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RESEARCH PAPER

The Impact of Economic Determinants on Terrorism in Iraq during the Period 2000-2020

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Abstract
There are many economic, social, and political determinants that impact a country's degree of terrorism. In this study, we attempt to reveal the influence of the most major macroeconomic determinants on the consequences of terrorist actions in Iraq, which was measured by the Terrorism Index (TI), during the period 2000-2020. This was done using descriptive statistics and econometric methodologies such as Auto Regressive Distributed Lags (ARDL), Error Correction Model (ECM), Variance Decomposition (VD), and VAR Impulse Response (VAR). According to the findings, the inflation rate has a long-term positive association with terrorism in Iraq, but GDP growth, unemployment, income inequality, and political stability all have a negative link with terrorism, ceteris paribus. Regarding the short-term determinants, the inflation rate has a positive relationship with TI, whereas the GINI coefficient has a negative impact on TI. The rate of adjustment from the previous year's TI disequilibrium to the current year's equilibrium is 81.9%.
Keywords: ARDL, ECM, Economic Determinants, Iraq, Terrorism Index TI.
JEL Classification: C01, C22, F52.

1. Introduction
Terrorism has become a serious phenomenon on the global level, particularly in recent years that transcends mental, geographical, and political boundaries, and has intensified in MENA, and also in some Asian countries such as Iraq, Levant, and Afghanistan (Global Terrorism Index, 2020). Besides the losses in human capital, many economies have been affected severely, composing 26.43% of the global economy (Global Terrorism Index, 2021). In addition, terrorism has harmful effects on human rights and freedom (Human Rights Counsel, 2014). The emergence of new terrorist groups in Sub-Saharan Africa, particularly in Sahil, escorted by poor economy and poverty, created a suitable environment to enter more people into these groups (USAID, 2017).

Much attention has been devoted by scholars to studying terrorism since the 1960s till the time being, as Long (1990) and Rice (1988), because of the high costs of both World Wars, and suing cold war. The beneficiaries of conflicts prefer

alternative warfare, introduced through creating conflicts via terrorist organizations. Iraq with its strategic geopolitical position in the Middle East and being a member of OPIC was not excluded from terrorist activities. It has thus been targeted intensively to multiple terrorist attacks during the past two decades. Causing severe humanitarian and economic damages in the country. The number of terrorist attacks on Iraq based on U.S. State Department Chronologies, was 26 attacks at a rate of 1.6 events per million population during the period 1997–2003 (Krueger, 2007). While this number increased considerably to 39,898 between 2006 and 2020 (Statista online portal, 2022).

This study is an effort to show the most significant economic determinants that might cause terrorism in Iraq during the period 2000-2020.

The **objectives** of this study are:

- To conduct a descriptive statistics analysis of Iraq's economic determinants under study during the period 2000-2020, such as; GDP growth, inflation, unemployment, income inequality, political stability, and terrorism index TI.
- Constructing an ARDL model for the time series data of the economic determinants as the independent variables and the terrorism index as a dependent variable.
- Show the short-run, and long-run effects of economic determinants on terrorism, in Iraq through the Error Correction Model.
- Reveal the impact of shocks to economic determinants on terrorism volatility in Iraq through the variance decomposition technique.

The logical **hypothesis** is that terrorism is a negative behavioral activity that might take place due to the impact of some independent variables such as; GDP growth, inflation, unemployment, income inequality, and political stability. Therefore, this study hypothesizes that an increase in the inflation rate, income inequality, and unemployment, increases terrorism. While increase in GDP growth rate, and political stability leads to a decrease in terrorism in Iraq.

2. Literature Review

The science of economic terrorism is relatively new in the field of academic studies. The first scholar who applied the economics of crime and punishment was William Landes (1978) in his study about skyjacking cases in the United States. Many other scholars adopted economic style analysis to show the impact of terrorism on the economy and to examine the most economic indicators that might cause terrorism, such as Sandler et al., 1983; Enders et al., 1992; Enders and Sandler, 1993; 1995; 1999; 2000; 2001. The following are some studies that have been done in recent years about the subject:

Nurunnabi and Sghaier (2018) adopted the ARDL model, and ECM to perceive the impact of some socioeconomic factors on terrorism, and examine the stability of the long-term relationships between them in Tunisia for the period 1979–2015. They found that unemployment rate, political instability, and higher school enrollment rates positively and significantly affect terrorism. But, per capita GDP and foreign direct investment FDI, have a negative and significant impact on terrorism.

Bukhari and Masih (2016) applied the ARDL bounds test, variance decomposition VDC, and impulse response IR function to show the causal relationship between the variables of; economic growth, trade, unemployment, military spending, and education spending, with terrorist attacks in Pakistan for the period of 1970–2014. The results assert the Deprivation and Modernization concept, which states that poverty and underdevelopment facilitate terrorists' jobs for recruits, meanwhile, unequal economic growth might equally facilitate terrorism. In the short run trade and GDP affect terrorism significantly. The results of the long-run model show positive and significant relationships between terrorism and each of GDP growth, and military spending, which suggest that augmented economic growth and military spending increase terrorism.

