

How does terrorism hollow out the sustainable economic growth in Big Ten Countries?

Terrorism and sustainable economic growth

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Abstract

Purpose – The main objective of this research is to investigate if there is a long-term relationship between “terrorism” and sustainable “economic growth” in Big Ten Countries.

Design/methodology/approach – The data was tested via Panel ARDL Analysis. The growth rate (GR) is the dependent variable, and the “Global Terror Index (GTI)” is the independent variable as the terror indicator. The ratio of Foreign Direct Investment (FDI) to the Gross Domestic Product (GDP), and the ratio of External Balance (EB) to Gross Domestic Product (GDP) are included in the model as the control variables due to their effect on the growth rate. A Panel ARDL analysis is conducted to examine the existence of long-term co-integration between terror and the economy. The planning of the study, the formation of its theoretical and conceptual framework, and the literature research were carried out in 2 months, and the collection of data, the creation of the methodology and the analysis of the analyzes were carried out in 2 months, the interpretation of the findings and the development of policy recommendations were carried out within a period of 1 month. The entire study was completed in a total of 5 months.

Findings – Results showed that “Terror” has a negative impact on “Growth Rate” in the long term while “External Balance” and “Foreign Direct Investment” positively affect the Growth Rate. The coefficients for the short term are not statistically significant.

Research limitations/implications – The sample is only limited to Big Ten including China, India, Indonesia, South Korea, Argentina, Brazil, Mexico, Turkey, Poland and South Africa. The period for annual data collection covers the years between 2002 and 2019 and due to the unavailability of data.

Practical implications – Considering the risks and the mutual negative effect that turns into a vicious circle between terrorism and the economy, it is necessary to eliminate the problems that cause terrorism in the mentioned countries, on the one hand, and to develop policies that will improve economic performance on the other.

JEL Classification — A12, C55, D31, D74, E01, F43

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Social implications – Trustful law enforcement bodies have to be established and supported by all technological means to prevent terror. The conditions causing terror have to be investigated carefully and the problems causing terror or internal conflict have to be solved. International cooperation against terrorism has to be strengthened and partnerships, information, experience sharing have to be supported at the maximum levels.

Originality/value – It is certain that terror might have a negative influence on the performance of economies. But the limited number of studies within this vein and the small size of their sample groups mostly including single-country case studies require conducting a study by using a larger sample group of countries. Big Ten here represents at least half of the population of the world and different regions of the Globe.

Keywords Terrorism, Sustainable economic growth, Big Ten Countries, Panel ARDL analysis

Paper type Research paper

1. Introduction

In the past several decades, many countries have witnessed a variety of internal and/or international conflicts while many suffer from terrorism in addition to existing other social and economic problems. Even though most of these challenging problems have intersections among themselves, the relation between a secure business environment providing stability and predictability and sustainable economic growth is the most prominent for almost all countries seeking ways to develop their economy and increase their economic growth. From a developmental perspective, *sustainability* means the ability to ensure continuity without losing control, and it has three dimensions among which the balance has to be preserved, *environmental, social and economical* (Gazibey *et al.*, 2014, p. 511). To investigate the possible impacts of *terror* on *sustainable economic growth* which falls under the *economic dimension of sustainability* as a main indicator, the long-term relationship between the two variables has to be analyzed and there is a gap regarding this issue in the literature. Within this frame, Shahbaz *et al.* (2013a, b, p. 21) assert that even if academics have historically focused on the economic consequences of war and internal conflicts, the impact of terrorism did not receive sufficient attention. On the contrary, current terrorism literature has mainly studied the impact of the political and institutional factors on terrorism (Gassebner and Luechinger, 2011, pp. 235–261; Krieger and Meierriecks, 2019, pp. 125–136), or just focused on analyzing the cointegration between the variables for single cases as Pakistan (Shahbaz *et al.*, 2013a,b, pp. 21–29).

So, most of the researchers study the relations between various variables with economic growth but they usually neglect terrorism and its impacts as a variable, which can be determined as a gap in the existing literature. In a similar vein, it is possible to see that there are some studies investigating the relations between economic growth, military expenditure and political instability. E.g. Maher and Zhao (2022) study the relationship between political instability and economic growth in the Egyptian economy over the period 1982–2018 by using an autoregressive distributed lag (ARDL) approach. Their results show a significant negative relationship between political instability and economic growth. Conversely, the impact of military expenditure is insignificant on economic growth in the long run. In a similar vein, Biglaiser *et al.* (2023) assert that economic instability has increased because of specific domestic terrorist attacks, which in turn leads to the loss of capital and so, misuse of resources since they were allocated to counterterrorism instead of productive sectors. Finally, as mentioned by the authors (Biglaiser *et al.*, 2023) the country's economy has weakened by these negative economic changes.

On the other hand, some studies concentrate on the impacts of terror on trust. E.g. Ahmad and Rehman (2021) show how the persistent shock of terrorism affects people's trust in Pakistan.

Another recent study conducted by Esteller-Moré and Rizzo (2022) investigated a secessionist conflict's economic costs in Spain's Catalonia region. The authors assert that Catalan society has been progressively affected by the conflict in several dimensions

including the economy. Even if this study is related to a kind of conflict, it is not directly based on terrorism and its impacts on the economy, since it mainly focuses on political conflicts.

In one of the most relevant studies, [Kisangani and Nafziger \(2007\)](#) analyzed factors contributing to terrorism. Real GDP growth, military expenditures/GDP, real per capita GDP, mineral exports/GDP and population density were the independent variables of the economy in the study. The “murder of people by the government”, and “democide” were included in the authors’ model as the dependent variables. The researchers concluded that the probability of democide was increased by mineral exports and poor economic performance (both level and growth of income). As could be seen this research investigates the reasons and/or factors affecting terrorism.

Of course, it is a general view that investors and capital seek safe heavens to make investments and that’s why investors hesitate to transfer their capital to regions suffering from any kind of conflict including terror. Since fear of terrorism has strong implications for public governance ([Van Der Does et al., 2021](#), pp. 1276), it is certain that terror might have a negative influence on the performance of economies. But the limited number of studies within this vein and the small size of their sample groups mostly including single-country case studies encourage us to conduct a study by using a sample group of countries at least representing half of the population of the whole world and also representing different regions of the Globe. So, the assumptions asserting that *activating a secure environment for business that aims for stability and predictability by preventing terror and other types of conflict, positively affects the economic growth on a sustainable basis of any country* needs to be empirically studied with larger sample groups, especially including those countries with an impulsive economy on the global scale. After the aforementioned expectations, it is significant to conduct a study to provide an answer to a research question: *is there a long-term relationship between ‘terrorism’ and sustainable ‘economic growth in Big Ten Countries?’* So, the hypothesis of *there is a significant long-term relationship between ‘terror’ and sustainable ‘economy’ in the Big Ten countries* was tested via the Panel ARDL Analysis. Big Ten Countries here include China, India, Indonesia, South Korea, Argentina, Brazil, Mexico, Turkey, Poland and South Africa. Because of the data limitation and shared data problems, the annual data covering the years between 2002 and 2019 were included in the tests. The “Growth Rate (GR)”, which is generally used as the basic economic variable in the literature is determined as the dependent variable to represent sustainable economic growth. The “Global Terror Index (GTI)” was determined as the independent variable to represent the terror indicator. Besides, since their effect on the growth rate which is the dependent variable, the ratio of Foreign Direct Investment (FDI) to the Gross Domestic Product (GDP), and the ratio of External Balance (EB) to Gross Domestic Product (GDP) are included in the model as the control variables. To investigate the existence of a possible long-term co-integration and causation between terror and the economy, a Panel ARDL Analysis was conducted.

