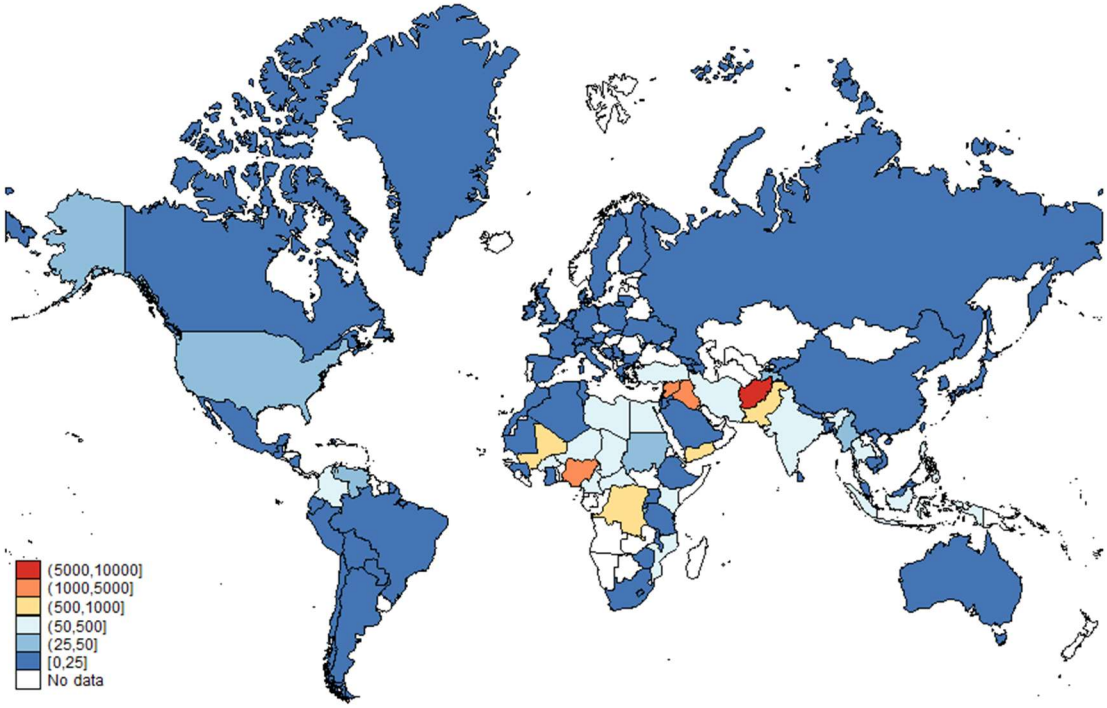
[1] Enders and Sandler (2006) provide a comprehensive survey of the literature on terrorism.

[2] Becker and Murphy (2001) estimate that the terrorist attacks of September 11, 2001 resulted in a loss of 0.06 percent of productive assets in the US, with a long-run effect of 0.3 percent of GDP. Abadie and Gardeazabal (2003) examine the effects of terrorism in Spain's Basque region and identify a 10 percentage points decline in per capita income due to terrorism relative to a synthetic control region without terrorism. Focusing on Israel's experience, Eckstein and Tsiddon (2004) demonstrate that terrorism has a significant negative effect on income per capita.

[3] Some other authors have focused on specific productive sectors of the economy, such as tourism (e.g., Rose et al. 2009; Sab, 2014) or looked at the transnational effect of terrorism disrupting trade flows (e.g., Nitsch and Schumacher, 2004; Bandyopadhyay et al., 2018) or assessing the effect on neighboring countries´ growth (e.g., Gaibulloev and Sandler, 2008, 2011).

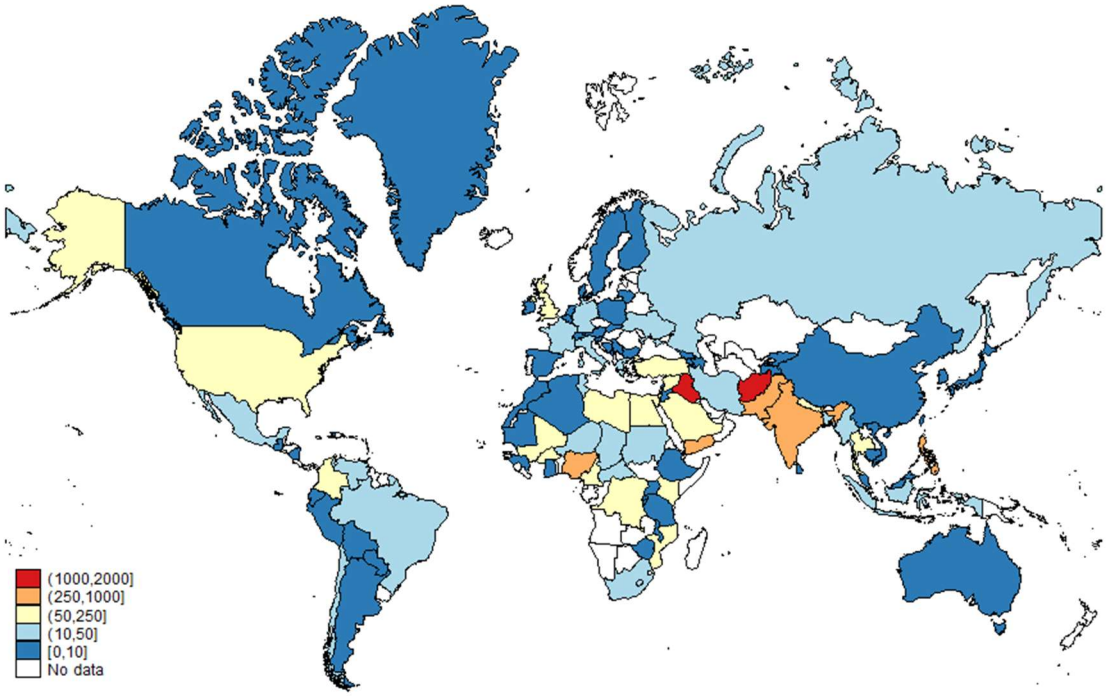
conflict specifically in sub-Saharan Africa and found an adverse effect on revenues as well as public debt with the composition of spending tilting in favor of defense outlays—a result broadly similar to Gupta et. al. (2004).

Figure 1. Fatalities across the World, 2018



Source: authors´ calculations with Global Terrorism Database data.

Figure 2. Terror Attacks across the World, 2018



Source: authors´ calculations with Global Terrorism Database data.

Against this background, this chapter´s objective is to provide a better understanding of the fiscal dimensions of terrorism – a relatively underdeveloped strand of research - by empirically exploring the discernible budgetary consequences and relying on a large panel of 191 countries from 1970-2018. More specifically, we focus on the short- to medium-term fiscal dynamics of terrorism which has been neglected in the literature (most papers have a long-run focus). We do so by constructing what we call "terror-shocks" and plotting the impact on several macroeconomic and fiscal variables by means of Jorda´s (2005) local projection method. Inspired by Araz-Takay, Rain, and Okay (2009) – who looking at Turkey found a greater negative economic effect of terrorism during economic expansions – we explore whether the fiscal consequences of terrorism are affected by the prevailing macroeconomic conditions at the time of the "terror-shock". We rely on Granger and Teravistra´s (1993) smooth transition autoregressive (STAR) model for this purpose. We also perform numerous robustness checks, including sub-sample analysis and sensitivity to different specifications, to validate our empirical findings. Our results confirm that terrorism has adverse consequences on the economy and on public finances. Certain groups of countries are affected more than others, suggesting the need for them to build fiscal buffers to counter the acts of terrorism.

The remainder of the chapter is structured as follows. Section 2 presents the empirical strategy followed to analyze the fiscal consequences of terrorism. Section 3 presents the data and key stylized facts. Section 4 discusses the baseline empirical results, sensitivity and robustness checks. Section 5 concludes and elaborates on the policy implications.

2. Econometric Methodology

There are three main ways in which armed conflict and terrorism can affect fiscal outcomes. First, by influencing real economic activity and, thereby, government revenues, fiscal deficits, and public debt. The destruction of physical infrastructure and human capital due to violence and the indirect effects on trade, tourism and business confidence, all adversely affect growth. Second, by negatively affecting both the tax base and the efficiency of the tax administration. Tax receipts, for example, vary with the health of the economy. Economic downturns due to insecurity and violence can lead to a decline in tax revenues. Beyond their effects on real activity, armed conflicts and terrorism can destroy part of the tax base (e.g., through the destruction of business firms) and weaken the efficiency of tax administration. Ndikumana (2001) noted that, following the outbreak of armed conflict in two countries in Africa, not only did the tax base collapse but tax administration was also hampered. Third, by changing the composition of government spending. Military expenditures typically increase in response to conflict and terrorism and tend to remain high even after cessation of violence. Yang et al. (2010) notes that the effect on defense spending on growth can be either positive or negative.[4] First there is a negative crowding-out effect as the increased spending on defense compresses the amount available for other areas such as education, health and productive public investment. These fiscal consequences can have repercussions on economic growth, which would further negatively impact the public finances. Second there is the possibility of a positive spin-off from the supply side effects of defense spending on the nondefense sectors of the economy. This effect is likely to be small in developing conflict-affected countries since the non-wage defense spending tends to be on imported armaments. This interpretation is consistent with the result found by Chen et al. (2014) on the impact of defense spending on growth: In high-income countries defense spending has a positive influence on growth while there is no effect in sub-Saharan Africa.[5]

[4] Earlier studies suggested that defense spending had a positive effect on growth in developing countries (Benoit, 1978). Subsequent papers found that cutting military spending fostered economic growth and thus lead to a "peace dividend" (Arora and Bayoumi, 1993, Bayoumi et al., 1993; Knight et al., 1996).

[5] There is vast literature on the relationship between military spending and growth, which is summarized in Chen et al. (2014).

Third, there is a resource mobilization effect on savings and investment: defense spending provides both internal and external security which boosts private savings and investment and attracts foreign direct investment. This has a positive effect on growth, but this effect is likely to be nonlinear and dependent on the level of defense spending.

In order to estimate the dynamic response of macroeconomic and fiscal variables to terrorism events, we follow the local projection method proposed by Jordà (2005) to estimate impulse-response functions. This approach has been advocated by Auerbach and Gorodnichenko (2013) and Romer and Romer (2017) as a flexible alternative to vector autoregression (autoregressive distributed lag) specifications since it does not impose dynamic restrictions. It is better suited to estimating nonlinearities in the dynamic response—such as, in our context, interactions between terrorism shocks and the economic business cycle. The main specification takes the following form:

$$y_{t+k,i} - y_{t-1,i} = \alpha_i + \beta_k T_{i,t} + X_{i,t}'\theta + \varepsilon_{i,t} \quad (1)$$

in which *y* is the dependent variable of interest; β_k denotes the (cumulative) response of the variable of interest in each *k* year after the terror shock; α_i are country fixed effects; $T_{i,t}$ denotes the terror shock - we focus only on the first year of a given terror episode to improve the identification and minimize reverse causality problems – for a similar approach see Ball et al. (2013) (see below for details on terror proxies)[6]; and $X_{i,t}$ is a vector of control variables including two lags of terror shocks, two lags of real GDP growth and two lags of the dependent variable. Our dependent variables comprise of two blocks of macroeconomic and fiscal variables. The first contains real GDP growth, real GDP growth per capita, real private consumption and real private investment per capita. The second contains the debt-to-GDP ratio, government real expenditures per capita, government real revenues per capita and the share of military spending in total government expenditures.[7]

Equation (1) is estimated using OLS. Impulse response functions (IRFs) are then obtained by plotting the estimated β_k for k= 0,1,..5 with 90 (68) percent confidence bands computed using the standard deviations associated with the estimated coefficients β_k—based on robust standard errors clustered at

[6] All terror shocks featured in our analysis are assumed to be country-wide shocks.

[7] These variables are retrieved from the International Monetary Fund´s World Economic Outlook and Government Finance Statistics databases as well as World Bank´s World Development Indicators database. Macro and fiscal variables not expressed in percent of GDP are used in logs. Summary statistics present in Table A1 in the appendix.

the country level.[8] According to Sims and Zha (1999) "the conventional pointwise bands common in the literature should be supplemented with measures of shape uncertainty". Hence, for characterizing likelihood shape, bands that correspond to 68 percent posterior probability - or one standard deviation shock - provide a more precise estimate of the true probability.[9]

3. Data and Stylized Facts

There is no consensus regarding how terrorism should be defined. Title 22 of the US code section 2656f(d) defines terrorism as "premeditated motivated violence perpetrated against noncombatant targets by subnational groups or clandestine agents, usually intended to influence an audience". The Columbia Encyclopedia 6th ed (2001) defines terrorism as "the threat or use of violence, often against civilian population to achieve political ends. Terrorism involves activities such as assassinations, bombings, random killings, hijackings and skyjackings. It is used for political not military purposes and by groups too weak to mount open assaults".

Previous studies have employed alternative proxies for armed conflict and terrorism from a variety of sources.[10] Source-wise, SIPRI (the Stockholm International Peace Research Institute) has been a major provider. Drawing data on armed conflicts from the Uppsala Conflict Data Project, they provide an index whose shortcoming is the application of an absolute criterion for the number of battle-related deaths.[11] The SIPRI index has been used in some empirical studies on military spending, such as Davoodi et al. (2001). Another source is the Heidelberg Institute for International Conflict Research (HIIK) that defines conflict broadly as "*the clashing of overlapping interests (positional differences) around national values and issues […]; the conflict has to be of some duration and magnitude of at least two parties […] that are determined to pursue their interests and win their case*". Their measure is highly consistent with

[8] Another advantage of the local projection method compared to vector autoregression (autoregressive distributed lag) specifications is that the computation of confidence bands does not require Monte Carlo simulations or asymptotic approximations. One limitation, however, is that confidence bands at longer horizons tend to be wider than those estimated in vector autoregression specifications.

[9] Other papers that have employed one standard deviation bands include e.g., Giordano et al. (2007), Romer and Romer (2010) and Bachmann and Sims (2012).