Ten countries included in the Big Ten were chosen as the sample group to elucidate any possible relationship between indicators of terrorism and economic growth. To briefly discuss, as mentioned by [Garten \(1997\)](#) and [Cellich \(1998\)](#) the Big Ten consists of those selected 10 countries which offer financial stability in the long term, and which have the best potential growth potential as being among the major emerging markets. [Garten \(1997\)](#)’s selection of these countries includes different individual countries representing various continents and regions of the World: (1) China, (2) India, (3) Indonesia, and (4) South Korea in Asia; (5) Argentina, (6) Brazil, and (7) Mexico in Latin America; (8) Turkey in the Middle East; (9) Poland in Europe; (10) South Africa in Africa. [Garten \(1997\)](#) used some criteria in selecting these countries, which are categorized into the following five features: (1) Having large populations, domestic markets and resource bases, and the countries evaluated as the powerhouses in their respective regions; (2) the countries playing significant roles in the global arena and shattering the status quo; (3) which can be evaluated as being the major

participants in the critical political, economic and social global agendas; (4) The countries which are the main actors behind the explosive growth of global trade as representing the world's fastest expanding markets; and finally (5) The ten countries which try to open their economies, privatize and/or dispose of their state enterprises, and balance their budgets. These ten countries are and will be dominating the major developing sectors of the global economy as energy, information technologies, transportation systems and environmental technology as well with a very huge population.

So, it is possible to assess that the economies of these countries shall attract an enormous amount of foreign investment as well because of their potential. On the other hand, although these countries have a high potential for economic growth and effective returns for investors there are some risks indicated not to be regarded as well. As reviewed by Cellich (1998, p. 95), according to Garten (1997), any company aiming to invest in emerging markets including the Big Ten has to be aware of the potential financial risks which may be caused by possible instability both in political and in economic fields. Of course, political instability includes possible internal and international conflicts also. Moreover, potential conflicts in turn worsen both the political and economic stability. As mentioned before, since investors seek stability and predictability in areas where they will make an investment, conducting empirical analyses on the relationship between variables of war and conflict-like issues and economic growth carry of major importance. As an important and challenging problem, by deteriorating the security situation in any region, terror and its impacts have to be studied within this frame including *multi-country* data, but Big Ten countries which have more than half of the global population and include some countries suffering from terror the most as Turkey.

Thus, the aim of this research is to fill this gap after analyzing the cointegration between terror and economic growth in Big Ten via a Panel ARDL test to provide evidence-based empirical results for the economics, and political science literature and policy practitioners of the countries.

In the study, firstly, the existing literature on the subject was examined, then the methodology used in the analyses was revealed, after the information about the methodology, the findings obtained as a result of the analyzes were included and these findings were compared with the existing literature, and the results and policy recommendations were included in the last section.

2. Literature review

This chapter deeply reviews the existing literature on terror and its economic impacts. The possible relations between terror and economic growth and/or the impacts of terrorism on some other variables are investigated by researchers applying various methods in different periods. Brief information about these researches, the variables used, the methods applied and the results and findings reached are presented in Table 1.

When Table 1 about the current literature is analyzed, it is possible to see that there are some researchers finding significant negative relation between terror and economic growth and/or development like Persistz (2007), Gaibullov and Todd (2009), Araz Takay *et al.* (2009), Blomberg *et al.* (2004), Gaibullov and Todd (2011), Freytag *et al.* (2011), Caruso and Schneider (2011), Shahbaz *et al.* (2013a, b), Shahzad *et al.* (2016), Mohamed *et al.* (2019), Korotayev *et al.* (2021), Meierrieks and Schneider (2022) and Paul and Bagchi (2023). When these studies are investigated it is possible to see that some of them focus only on one unique country like Pakistan, or Israel, or a single specific region like Sub-Saharan Africa, Asian Countries or European Countries. On the other hand, there are some studies that reach conflicting results with the already mentioned studies. E.g. Llussa and Travers (2011) reached a finding that while terror acts have a statistically significant negative

Authors	Variables	Methods and countries	Findings
Persitz (2007)	Gross Domestic Product GDP, Imports, The Ratio of GDP per Sector, Special Final Consumer Expenditures, Investments, Public Expenditures, Exports, Population Density	VAR Analysis (1980–2003) period, Israel	Within the analysis, the conditions under the effect of terrorism and without terrorism are compared, and in the post-1994 period with the absence of violent acts in Palestine, the country's <i>GDP per capita</i> is estimated to be 8.6% more in 2003
Araz Takay et al. (2009)	Economic Growth	STVAR Cointegration Tests (1987, p. 1 to 2004, p. 4) periods	<i>A statistically significant negative impact of Terrorism on economic growth is found</i>
Gaibulloev and Todd (2009)	Income per Capita	Panel Data Analysis, (1970–2004) periods, 42 Asian Countries	The results showed that the <i>negative impact of terror caused low investment levels</i>
Llussá and Travers (2011)	Consumption and Investment, Public Expenditures	Panel Data Analysis, (1970–2007) periods, 187 Countries	There is a negative statistically significant impact of terror on consumption and investment levels. On the other hand, no statistically significant impact of terrorism is found on economic growth and public expenditure
Blomberg et al. (2004)	Economic Growth	Panel Data Analysis, (1968–2004) periods, 46 Sub-Saharan African Countries	Although the terror events in the Sub-Saharan African region are less than in the rest of the World, the research found <i>that there is a strong relationship between terrorist acts and economic growth</i>
Gaibulloev and Todd (2011)	Economic Growth	Panel Data Analysis, (1970–2007) periods, 51 African Countries	Results showed that terror does not have any impact on the real income level per capita but conversely, international terror events have a significant marginal impact on economic growth
Freytag et al. (2011)	Gross Domestic Product GDP per Capita, Investments, Political Instability	Panel Data Analysis, (1971–2007) periods, 110 Countries	<i>Results showed that the level of development and economic growth is high in the countries which could succeed to decrease the level of terrorist acts</i>
Caruso and Schneider (2011)	Unemployment and Income per Capita	Panel Data Analysis, (1994–2007) periods, 12 European Countries	<i>There is a negative relation between the level of terror events and employment and economic growth</i>
Meierrieks and Gries (2013)	Economic Growth and Inflation	VECM Granger Causality and Cointegration were analyzed by ARDL Limit Tests, (1971–2010) periods, Pakistan	Results showed that high inflation rates triggered the level of terrorist acts while low levels of inflation rates decreased the level of terrorist acts
Shahbaz et al. (2013a)	Foreign Direct Investment (FDI)	Least Squares Analysis, (2000-201) periods, Pakistan	<i>Terror events cause a decrease in the level of FDI by causing a loss of trust in the economy of the country among foreign investors</i>
Shahbaz et al. (2013b)	Economic Growth, Capital Stock per Capita, External Balance – (EB)	ARDL Limit Tests, (1973–2010) periods, Pakistan	<i>A long-term relationship is found between economic growth and terrorism. There is a single-sided causality from terror to economic growth, while there is a two-sided causality between terror and external balance</i>