[10] For instance, Alesina et al. (1992) used the number of assassinations per million population per year while later on Alesina and Perotti (1996) relied instead on an index of socio-political instability, deaths associated with disturbances and number of coups. Knight et al. (1996) used a measure of peace while Rodrik (1999) relied on proxies of bureaucratic efficiency and external shocks. More recently, Cevik and Ricco (2018) employed a Cold War dummy to study the impact of terrorism on fiscal outcomes. IMF (2019) relied primarily on Conflict Upsala Data Program to analyze the growth and fiscal implications of conflicts in sub-Saharan Africa.

[11] Thus, a country with a large population will be classified as being in conflict although the number of deaths may be relatively small to its population.

SIPRI´s index. The third possible source of data is the International Country Risk Guide (ICRG). They provide ratings assessing the violence in a country due to civil war, terrorism, and civil disorder, and the actual or potential impact on governance.[12] Because more than 90 percent of all major armed conflicts since the 1990 have been internal, the ICRG ratings on internal conflict have been used in empirical analyses to proxy for the combined risk from terrorism and conflict (see e.g., Gupta et al., 2004). One key advantage is the fact they provide ratings for a wide range of countries and not just for those that have had major armed conflicts as defined by SIPRI. Finally, regarding the Global Terrorism Database (GTD), it is a database that tracks domestic and international terrorist events since 1970, including the information on the weapons used, the nature of the target and the identity of perpetrator, the intensity of the conflict, the number of casualties, and property damage. GTD is more detailed than other databases but it is specific to terrorist events only. The GTD has been used in studies such as Meierrieks and Gries (2012) and Cevik and Ricco (2018).

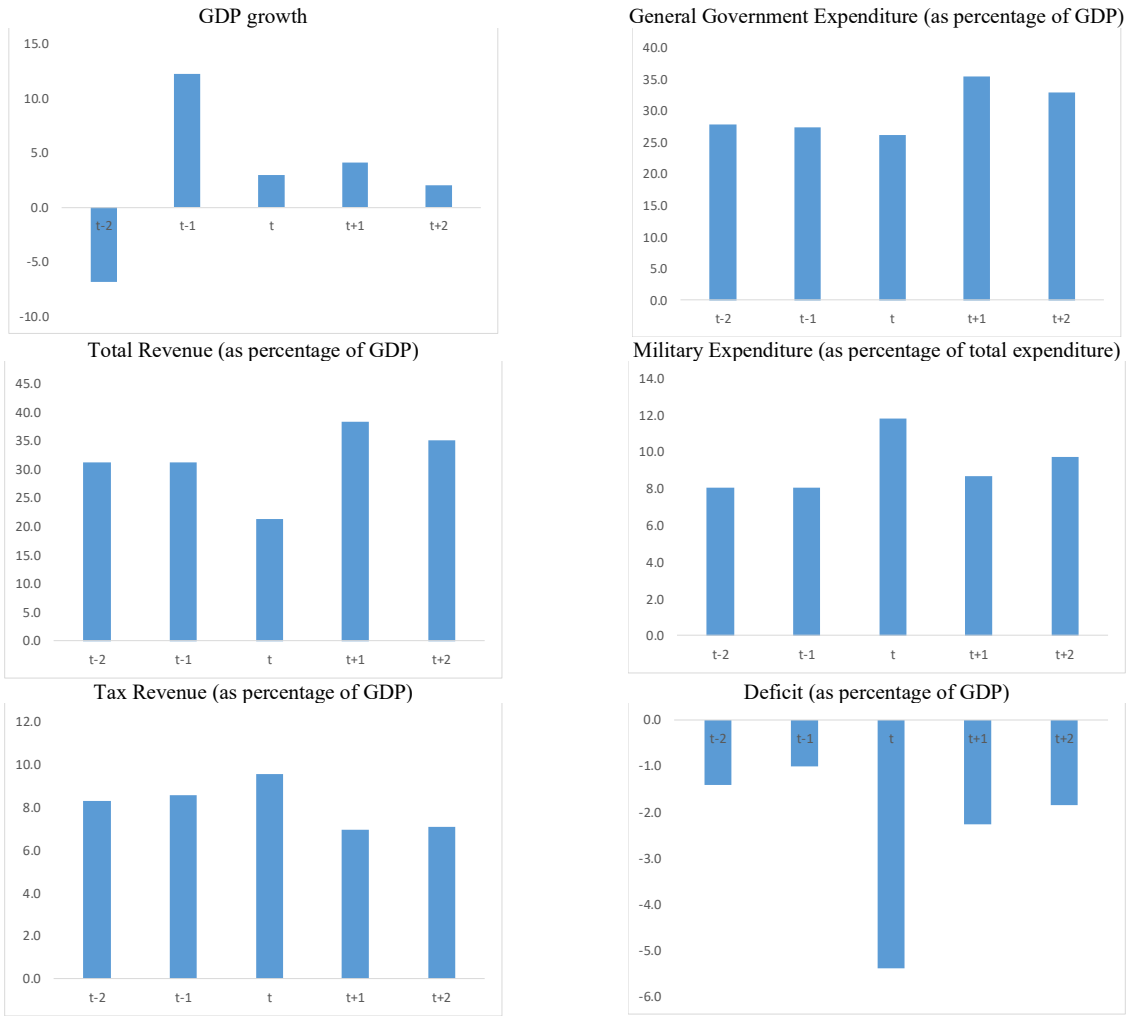
We rely on two terrorism proxies. First, we use ICRG ratings on internal conflict (that proxies combined risk from terrorism and conflict, as in Gupta et al., 2004) to construct our first terror shock. We invert its scale, so that the larger the rating the larger the degree of terrorism a given country is associated with. Then we define a terror shock such that it takes the value 1 if the (inverse) rating in a given year is larger than the country-specific time-average plus one standard deviation of the rating in that country over the entire time span of available data (which we name "terror shock 1"). Second, we employ the number of terror-related fatalities from the Global Terrorism Database. This variable is used to construct what we call a "major terror-shock" defined as those years with deaths above or equal to 1,000 people (which we name "terror shock 2").

Descriptive statistics on different macroeconomic and fiscal variables before, during and after the beginning of the above-described terror shocks (Figure 3a and 3b). Our sample comprises of an unbalanced panel containing 191 countries, of which 39 are advanced, 93 are emerging markets and 59 are low-income between 1970 and 2018. This event-study type exercise suggest that terror shocks have, on average, been associated with a deterioration of macroeconomic and fiscal outcomes. More specifically, Figure 3b – for terror shock 2 - shows the detrimental effect terrorist events have on real GDP growth, which continues to decline even two years post terrorist acts. Fiscal deficits increase during the years countries are beset by terrorism, owing to lower revenues and increased general government

[12] The highest rating is given to those countries "[…] where there is no armed opposition to the government and the government does not indulge in arbitrary violence, direct or indirect, against its own people". The lowest rating is given to a country embroiled in an ongoing civil wat and/or facing terrorist attacks.

expenditure, and the share of military outlays in the total rises with implications for priority and social spending.[13] On average, total revenues seem to rebound in the years following terrorist shock, which could reflect higher nontax revenue linked to commodity revenues.[14] Section 4 tests whether this (unconditional) suggestive evidence holds up to more formal tests.