(continued)

Table 1.
Related studies in the literature

Authors	Variables	Methods and countries	Findings
Shahzad <i>et al.</i> (2016)	FDI, Economic Growth	ARDL Limit Tests, (1988–2010) periods, Pakistan	<i>A long-term relationship is found between economic growth, FDI, and terrorism.</i> Furthermore, a two-sided causality between terror and FDI is also reached
Estrada <i>et al.</i> (2018)	Indicators are <i>economic degrowth</i> (δ), <i>intensity of terrorist activities</i> (α), <i>terrorist attack losses</i> (π), <i>economic wear</i> (Π), <i>level of terrorist attack tension</i> (ζ), <i>level of terrorist attacks monitoring</i> (η), and total economic leaking	(TAVE-Model) to evaluate the effect of Terrorism on the economic performance of Turkey	Economic leaking, economic degrowth, and economic wear have increased between 1990 and 2016
Mohamed <i>et al.</i> (2019)	Renewable or Fossil Energies, Economic Growth and Trade Openness (ED)	ARDL Limit Tests (1980–2015) periods	<i>A long-term cointegration is found among all the variables.</i> Furthermore, a long-term two-sided causality among all the variables is reached
Korotayev <i>et al.</i> (2021)	Per capita GDP and the level of terrorist activity, educational level, unemployment, number of factional democracies, and number of consolidated democracies	Cross-national tests with negative binomial regression models	Negative correlation between per capita GDP and the level of terrorist activity
Meierrieks and Schneider (2022)	Dependent variable: <i>de jure economic openness KOF De Jure Globalization Index</i> , Independent variable: <i>terrorism</i> (drawn from the Global Terrorism Database (GTD)), Control variables: <i>policy diffusion</i> , <i>population size</i> , a country's <i>level of economic development</i> , the effect of <i>democracy</i> on policy choices	The effect of terrorism on international economic policy for a panel of 170 countries between 1970 and 2016	Countries resort to less liberal international economic policies when facing the threat of terrorism
Paul and Bagchi (2023)	<i>Terrorism, immigrants' quality of life</i> , GDP per capita.	OECD Countries	GDP per capita is adversely affected by domestic terrorism

Table 1.

Source(s): Table by authors

impact on investment and consumption levels, it does not have the same impact on economic growth and public expenditure. Another study reached that terrorist acts have different impacts on different variables. In this study, [Gaibulloev and Todd \(2011\)](#) reached that while terror does not have any impact on the real income level per capita, it conversely has a significant marginal impact on economic growth. The conflicting ideas within all these aforementioned studies show that a hole exists in the related literature and this status provokes conducting empirical studies researching the interaction between terrorism and economic growth. Thus, this study aims to fill this gap by including the data of the Big Ten Countries as a sample group, since the issue still reserves its attractiveness to be studied with the data from other sample groups, covering a different period and by applying different methods.

Within this frame, this study aims to fill the aforementioned gaps in the academic literature by adapting some required differences. The main differences between the study from the current literature can briefly be explained below:

- (1) New generation tests are used for the analysis.
- (2) The analyzed countries within the sample group include totally different individuals as Big Ten Countries, which totally include more than 50% of the World's population and compose the fastest developing ones, countries suffering from terrorism since 1984 like Turkey.

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- (3) The time period covered is also different than the studies within the literature.

Within the frame of all the above explanations, the relationship between terror level and economic growth through Big Ten Countries was analyzed.

3. Methods and econometric analysis

The research analyses the relationship between terrorism and sustainable economic growth by using the data of the countries involved in Big Ten. So, the analyses are conducted to answer the research question of “*is there a significant long-term relationship between ‘terror’ and sustainable ‘economy’ through the data of Big Ten countries?*”? Within this frame firstly the model of the research and the data set to be used for testing the hypothesis are introduced and then the method to be employed is assessed. After explaining the model for the conceptual and theoretical framework, the analyses are conducted, and the findings are interpreted.

3.1 Data set and model

The hypothesis of “*there is a significant long-term relationship between ‘terror’ and sustainable ‘economy’ through the data of Big Ten Countries*” is tested by applying panel data analysis methods. The countries included in the Big Ten here are China, India, Indonesia, South Korea, Argentina, Brazil, Mexico, Turkey, Poland and South Africa. Because of the data limitation and shared data problems, specifically, the annual data for the period between 2002 and 2019 was used for the tests.

The main reason motivating the research hypothesis is the impact of increasing defense expenditures on the economy, due to the instability and deteriorating security environment caused by terrorist attacks and its harmful results on sustainable economic growth. Because experiencing instability in macroeconomic variables is a usual result for countries suffering from intensive terrorist attacks. Foreign private investors and countries which have the potential to transfer capital abroad behave reluctantly when investing in countries facing terrorist attacks often. The main motive behind this choice is the trust factor. Besides, the considerable amount of defense expenditures allocated from the fiscal budgets of these countries also has negative pressure on the economy. So, it is assumed that increasing numbers of terror events shall have significant negative impacts on those countries’ economies in the short and long run which negatively affects the economies’ sustainability as well. It is also known that economic development level also has an impact on terror in the short and long term. In finding easy support for their activities, terrorist organizations face difficulties in countries with high welfare levels. Terrorist organizations can not provoke mass actions easily since they do not have sufficient material as unemployment, inflation and low-income level per capita in developed countries. So, it can be asserted that terrorist acts shall be less experienced within strong economies. With reference to the mentioned reasons, the basic motivation of this study relies on the hypothesis: “there is a long-term relation between terror and a sustainable economy”.

The variables of the hypothesis, compatible with the studies in the literature are given in [Table 2](#). In determining the variables of the model, we applied them to the existing literature as can be seen in the literature summary in [Table 1](#) above, coinciding with the previous studies. Within this scope, the basic economic variable of the literature, which is the Growth Rate (GR) is selected as the dependent variable for sustainable economic growth. The main reason behind this relies on the fact that the basic economic power and welfare level of a country is analyzed by using the data on growth rates. As for the independent variable, the

“Global Terror Index (GTI)”, which is mostly used to represent the terror indicator within the studies (as can be seen in the literature table) was used to represent the terror indicator.