Figure 3a. Evolution of Macroeconomic and Fiscal Variables around Terror Shocks – Terror Shock 1

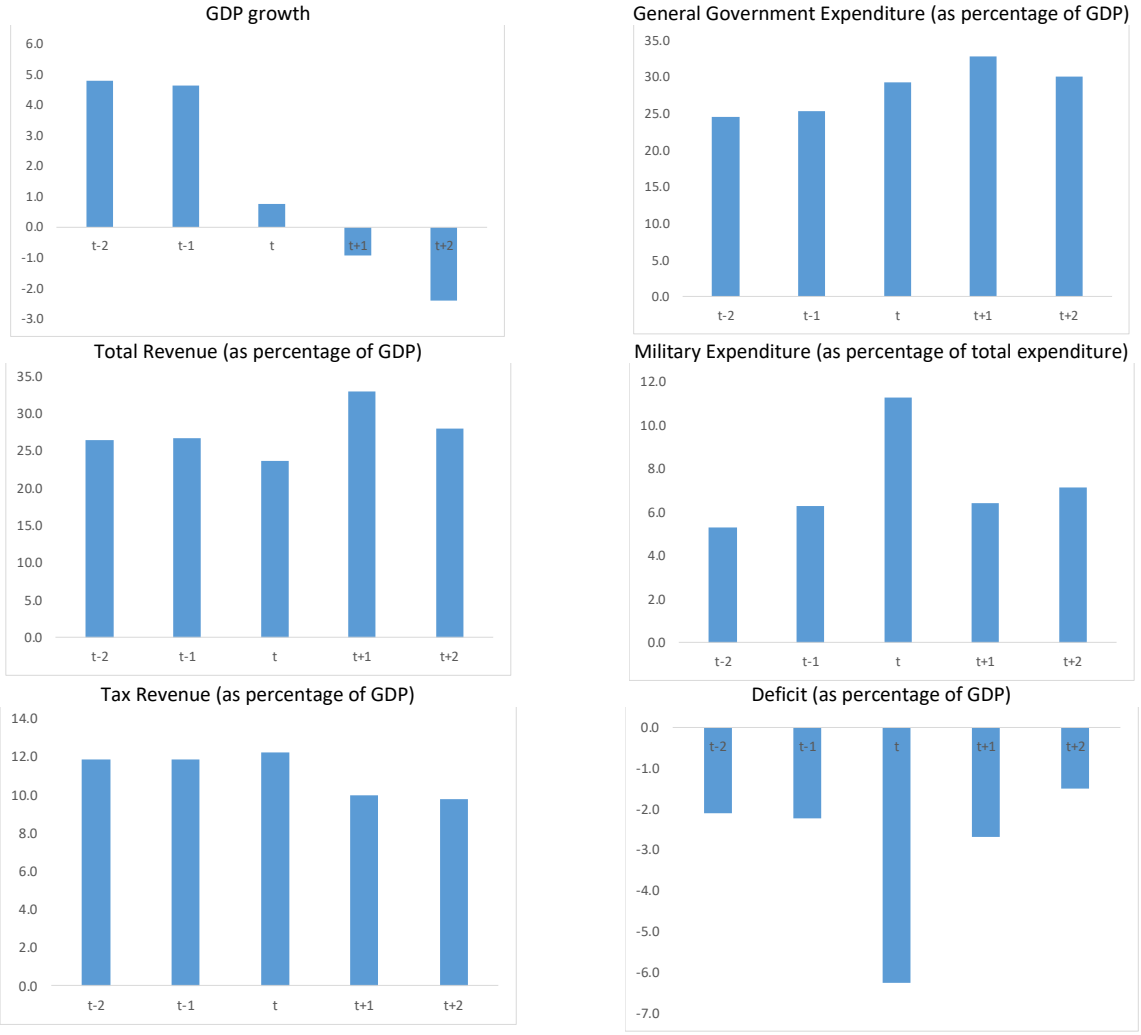


Note: x-axis in years; t=0 is the year of the terror shock. See main text for details on terror shock definition.

[13] A similar result is obtained if military spending as a share of GDP is used.

[14] Total revenues are composed of tax revenues, grants, social contributions and other revenues such as those derived from natural resources.

Figure 3b. Evolution of Macroeconomic and Fiscal Variables around Terror Shocks – Terror Shock 2



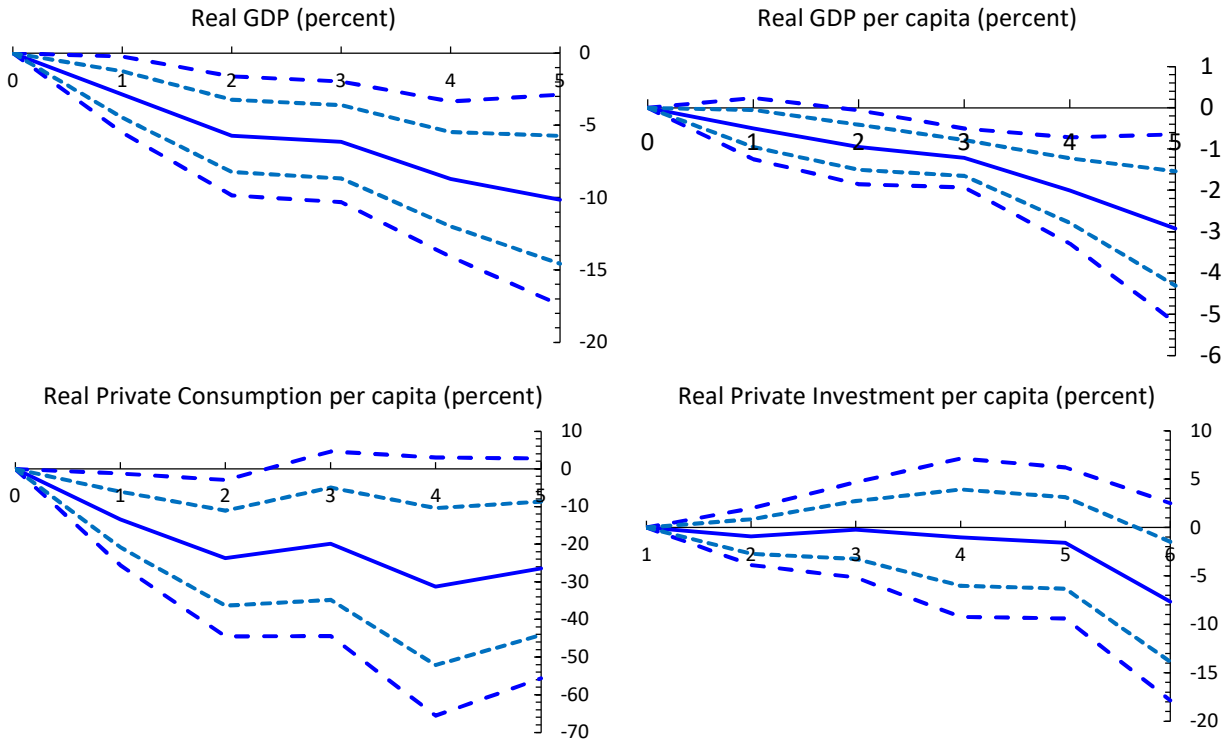
Note: x-axis in years; t=0 is the year of the terror shock. See main text for details on terror shock definition.