In determining the independent variables, special attention was given to choosing those relevant to the literature. Besides, the economic relations of those variables are taken into consideration with the dependent variable as well. It is known that foreign direct investment (FDI) among the independent variables affects economic growth through the external balance (EB). Moreover, it is possible to assert that FDI accumulations affect economic growth positively via the increase in foreign currencies and increase in production. Another variable of the model external balance (EB) is an important one used in the calculations of national income. A negative external balance is evaluated as an insufficiency in savings. In other words, external balance is a significant economic power of a country that has an effective impact on economic growth. Last but not least, it should be mentioned that as the independent variables included in the model are effective on the growth rates of the countries, they are significant driving forces on terror, which is the basic motivation of the research as well. As mentioned, when explaining the hypothesis of the research above, terrorist acts in a country have negative impacts on many economic variables. Foremost among them come many sub-items of FDI and EB.

In addition to the independent and dependent variables, since their effect on the Growth Rate (GR) which is the dependent variable, the ratio of Foreign Direct Investment (FDI) to the Gross Domestic Product (GDP), and the ratio of External Balance (EB) to Gross Domestic Product (GDP) are included in the model as the control variables. All the selected variables are supported by the variables used by the existing literature in [Gaibullov and Sandler \(2008\)](#), [Zeb et al. \(2014\)](#), [Fatah and Salihoglu \(2016\)](#) and [Serfraz \(2017\)](#). In addition, it is not needed to take the logarithm of the variables since all of them are ratios and index values.

To analyze the relationship between terror and a sustainable economy, the following model is designed by covering the sample group’s data range ([Equation 1](#)).

$$GR_{it} = \beta_0 + \beta_1 GTI_{it} + \beta_2 FDI_{it} + \beta_3 EV_{it} + \varepsilon_{it} \quad (1)$$

$i = 1, 2, 3, \dots$ in the model “ N ” represents the cross section data, while $t = 1, 2, 3, \dots$ “ T ” is the time dimension, and ε is the error term.

3.2 Econometric method

The methodological ranking in this study is given below to analyze the relationship between terror and the economy by using Big Ten Countries’ annual data for the period between 2002 and 2019:

- (1) [Breusch and Pagan \(1980\)](#)’s CD_{lm1} , [Pesaran et al. \(2008\)](#)’s LMadj tests were utilized for analyzing the variables’ cross-section dependency.
- (2) [Pesaran \(2007\)](#)’s CADF and [Levin et al. \(2002\)](#)’s Fisher ADF, Fisher PP and [Hadri \(2000\)](#)’s; and [Im et al. \(2003\)](#)’s stationarity tests were applied to determine if the variables in the model have a unit root.

Variables	Explanation	Sources
GR	Growth Rate	World Bank Indicators
GTI	Global Terror Index	Vision of Humanity
FDI	Foreign Direct Investment/GDP	World Bank Indicators
EB	External Balance/GDP	World Bank Indicators

Table 2.

Variables and sources

Source(s): Table by authors

- (3) Pesaran and Yamagata (2008)'s homogeneity test was applied to determine the homogeneity or heterogeneity features of variables.
- (4) Finally, to determine whether there is a cointegration among the variables included in the model, Pesaran *et al.* (2001)'s Panel ARDL test and coefficient estimation are used.

3.2.1 Cross-section dependence test. Before the hypothesis tests in the studies using panel data analyses, it needs to be conducted a Cross-Section Dependence analysis to determine the presence of a cross-section between variables. The dependency between countries has increased in the recent globalization period. This dependency causes a kind of chain impulse and appearing any negative or positive development and/or any sudden shock in any single country carries the potential of affecting other individual national economies. So, the cross-section dependence caused by the problem of "common factor" should be detected in econometric studies.

Without a cross-section analysis, Philips and Sul (2003)'s, Andrews (2005)'s and Pesaran (2006)'s related studies give biased and inconsistent results. Besides, as asserted by Breusch and Pagan (1980), and Pesaran (2004) the analyses need to be continued by considering this issue if cross-section dependence in variables is present.

So, the following tests have to be used to determine cross-section dependency:

- (1) Breusch and Pagan (1980)'s CD_{lm1} test is used in cases when the time dimension is smaller than the cross-section dimension ($T > N$),
- (2) Pesaran (2004)'s CD_{lm2} test is used in cases when the time dimension equals to the cross-section dimension ($T = N$),
- (3) Pesaran (2004)'s CD_{lm} test is used in cases when the time dimension is smaller than the cross-section dimension ($T < N$),
- (4) LM_{adj} test belonging to Pesaran *et al.* (2008) is used in cases when the time dimension is both greater ($T > N$) and smaller ($T < N$) than the cross-section dimension.

In our equation, the cross-section dimension represented by the term N is 10 (The number of included countries is ten – Big Ten). For the number of years being analyzed the term T is 17 (years between 2002 and 2019). So, CD_{lm1} test belonging to Breusch and Pagan (1980), and LM_{adj} test of Pesaran *et al.* (2008) were applied for the analyses since $T > N$ ($17 > 10$).

Since $T > N$, based on the CD_{lm1} and LM_{adj} results, it is possible to make decisions by considering countries and time dimensions in the model. Again, since the CD_{lm1} test may produce biased results in cross-section dependence tests, LM_{adj} test results are considered in general. Except for FDI, GR and GTI, the probability values of all the variables are statistically significant at 0.01 level, and EB at 0.05 level as can be seen in the cross-section dependence test results in Table 3. According to the LM_{adj} test results, the probability level is not statistically significant for the FDI variable.

With reference to LM_{adj} test results, for GR, GTI and EB variables, the main hypothesis of "there is no cross-section dependence between sections" is denied and the hypothesis of "there is cross-section dependence between sections" is accepted. This shows that any shock effect in one of the Big Ten Countries shall affect others in the group as well and this situation is consistent with the interdependency of the countries in the modern global world. So, policy and decision-makers in particular and the governments in general in the countries of the sample group should take the current events into account and produce their policies by taking the multilateral interdependency and interaction among the variables. Finally, according to the results, the tests did not show any cross-section dependence for the FDI variable.

Variables	CD tests	CD _{lm1} (Breusch and Pagan, 1980)	CD _{lm2} (Pesaran, 2004)	CD (Pesaran, 2004)	LM _{adj} (Pesaran <i>et al.</i> , 2008)
GR	<i>T</i> statistics	117.2497*	7.615783*	3.204901*	7.303283*
	Probability Value	0.0000	0.0000	0.0000	0.0014
GTI	<i>T</i> statistics	146.3394*	10.68211*	10.11344*	10.36961*
	Probability Value	0.0000	0.0000	0.0000	0.0000
FDI	<i>T</i> statistics	59.32850**	1.510357	1.773789**	1.197857
	Probability Value	0.0745	0.1310	0.0761	0.2310
EB	<i>T</i> statistics	129.0530*	8.859961*	2.210707*	8.547461**
	Probability Value	0.0000	0.0000	0.0000	0.0271

Table 3.
Cross-section
dependence test results

Note(s):* ** and *** show dependency between sections respectively at 1, 5 and 10% significance levels
Source(s): Table by authors

3.2.2 Panel Unit Root Test. Stationarity tests should be performed in econometric analyses to provide a solution for the spurious regression problem. According to [Granger and Newbold \(1974\)](#), if variables are with unit roots in series, the results of the analysis shall not be realistic. The determination of stationarity in series is measured by [Gujarati \(1999\)](#) as follows: if the variance and average of a series do not change in time and also the covariance between the periods is based on the distance between two periods only but not the period of this covariance, a series is stationary in this case.

In stationarity tests of panel data analyses, the key issue that needs to be considered is if the countries in the sample are independent of each other or not. Within this scope, the unit root tests of panel data analyses consist of the first- and second-generation tests. The first-generation unit root tests fall into two groups based on the homogeneity and heterogeneity characteristics of the countries. [Göçer *et al.* \(2012, p. 457\)](#) assert that mostly the tests belonging to [Levin *et al.* \(2002\)](#), [Hadri \(2000\)](#) and [Breitung \(2005\)](#) applied for the homogeneity assumption. However, based on the assumption of heterogeneity, [Im *et al.* \(2003\)](#)'s, [Maddala and Wu \(1999\)](#)'s and [Choi \(2001\)](#)'s analyses are conducted.

The second-generation unit root tests consider the cross-section dependence opposite to the first-generation unit root tests. That's why in this study the second-generation tests are preferred by taking the assumption of "a shock faced by one of the countries in the panel may affect all others as well" into consideration.

Within this study, the second-generation unit root tests are applied due to the presence of a cross-section dependence among the GR, GTI and EB variables. Conversely, first-generation unit root tests have to be used for the FDI because there is not a cross-section dependence for this variable. That's why, as being the most preferred test in the literature, the CADF unit root test developed by [Pesaran \(2007\)](#) is applied for GR, GTI and EB variables, and Im, Pesaran and Shin (IPS), Levin, Lin and Chu (Fisher ADF, Fisher PP) and Hadri's stationarity tests have to be used for FDI variable.

CADF unit root test differs from other unit root tests in the literature for the following characteristics:

- (1) CADF provides consistent results for situations of $T > N$. In this study for the cross-section dimension, the time dimension is $T = 17$, and $N = 10$. Since $T > N$, CADF unit root test is used.
- (2) A test statistics value is calculated for all units consisting of the model during the analyses, and then CIPS (Cross-Sectional Augmented IPS) test statistics are calculated after applying the arithmetic means of these tests for the whole panel.

- (3) An extended version of ADF regression with lagged mean of a cross-section is conducted for applying the CAF test. The regression model of CADF shall be reduced to a level of estimation by OLS in this way for Equation (1) (Pesaran, 2007, p. 269).

$$\Delta y_{it} = a_i + b_i y_{i,t-1} + c_i \bar{y}_{t-1} + d_i \Delta \bar{y}_t + e_{it}$$

Pesaran (2007) utilized Monte–Carlo simulations to compare the CADF and CIPS test statistics values generated by the CADF unit root tests. This comparison aimed to test the stationarity hypotheses. Specifically, if the absolute values of the calculated CADF and CIPS test statistics exceed the critical table values provided by Pesaran (2007) in the range of 265–312, then the fundamental hypothesis of a unit root in the series is rejected. Conversely, if the calculated values are smaller than the critical table values, the alternative hypothesis of no unit root in the series is accepted for the overall panel.

In this study, the stationarity of the variables GR, GTI, and EB in the serials of the model was examined. The analysis was conducted for both the overall panel and the individual cross-section units comprising the panel. The CADF unit root test (constant model) was employed for this purpose, and the obtained results, along with the critical table values from Pesaran (2007), are presented in Table 4.

Various stationary levels are seen when CADF test results for GR, GTI and EB variables for the countries included in the panel in Table 4 are investigated. The status for the variables is as follows:

- (1) GR variable level value is stationary at a significance level of 1% in Argentina and South Africa, while it is stationary at a significance level of 5% in Poland. It has unit roots in all other countries. When the CIPS statistics, which show the stationary level for overall the panel, are evaluated it is seen that the GW variable is stationary at a significance level of 10%.
- (2) GTI variable level value is stationary at a significance level of 10% in China and Mexico; while it is stationary at a significance level of 5% in Turkey. When the CIPS statistics reflecting the stationary level of overall panel are evaluated it is seen that the GW variable is stationary at a significance level of 5%.

Country	GR	GTI	EB
Argentina	-4.845*	-2.222	-2.276
Brazil	-1.417	-1.788	-2.563
China	-2.956	-3.234***	-1.349
India	-1.215	-2.444	-1.630
Indonesia	0.000	-2.052	-2.172
Mexico	0.000	-3.216***	-2.862
Poland	-3.888**	-2.810	-1.708
South Africa	-7.808*	-2.082	-1.346
South Korea	0.000	-3.019	-1.658
Turkey	-0.880	-4.2097**	-1.578
CIPS statistics	-2.301***	-2.716**	-1.914

Note(s): 1) CADF table critical values: 1%: -4.65 5%: -3.53 10%: -3.06

2) CIPS table critical values: 1%: -2.66 5%: -2.37 10%: -2.22

3) Stationary at (*)1%, (**)5% and (***)10% statistical significance levels

4) Lag lengths are selected according to Schwarz criteria

Source(s): Table by authors

Table 4.
CADF unit root test results

- (3) When the level value of EB variable is investigated, it is seen that all the sample group countries and the overall panel have unit roots.

To examine stationarity, first-generation unit root tests are conducted on the FDI variable in the model. As there is no cross-section dependence for this variable, these tests are suitable. A probability value close to “0” indicates stationarity, while a value close to “1” suggests the presence of unit roots.

Table 5 presents the results of the unit root tests for the FDI variable in both constant and constant-trend models. The findings indicate that the FDI variable’s level values exhibit stationarity at a significance level of 1% across all tests.

According to unit root test results in the study which analyzed the relationship between terror and the economy, it is possible to see that the variables included in the model do not have the same stationarity level. Some variables of the model are with unit roots while others are stationary at level values. In econometric studies in which the variables do not have the same level of stationarity, the Panel ARDL cointegration test can be conducted. So, to analyze the long-term relationship between terror and the economy a Panel ARDL test is conducted.