4. Empirical Results

4.1 Baseline

Figure 4 shows the results of estimating equation (1) for alternative dependent macroeconomic variables. Both the 90 and 68 percent confidence bands are shown. After a terror shock takes place real GDP growth goes down immediately, and the cumulative fall reaches about -10 percent after 5 years (which corresponds to more than 1.5 standard deviations). The fall in real GDP per capita (-3 percent after 5 years) is mostly driven by a statistically significant large (and persistent) decrease in real per capita private consumption. These per capita effects are in line with those found in previous studies (e.g., Crain and Crain, 2006; Meierrieks and Gries, 2012). In contrast, real per capita private investment is not affected (the point estimates are not statistically different from zero up to 5 years after the terror shock).

Figure 4. Impact of Terror Shocks on Macroeconomic Aggregates

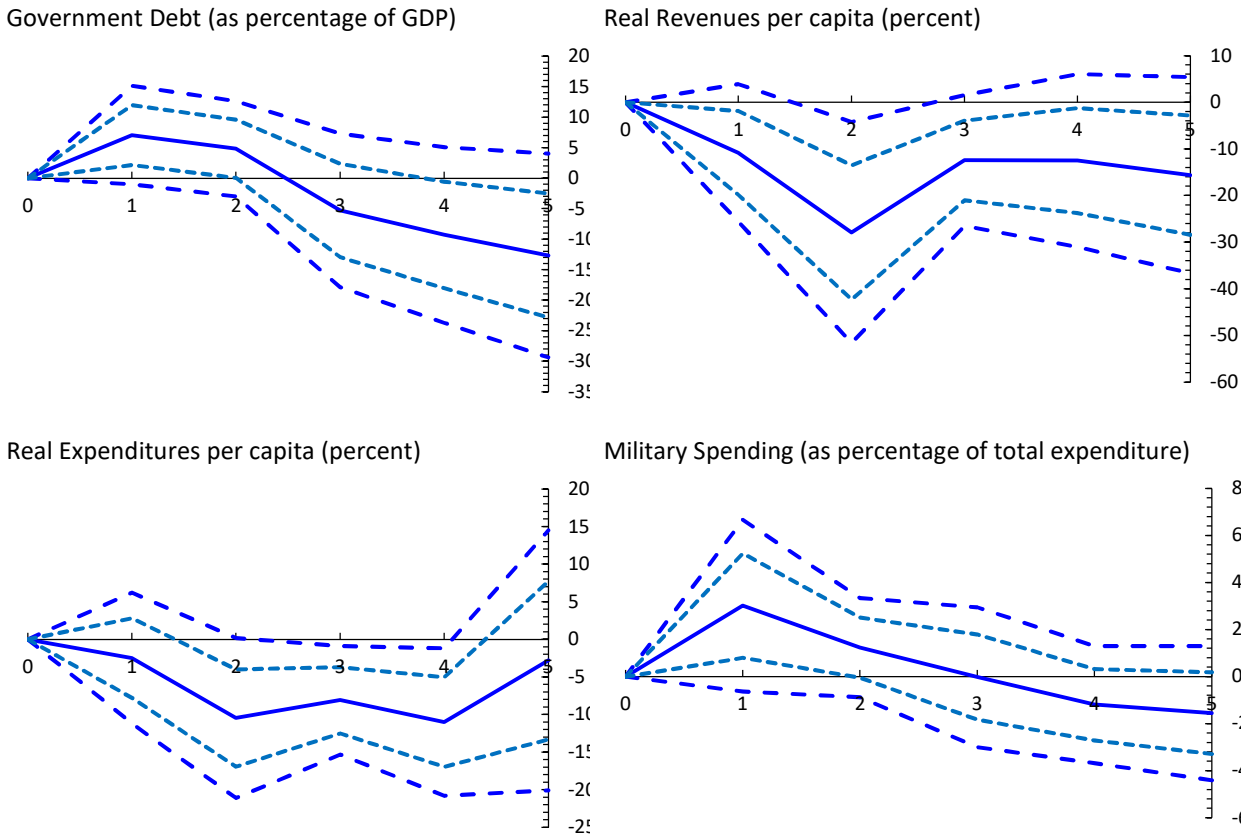


Note: x-axis in years; t=0 is the year of the terror shock. Terror Shock 1 used – see main text for definition. Solid black lines denote the response to a terror shock, blue dashed lines denote 90 percent confidence bands and green dashed lines denote 68 percent confidence bands, based on standard errors clustered at country level.

Turning to fiscal, Figure 5 plots the dynamic effects of the terror shock on government debt, real revenues per capita, real expenditures per capita and military spending (percent of total government

expenditures). In the very short-run (1-2 years after the shock), government debt goes up by 5 percentage points (and this effect is borderline statistically significant). We also observe that revenues go down by as much as 25 percent after 2 years, while expenditures fall by less than half that amount. Our evidence contrasts with that of Blomberg et al. (2004) and Gaibulloev and Sandler (2008) that showed that terrorism is associated with higher government spending. The differences arise from the fact that the former set of authors while also looking at a large panel of countries, they did so between 1968 and 2000 and relied on the ITERATE dataset for terrorist events.[15] The latter set of authors focused on a much smaller sample of 18 advanced economies between 1971 and 2004 and used not only the ITERATE source but also the TWEED one[16]. Finally, the share of military spending in total expenditures, in contrast, rises slightly in the first three years.

Figure 5. Impact of Terror Shocks on Fiscal Aggregates



Note: x-axis in years; t=0 is the year of the terror shock. Terror Shock 1 used – see main text for definition. Solid black lines denote the response to a terror shock, blue dashed lines denote 90 percent confidence

[15] International Terrorism: Attributes of Terrorist Events (ITERATE) (Mickolus et al., 2006).

[16] Terrorism in Western Europe: Events Data (TWEED) (Engene, 2007).