Within the econometric analyses, the actuality and being new generation for the cointegration and causality tests are determined primarily by cross-section dependency. First generation (Kao, 1999; Pedroni, 1999) tests can be used if the variables do not include cross-section dependency. On the other hand, according to the literature, many various second generation cointegration tests (Westerlund and Edgerton, 2007; Westerlund, 2008) may be applied in cases of cointegration. However, since all the variables in the model are not stationary at the same level, the Panel ARDL cointegration test, which makes it possible to research if there is a long-term relationship is used. This is the main reason behind the structure to use the Panel ARDL test to analyze the hypothesis.

3.2.3 Homogeneity test. It is needed to assess if the coefficients of variables, assumed to have long-term cointegration have homogeneity or not in panel data analysis. The homogeneity test investigates if a change occurs in one of the countries affects the others at the same level or not. Within this frame for the models consisting of countries with various economic structures, we expect to have heterogeneity of coefficients while the coefficients are expected to have homogeneity in cases of similar economic countries in the model. In this study, we conducted Pesaran and Yamagata (2008)’s Delta Test (Slope Homogeneity Test) for testing the homogeneity. The Slope Homogeneity Test (Delta Test) is valid for large sample groups while for small samples the Δ_{adj} test is valid. The null hypothesis in the homogeneity test (H0) is evaluated as “slope coefficients are homogeneous” and the alternative hypothesis (H1) is as “slope coefficients are heterogeneous”. The variables’ homogeneity test results are given in Table 6.

Since both test statistics of variables at the homogeneity test results have probability values smaller than 0.01, the H0 hypothesis (slope coefficients are homogeneous) is denied and it is decided that the coefficients are heterogeneous. This result shows that *a change in*

Variables	Constant		Constant and trend	
	Test statistics	Probability value	Test statistics	Probability value
Im, Pesaran and Shin	-2.97929*	0.0014	-4.40411*	0.0000
Levin, Lin and Chu	-3.82160*	0.0001	-7.08049*	0.0000
Fisher ADF-Chi-square	44.2638*	0.0014	54.8726	0.0000
Fisher PP-Chi-square	49.9394*	0.0002	61.8937	0.0000
Hadri-Z test	-3.77062*	0.0001	2.44875	0.0072

Table 5.
FDI variable unit root
test results

Source(s): Table by authors

terror, foreign direct investment and external balance variables might have different impacts on sustainable economic growth in each country.

3.2.4 *Panel ARDL cointegration test.* In the study which investigates the cointegration between terror and the economy, the variables included in the model are not found stationary at the same level. While the GR, GTI and FDI variables are stationary at the level according to the CIPS statistics, the EB variable has unit roots according to the first-generation stationarity tests. After conducting a country basis analysis of the sections included in the panel via CADF unit tests, different stationaries are found. When the literature is reviewed it is possible to see that, in cases where different levels of stationary for the variables are found, ARDL panel data analysis is used as the most optimal method by most of the researchers, e.g. [Silva et al. \(2018\)](#), [Salisu and Isah \(2017\)](#) and [Khan et al. \(2020\)](#). Contrary to other cointegration tests, in ARDL method does not need information if the variables are stationary or not. In Panel ARDL models, only the delayed values for the dependent variable take place. Besides, the current and delayed values for the independent variables are also within the scope ([Pesaran et al., 2001](#), pp. 289–326). [Pesaran et al. \(1999\)](#) developed to estimator within the frame of the ARDL model as MG (Mean Group) and PMG (Pooled Mean Group). No constraint or limit is used for ARDL specification in the MG estimator. The long-term parameters are produced from the means of long-term parameters reached by individual ARDL estimators. The most significant disadvantage of the MG estimator is the limit of not having the same parameters among the units included in the panel. This deficit of the MG estimator is resolved by the PMG estimator. For the long term, in the PMG estimator also the parameters have to be the same for the countries included in the panel but in short term, this estimator allows the parameters, constant and error variations to differentiate for the countries included in the panel. Another estimator, which is Dynamic Fixed Effects (DFE) can conduct estimations only in cases when the coefficients of the cointegration vector are the same for all the countries in the panel ([Blackburne and Frank, 2007](#), p. 206).

Panel ARDL estimator results, conducted according to the information above are shown in [Table 7](#).

Test statistics	Test statistics	Probability value
Delta_tilde	3.862*	0.000
Delta_tilde_adj	4.379*	0.000

Source(s): Table by authors

Table 6.
Homogeneity test results

	PMG	MG	DFE
<i>Long-term coefficients</i>			
GTI	-0.49075 (0.000)*	0.05709 (0.948)	-0.75628 (0.001)*
FDI	0.91864 (0.000)*	-0.72711 (0.358)	0.39175 (0.183)
EB	0.38244 (0.000)*	0.51241 (0.082)***	0.37643 (0.000)*
Error Correction Coefficient – ECT	-0.83897 (0.000)*	-1.02023 (0.000)*	-0.99340 (0.000)*
<i>Short-term coefficients</i>			
GTI (D1)	0.75977 (0.286)	0.48487 (0.671)	0.38857 (0.201)
FDI (D1)	0.09650 (0.833)	0.99513 (0.209)	0.53058 (0.049)**
EB (D1)	-0.18287 (0.283)	-0.22629 (0.292)	-0.37233 (0.006)*

Note(s): The values in () show the probability values indicating the statistical significance of coefficients. *, ** and *** symbols indicate in order that the coefficients are statistically significant at 1%, 5% and 10% levels

Source(s): Table by authors

Table 7.
Panel ARDL estimator results (dependent variable: GR)

When the Panel ARDL estimator (PMG)'s results are evaluated, it is possible to see that; "Terror (Global Terror Index-GTI)" has a negative impact on "Growth Rate" so does on National Income, while, "Foreign Direct Investment (FDI)" and "External Balance" has a positive impact on "Growth Rate" in the long term while the coefficients for the short term are not statistically significant.

However, the findings of MG Estimator show that in the long term the coefficients of "Terror (GTI)" and "Foreign Direct Investment (FDI)" are not statistically significant, while "External Balance (EB)" positively affects the "Growth Rate". The coefficients are not statistically significant in the short term for the MG estimator as well.

When the results of the DFE estimator are investigated, it is seen that in the long term "Terror (GTI)" affects the "Growth Rate" negatively, while the "External Balance (EB)" has a positive impact on it. The coefficient of FDI is not statistically significant. In the short term, "FDI" affects the "GR" positively with a one-period delay, while the "EB" has a negative impact. The coefficient for the "Terror (GTI)" variable is not statistically significant.

Hausman test is evaluated as an auxiliary tool used for designating which estimator is the most useful one for the model. Hausman test is conducted to be able to make choices among the estimators and the results are given in [Table 8](#).

The results of the Hausman test are given in [Table 8](#), and they require that the H0 hypothesis (the variables are homogeneous in the long term) is to be denied since the probability values are larger than 0.05. In other words, the PMG estimator provides more efficient and consistent results than MG and DFE estimators. So, it is assessed that the useful estimator for the model is the PMG estimator.

3.2.5 Causality test. In econometric studies, the cointegration relationship does not provide information about the causality and its direction between the variables. For this reason, causality analysis developed by [Dumitrescu and Hurlin \(2012\)](#) was used to test the causality relationship and direction between the variables included in the model.

The selection of the Dumitrescu and Hurlin causality test is primarily motivated by its ability to be applied even in the absence of a cointegration relationship. Additionally, this test is known for providing reliable results in situations involving both cross-sectional dependence and independence.

The Dumitrescu and Hurlin causality test calculates constant slope coefficients individually for each country and incorporates considerations for cross-sectional dependence ([Dumitrescu and Hurlin, 2012](#), p. 1457). This method is preferred due to its effectiveness in capturing causal relationships under such circumstances.

[Table 9](#) shows the test results of the causality between *economic growth, terrorism, foreign capital and balance of payments*. According to the panel causality test results; *there is a one-way causality from the economic growth variable to the balance of payments variable. No causal relationship was found between other variables*. The possible reason for the causality between economic growth and balance of payments might be the significant impact of the economic growth performance of Big Ten countries on the balance of payments. This can be interpreted as they have begun to play a significant role in foreign trade and international financial markets as a result of globalization trends in the world.

Estimator	X^2 value	Probability value
PMG, MG	2.20	0.5323
PMG, DFE	7.77	0.0510
DFE, MG	0.57	0.9039

Table 8.

Hausman test results

Source(s): Table by authors

The direction of The Causality	Test	Test Statistics	Probability Value (%10)
FDI \neq GR	Z-bar	3.7869	0.3029
	Z-bar tilde	0.1827	0.7529
GR \neq FDI	Z-bar	3.4141	0.1762
	Z-bar tilde	1.0616	0.2586
GR \neq GTI	Z-bar	0.9568	0.5006
	Z-bar tilde	0.4391	0.6781
GTI \neq GR	Z-bar	0.9236	0.5336
	Z-bar tilde	0.4142	0.7237
Δ EB \neq GR	Z-bar	-0.8471	0.5057
	Z-bar tilde	-0.9187	0.3561
GR \neq Δ EB	Z-bar	6.6846	0.0456*
	Z-bar tilde	2.2463	0.0456*

Note(s): *, shows that there is a causality between the variables at a 10% significance level. \neq symbol shows the direction of the causality. Test statistics were achieved with 789 iterations. “ Δ ” symbol shows that the causality test is applied with the difference value of the variable

Source(s): Table by authors

Table 9.
The results of Dumitrescu–Hurlin causality test

4. Findings, results and discussion

It is important for any country to provide a good level of security situation to reach a high level of sustainable economic growth. So, within the frame of the study, we examined with certain measurable factors, if there is a long-term relationship between “Terror (Global Terrorism Index – GTI)” and “Economy (Economic Growth)” in a novel sample group of Big Ten countries (China, India, Indonesia, South Korea, Argentina, Brazil, Mexico, Turkey, Poland and South Africa). Data related to terror and economic growth, from these countries of Big Ten, was not examined previously in the existing literature; so, this research aims to investigate the impact of country-level security on sustainable economic growth.

A good security situation improves the stability and predictability of the business conditions in a country. So, it attracts investors’ interest globally and so contributes positively to employment, income per capita and access to basic human needs. When the findings of this study are compared with the findings of previous research, it is possible to see that the results of this study coincide generally with the results of the current literature with the support of larger data from a larger sample group.

Within the frame of current literature, [Shahbaz et al. \(2013b\)](#) conducted an ARDL bound test to examine the long-run relationship between terrorism and economic growth in Pakistan. Empirical results of the study, as a case study covering data only from Pakistan, “confirm the existence of a long-run relationship between terrorism and sustainable economic growth”. Similarly, the results of our study on Big Ten countries mirror the study on Pakistan in terms of Terrorism, and Sustainable Economic Growth in the long term. In other words, the Sustainable Economic Growth of Big Ten countries is affected by the Global Terrorism Index (GTI).

So, our research findings coincide with those studies that resulted in a significant negative relationship between terror and economic growth like [Persitz \(2007\)](#), [Gaibullov and Todd \(2009\)](#), [Araz Takay et al. \(2009\)](#), [Blomberg et al. \(2004\)](#), [Gaibullov and Todd \(2011\)](#), [Freytag et al. \(2011\)](#), [Caruso and Schneider \(2011\)](#), [Shahbaz et al. \(2013a, b\)](#), [Shahzad et al. \(2016\)](#), [Estrada et al. \(2018\)](#) and [Mohamed et al. \(2019\)](#). At this point, it is worth mentioning as examined by [Sun et al. \(2022, p. 7\)](#) that “socio-economic factors are the root cause of terrorism”. When these results are evaluated together with the results of this research, it is possible to see that terrorism has a negative impact on economic growth, and a negative economy triggers the intense of terrorist incidents which just turns out to be a vicious circle.

Because countries start implementing less liberal international economic policies when they face more threats from terrorism (Meierrieks and Schneider, 2022). Naturally, GDP per capita is also adversely affected by domestic terrorism as evidenced by research on OECD countries (Paul and Bagchi, 2023). Posso (2023) also asserts that “conflict-affected societies have lower levels of economic growth” in his research with the data from Nigeria. So, the findings of our research support the findings of these aforementioned studies. Moreover, our research provides support for these results from a larger sample group, housing almost more than half of the global population and including countries like Turkey, suffering from terrorism for several decades since 1984. So, this research strengthens the findings of the previous research, most of them focus only on one unique country like Pakistan, or Israel or a single specific region like Sub-Saharan Africa, Asian Countries or European Countries.

On the other hand, our research findings do not coincide with Llussá and Travers (2011)’s findings such as “. . . terrorism does not have any impact on economic growth and public expenditure”. This difference may be caused because of the time period difference and the sample group variation.

Our research findings also support the second side of Gaibulloev and Todd (2011)’s research which concludes that (1) terror does not have any impact on the real income level per capita but conversely, (2) international terror events have a significant marginal impact on economic growth. So, our findings also fill this gap in the existing studies by providing a data-proven empiric study on the relationship between terrorism and economic growth to overcome and provide answers for the conflicting results. By using the data from Big Ten Countries, which have an increasing domination in the world economy with a high population ratio at the global scale the study has a high representing capacity.