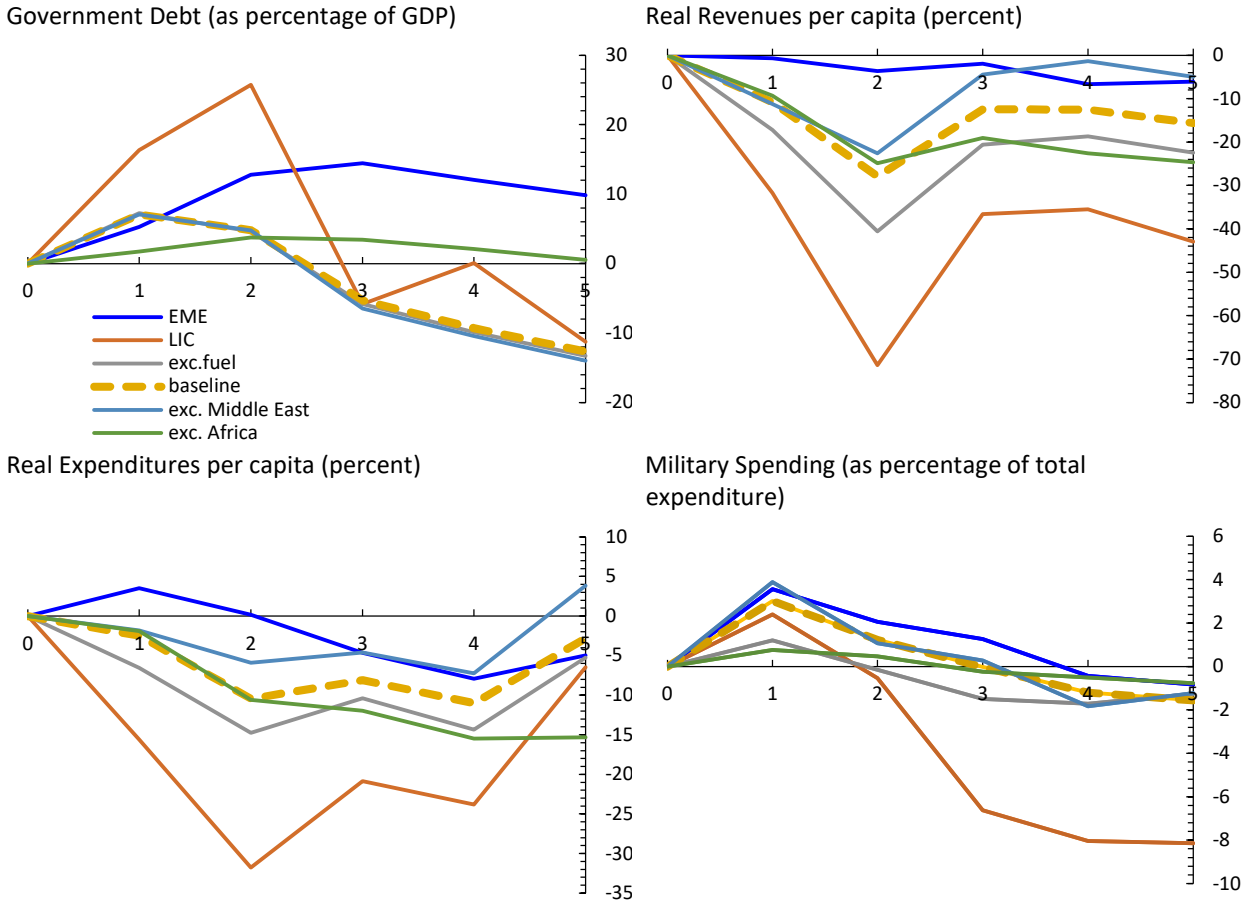
bands and green dashed lines denote 68 percent confidence bands, based on standard errors clustered at country level.

4.2 Sensitivity and Robustness

We perform several sensitivity and robustness exercises.

First, we perform a sample sensitivity exercise by re-estimating equation (1) for the following groups: i) emerging markets; ii) low-income countries; iii) all countries excluding fuel exporters; iv) all countries excluding Middle East countries; v) all countries excluding African countries. Figure 6 shows the results. We observe that, compared with the baseline – dotted yellow line – the state of public finances in low-income countries is more vulnerable to acts of terrorism than those in emerging market economics that are richer and more diversified. Moreover, excluding fuel producers magnifies the negative fiscal consequences of terrorism on revenues and expenditures. Excluding the Middle Eastern or African countries does not seem to have a big impact relative to the baseline results.

Figure 6. Impact of Terror Shocks on Fiscal Aggregates: sample sensitivity



Note: x-axis in years; t=0 is the year of the terror shock. Terror Shock 1 used – see main text for definition. Confidence bands are omitted for better graphical reading.

Second, we know that a possible bias from estimating equation (1) using country-fixed effects is that the error term may have a non-zero expected value, due to the interaction of fixed effects and country-specific developments (Teulings and Zubanov, 2010). This would lead to a bias of the estimates that is a function of *k*. To address this issue, equation (1) was re-estimated by excluding country fixed effects from the analysis. Results shown in Figure 7 suggest that this bias is negligible.

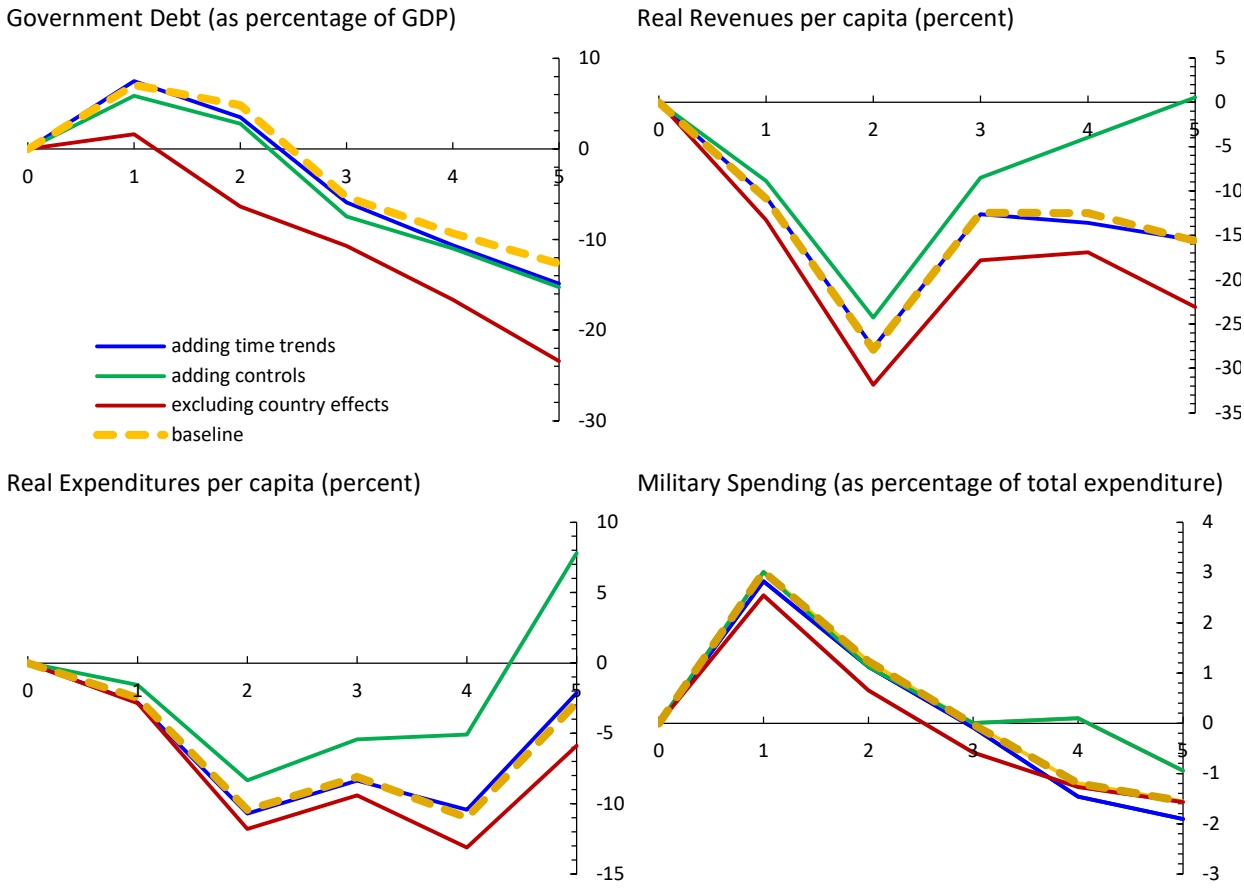
To try and estimate the causal impact of terror shocks on fiscal outcomes, it is important to control for previous trends in terrorism dynamics. The baseline specification attempts to do this by controlling for up to two lags in the dependent variable.[17] To further mitigate this concern, we re-estimate equation (1)

[17] Similar results are obtained when using alternative lag parametrizations. Results for zero, one and three lags (not shown) confirm that previous findings are not sensitive to the choice of the number of lags.

by including country-specific time trends as additional control variables. Results in Figure 7 show that the baseline results remain qualitatively unchanged.