The study, by using new generation tests, also gives pave for new and possible following research on the field by using data from other sample groups. Within this frame the brief findings of the research are as follows:

- (1) Cross-Section Dependency Test: Except for the FDI variable, there is a cross-section dependency among all variables included in the model. So, any problem or shock effect possible to rise in one of the Big Ten Countries has the capacity to affect all others. This finding coincides with the reality of global world conditions. As a result, the decision-makers of the respective countries included in the model have to take this interaction into consideration when they develop their policies.
- (2) Panel Unit Root Test: The variables included in the model are not stationary at the same level. If all the variables had unit roots at their levels, the series might have been stabilized by using a different method. Since the series are not stationary at the same level, the analyses were conducted by applying the Panel ARDL cointegration test.
- (3) Panel ARDL Test: According to the results of the Hausman test, the PMG estimator produced stronger results in the ARDL test in comparison to MG and DFE estimators. The results of the PMG estimator coincide with our initial expectations. Because ECT, which is the error fixing coefficient, is negative and it shows that there is a convergence to balance in the long term among the variables. Moreover, the results showing that terror has negative impacts on national income while it affects the FDI and external balance positively, also coincide with the theoretical frame and expectations.

5. Conclusion

A well-functioning economy requires stability and predictability. So, a good performance in the sustainability of economic growth needs a high standard of security and political

stability. Briefly, the investors and capital owners seek safe heavens free from terror and all kinds of conflict and instability circumstances.

The main limitations of this study, which analyzes the relationship between terrorism and the economy, are as follows:

- (1) The results of the analyzes are limited to the determined country sample (Big Ten countries),
- (2) Hypothesis tests are limited to the annual data of the 2002–2019 period due to the common data constraint of the variables included in the model,
- (3) In the model, the terror variable is limited to the Global Terrorism Index values created by Vision of Humanity,
- (4) Economy variables in the analyses are limited to national income, foreign direct capital and balance of payments variables, which are most frequently used in the literature.

Policymakers have to be aware that in order to provide a suitable environment for economic growth and to attract foreign direct investment the countries have to provide secure environments free from terror. The results of this study also support the hypothesis of *there is a significant long-term relationship between “terror” and a sustainable “economy” through the data of Big Ten Countries* after the panel data analysis methods were conducted. The Big Ten Countries in the study include China, India, Indonesia, South Korea, Argentina, Brazil, Mexico, Turkey, Poland and South Africa. During the analyses, the annual data specifically for the years between 2002 and 2019 was used for the tests. So, the analysis results also show that there is a negative statistically significant relation between terror and economic growth. In other words, terror negatively affects sustainable economic growth.

From this standpoint, the policymakers have to concentrate on the following issues to have a high performance in their country’s economic performance:

- (1) Initially the legal reforms supporting the rule of law and transparency have to be conducted and the political stability should be supported on the legal basis.
- (2) Secondly a well-functioning justice system and property rights have to be guaranteed especially for foreign investors.
- (3) The legal and political reforms should be realized in practical applications to strengthen trust.
- (4) Trustful law enforcement bodies have to be established and supported by all technological means to prevent terror.
- (5) The conditions causing terror have to be investigated carefully and the problems causing terror or internal conflict have to be solved.
- (6) International cooperation against terrorism must be strengthened and partnerships, information and experience sharing must be supported at maximum levels.

The stated policy recommendations will be much more meaningful when evaluated on a country basis. For example, in the Big Ten countries such as Turkey, Indonesia, South Africa and India, which have been the center of terrorist attacks for years, achieving successful results from economic policies is much more important. As seen in the study, *the balance of payments* and *foreign direct investment* positively affect national income. Considering the economy of Big Ten countries, especially Turkey, Indonesia, South Africa and India, it is a fact that despite being countries with strong economic potential, they have suffered

significant losses due to terrorism for years. Therefore, the most important problem with negative pressure on the economy in the mentioned countries is the existence of a risk environment. This risk factor, which has politically and economically negative effects, is the long-standing terrorist incidents.

Considering the stated risks and the mutual negative effect that turns into a vicious circle between terrorism and the economy, it is necessary to eliminate the problems that cause terrorism in the mentioned countries, on the one hand, and to develop policies that will improve economic performance on the other. Because the interaction between terrorism and the economy turns into a chicken-and-egg event and becomes a chronic problem resembling insoluble gangrene. In order to prevent this, priority should be given to developing policies that can close the deficits in the balance of payments in these countries, which are or have the potential to be important actors in global trade in many sectors. In this context, (1) policies should be developed to support exports (export tax refunds, successful exchange rate practices, export credits, export insurance, transportation facilities, etc.), (2) measures should be taken to protect domestic producers and increase their production (more support for technological investments, R&D). (3) Improvements should be made in all account items that can positively affect the balance of payments, such as reducing import expenditures, utilizing tourism opportunities and increasing the foreign exchange that can enter the country from tourism. In addition, ensuring confidence and stability, preserving price stability, reducing production costs and expanding state support by reducing bureaucracy are essential prerequisites for attracting foreign direct investment. Only after the development and careful implementation of these policies, will economic growth be achieved in the countries suffering from terrorism, and only then will the welfare be increased throughout the country, and only then will the economic basis for terrorism be eliminated. The realization of these policies, especially in regions with lower development levels, will have a positive effect on the regional balance and may produce even more effective results in the prevention of terrorism.

After the above-listed preconditions for a sustainable, well-functioning and terror-free economic environment, other micro and macro-level economic precautions have to be planned carefully. Because since the FDI and external balance positively affect economic growth, a production and export-based macro-economic system, which is based on a stable political environment, predictable and trustful business, and legal structure have to be activated. So well-planned effective policies, especially a predictable monetary policy, useful FDI-friendly policies, stable exchange policies, and the strengthening of trust and stability in the country will provide a suitable environment for positive external balance first and then national income. The increase in the national income and positive development at the national welfare level will in turn decrease the level of terrorist acts. So, it is possible to see the two-sided interaction between the economy and terrorism. One gets better, makes the other better or vice versa. For strengthening the external balance, the foreign trade balance, which is the most significant factor of external current account, has to be established. To provide this impulse, policies supporting production and export have to be developed. The potential of producing currently imported products in the country has to be researched and supported by projects. All these precautions may give the wave for a positive external balance and so a positive performance on the current accumulation and balance of payments. To conclude terror is a negative factor to be eliminated by developing effective policies to have a high level of sustainable economic growth. On the other hand, high performance in economic growth and national income by securing their sustainability decreases the level of terrorist acts in a country. By keeping this interaction in mind effective international cooperation among the sample countries may increase the performance of every single country in turn.

The study's results encourage new research on other sample groups and also adapt new variables instead of economy and/or data for different periods. In addition, new researchers can study the effect of terrorism on the economy by using time series analysis techniques by considering the countries within the Big Ten countries individually. Because, among the Big Ten, countries such as Turkey, South Africa and Indonesia have experienced significant losses due to terrorism for years and have had to face heavy economic repercussions. These conditions make them significant sample countries to conduct analysis on. So, the impacts of terror on social and environmental variables of sustainability and/or the interaction between terror and these two dimensions of sustainability have to be analyzed in future studies to expand our understanding of the impacts of terror.

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