Another possible concern regarding the analysis is that the results may suffer from omitted variable bias. To address this issue, we expand the set of controls to include other variables that have been typically found to affect the evolution of fiscal aggregates (e.g., Cevik and Ricco, 2018). In particular, we include the following additional control variables: the (log) real GDP per capita, the (log) consumer price inflation, the share of agriculture in GDP, trade openness, and a composite measure of democracy to capture institutional characteristics (polity 2 from the Polity IV database).[18] The estimated effects of terror shocks on fiscal outcomes are presented in Figure 7 and do not change the main thrust of our results.

Figure 7. Impact of Terror Shocks on Fiscal Aggregates: robustness



Note: x-axis in years; t=0 is the year of the terror shock. Terror Shock 1 used – see main text for definition. Confidence bands are omitted for better graphical reading.

[18] Additional controls were retrieved from the International Monetary Fund´s World Economic Outlook database.

An alternative terror shock variable was also tested empirically. In particular, we used terror-shock 2 in equation 1 – see definition above – to obtain the results presented in Figure A1 in the Appendix. Results are not are strong but key conclusions remain valid. Two key differences are that debt-to-GDP ratio continues to rise and the share of military outlays in total government expenditure does not fall.

Finally, we explore the role of business cycle conditions in affecting the fiscal impact of terror shocks. The position of a given economy in the business cycle may matter in terms of accentuating or mitigating the impact of a terrorist act. A second specification is estimated in which the dynamic response is allowed to vary with the state of the economy. Mathematically, we have the following equation:

$$y_{i,t+k} - y_{i,t-1} = \alpha_i + \beta_k^L F(z_{i,t}) T_{i,t} + \beta_k^H (1 - F(z_{i,t})) T_{i,t} + M_{i,t}'\theta + \varepsilon_{i,t} \quad (2)$$

with

$$F(z_{it}) = \frac{\exp(-\gamma z_{it})}{1+\exp(-\gamma z_{it})}, \quad \gamma > 0$$

in which z_{it} is an indicator of the state of the economy (the real GDP growth) normalized to have zero mean and unit variance. The weights assigned to each regime vary between 0 and 1 according to the weighting function $F(.)$, so that $F(z_{it})$ can be interpreted as the probability of being in a given state of the economy. The coefficients β_L^k and β_H^k capture the fiscal impact of terror shocks at each horizon *k* in cases of extreme recessions ($F(z_{it}) \approx 1$ when *z* goes to minus infinity) and booms ($1 - F(z_{it}) \approx 1$ when z goes to plus infinity), respectively.[19][20]

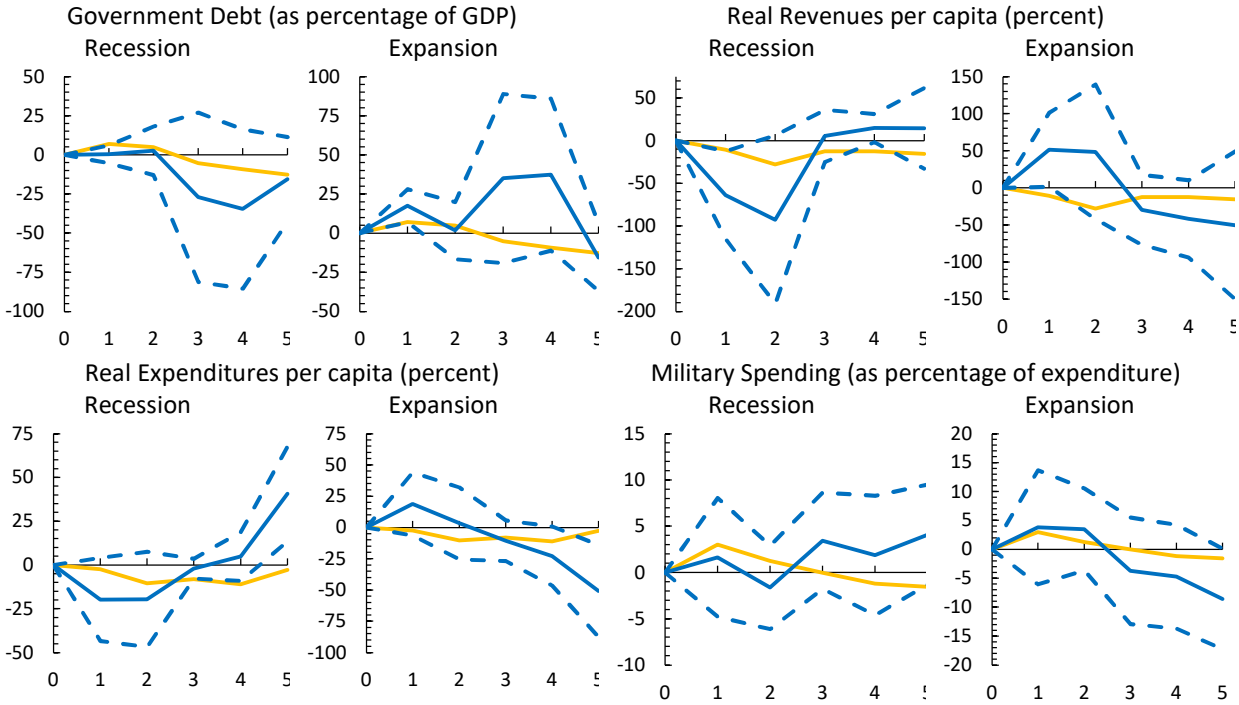
As discussed in Engene (2007) and Auerbach and Gorodnichenko (2012, 2013), the local projection approach to estimating non-linear effects is equivalent to the smooth transition autoregressive (STAR) model developed by Granger and Teräsvirta (1993). The advantage of this approach is twofold. First, compared with a model in which each dependent variable would be interacted with a measure of the business cycle position, it permits a direct test of whether the effect of the terror shock varies across different regimes such as recessions and expansions. Second, compared with estimating structural vector autoregressions for each regime, it allows the effect of terror shocks to change smoothly between recessions and expansions by considering a continuum of states to compute the impulse response functions, thus making the response more stable and precise.

[19] $F(z_{it})$=0.5 is the cutoff between weak and strong economic activity.

[20] We choose $\gamma = 1.5$, following Auerbach and Gorodnichenko (2012), so that the economy spends about 20 percent of the time in a recessionary regime—defined as $F(z_{it}) > 0.8$. Our results hardly change when using alternative values of the parameter γ, between 1 and 6.

Results suggest that the response of different fiscal aggregates to terror shocks is somewhat affected depending on prevailing business conditions, with some exceptions (Figure 8). In expansionary times, being hit by a terror event leads to a larger increase in government debt in the short-run compared with normal times. This increase is muted (effect not statistically different from zero) if the economy is in a recession which implicitly acts as a disciplinary fiscal device. If a given economy experiences a terrorist attack the negative drag on revenues in the very short-run is larger during recessionary times. The impact on the share of military spending in total government expenditures seems to be unaffected by the state of the business cycle (confidence bands are above and below the horizontal axis).

Figure 8. Impact of Terror Shocks on Fiscal Aggregates, the role of the business cycle



Note: x-axis in years; t=1 is the year of the terror shock. Terror Shock 1 used – see main text for definition. Solid blue lines denote the response to a tax reform shock, blue dashed lines denote 90 percent confidence bands, based on standard errors clustered at country level. The solid yellow lines denote the unconditional (baseline) result for a given dependent variable.

Results are also robust to re-estimating equation (2) with alternative measures of the business cycle instead of using a smooth transition function. Specifically, we alternatively employed: i) a dummy variable that takes value 1 when the real GDP growth rate of the country considered is negative and zero otherwise; ii) recession episodes identified as episodes with a negative output gap - computed with an HP-filter with smoothness parameter equal to 100 – below the 10th percentile of the output gap

distribution; iii) those produced by the Harding and Pagan (2002) algorithm to identify economic turning points. Results (not shown but available upon request) are in line with those in Figure 7, suggesting that our state-contingent results are not sensitive to the way the business cycle is measured.

5. Conclusion and Policy Implications

Since the 1970s, terrorist activity has increased worldwide with some regions affected substantially more than others. In addition to its considerable human toll, terrorism imposes significant economic costs, including the worsening of a country's public finances. In this paper, we studied the fiscal dimensions of terrorism in 191 countries spanning nearly five decades. Unlike other papers which have focused on the long-term impact of conflict, this paper makes a seminal contribution by examining the medium-term dynamics of key fiscal variables in the aftermath of a terrorist act.

The results show that terrorism lowers a country's real GDP attributable in part to falling real per capita consumption. This translates into lower per capita government tax revenues and with real per capita expenditure not falling as much, debt-to-GDP ratio rise. The composition of government spending shifts in favor of military spending, thereby squeezing priority spending on infrastructure and social sectors. The magnitude of the impact is more severe when an alternative indicator of terrorism is deployed in the analysis. Low-income countries are affected considerably more than both emerging market and advanced economies, suggesting that the former group of countries are economically more vulnerable to acts of terrorism. The adverse effects of terrorism on revenues and expenditures are smaller in countries that are fuel producers.

This study reinforces the message that it is crucial for countries to build buffers to counter shocks, including those arising from terrorism. This is more so because there is no international facility that a country can tap when faced with a significant act of terrorism. For low-income and emerging market economies, continued efforts to raise more resources domestically would give them room to maneuver when confronted with terrorism.

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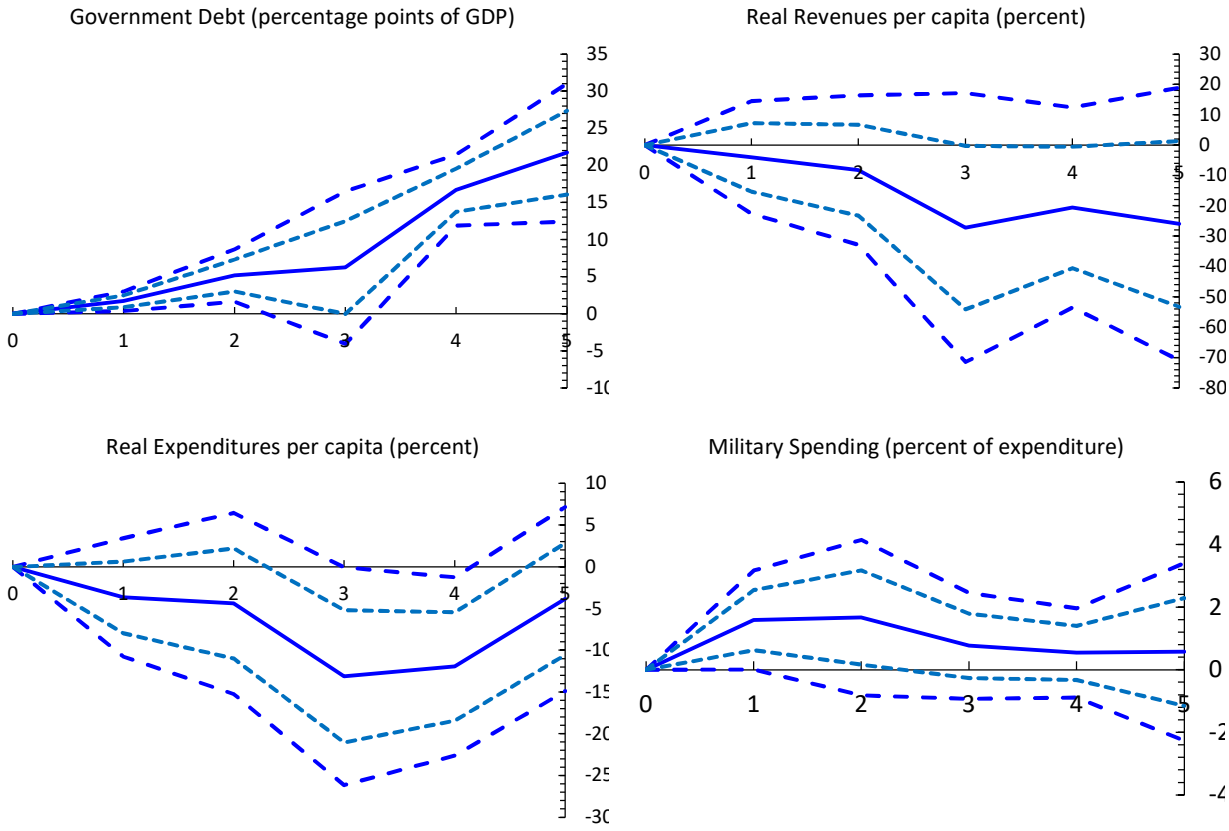
APPENDIX

Table A1. Summary Statistics

Variable	Observations	Mean	Standard deviation	Minimum	Maximum
Real GDP growth	7967	3.430	6.248	-109.833	90.815
Real GDP (ln)	8164	5.478	3.574	-8.424	16.109
Real private consumption per capita (ln)	6255	-0.971	2.279	-9.284	6.384
Real private investment per capita (ln)	2667	2.225	2.261	-5.264	9.845
Total revenues (percent of GDP)	4800	29.060	14.045	0.637	164.054
Total expenditures (percent of GDP)	3999	31.924	17.821	0.000	539.233
Military spending (percent of total expenditure)	2142	8.410	6.20	0.000	57.475
Government gross debt (percent of GDP)	2617	52.164	34.76	0.741	283.77

Figure A1. Impact of Major Terror Events: terror shock 2



Note: x-axis in years; t=0 is the year of the terror shock. Terror Shock 2 used – see main text for definition. Solid black lines denote the response to a terror shock, blue dashed lines denote 90 percent confidence bands and green dashed lines denote 68 percent confidence bands, based on standard errors clustered at country level.