Sanso-Navarro et al. (2023) studied the determinants of terrorism in Colombia during the period 2001 to 2014. They adopted the Bayesian Model Averaging BMA technique to deal with the uncertainty over the control variables by the robustness tests. The findings showed that the variables of a more robust relationship with terrorism are; employment rate, percentage of urban population, and income inequality. The determinates of employment rate, percentage of urban population, and business sector importance, are related to terrorism inversely, while the regions of high-income inequality are positively impacted by terrorism.

Omelicheva and Webb (2020) attempted to show the effect of some socio-economic determinants at the Federal Russia's individual and group levels, during the period 2008-2016. They adopted the methods of Negative Binomial Regression and Probit Regression. The results show increases in the rates of unemployment and inflation, at the individual level, led to increases in terrorist activities. While at the group level, the economic crises induce terrorism. In addition, an increase in the amount of accessible financial resources increases the rate of terrorism, which is consistent with opportunity-based theories of political violence.

Yaseen (2019) studied the performance of the Iraqi labor market as the dependent variable with the presence of terrorism as the key independent variable, accompanied by several socioeconomic variables as controlling independent variables, in the year 2007. She used the OLS approach for the cross-section data, while fixed effect, random effect, and Probit models for the panel data part. The

findings demonstrate that rising terrorism-related risks and expenses deter people from working fewer hours per week, earning lower salaries, and less job securities.

Rizvi and Véganzonès-Varoudakis (2019) studied 58 fragile countries during the period 2004 to 2017 to determine the institutional, social, and economic factors that influence internal conflict including terrorism, using the Fixed Effect Poisson Regression FEPR. The results show that increased incomes and effective institutions might lessen conflict in these countries. While, democracy increases conflicts in fragile countries. Also, human development factor doesn't aid conflict and terrorism lessening. The study concluded that fragile countries priority is to improve the social, economic, and institutional settings before they can obtain political and educational improvements. The same is true for globalization, economic-related changes, which likewise don't seem to contribute to a decrease in violence and terrorism in fragile countries.

Abadie (2006) examined the effect of economic variables on terrorist attacks in 186 countries, in 2003–2004 and found that economic variables do not have significant effects on terrorism as political variables do. Therefore, Political freedom explains changes in terrorism attacks, but in a non-monotonic way. The analysis showed that terrorism threats are more in countries of middle ranges of political freedom, than countries with high levels of political freedom, or countries with extremely strict rules. During the periods of ruling shift from autocracy to democracy the country may go through temporary increases in terrorism, as occurred in Spain, Iraq, and Russia. The results also showed that geographic aspects are substantial to continue the terrorist activities. And each of human development index and GINI index have a negative relationship with terrorism index.

Shahbaz and Shabbir (2011) investigated the effect of inflation on terrorist attacks in Pakistan, with occurrence of economic growth during the period 1970-2010, using ARDL, and moving average methods. The results revealed cointegration between terrorism, inflation, and the economic growth. At the meantime economic indicators of inflation, and economic growth are positively related with terrorist attacks. Furthermore, the VECM of the Granger-causality test shows a bidirectional causality between inflation and terrorism.

Shabaz (2013) applied the econometrics approaches of; ARDL, rolling window to cointegration, and VECM of Granger-causality to examine the presence of cointegration between each inflation, and economic growth with terrorism, in Pakistan between 1971 and 2010. The results showed bidirectional relationship between inflation and terrorism. However, in the short run terrorism causes the economic growth.

Ismail and Amjad (2014) adopted the Error Correction Model (ECM) via Johansen Cointegration technique, and impulse response IR, to analyze the impact

of various socio-economic variables on terrorism in Pakistan. The variables involved are; GDP per capita, unemployment, political rights, inflation, poverty, inequality and literacy level. The results showed that inflation, depression, per capita GDP, and poverty have a significant effect on terrorism. In the short run, some factors such as; inequality, unemployment, and literacy were insignificant. Concerning the long run, the factors of; per capita GDP, Literacy, poverty, and inflation, have a significant impact on terrorism. Whereas depression, income inequality and unemployment are insignificant in long run.

Adelaja and George (2020) used cross-country panel data in the USA covering the years 1996–2015. They found a direct relationship between youth unemployment, and domestic terrorism, given some factors of economic growth such as; administration ineffectiveness and the absenteeism of law, and corruption. In the meantime, they found youth unemployment does not have a crucial impact on transnational terrorism.

Malik and Zaman (2013) adopted the approaches of; the Granger causality test, Cointegration theory, and variance analyses, to specify the factors that caused terrorism actions in Pakistan during the period 1975 to 2011. Relying on these approaches, the results of their study show that price levels, political instability, population growth, and poverty are the most significant factors causing terrorism in Pakistan. While other factors haven't any long- run relationship with terrorism, such as; unemployment, foreign trade, and income inequality. The Granger causality test of all macroeconomic indicators had unidirectional causality with terrorist actions except for unemployment, which had a bi-directional causality.

The main objective of Bren et al. (2019) is to show the status of the correlation between terrorism and many social, economic, and security-political factors through the Spearman correlation coefficient as a statistical technique, for 162 countries in 2017. Their study concluded that social inequality, GDP, current war conflict, corruption, and political instability have increased terrorism in the world in 2017. Inflation, which is measured by the CPI changes over time, showed that there is no correlation between terrorism and CPI.

Goldstein (2005) stated that the unemployment factor had a crucial impact or link with terrorism for 105 countries in 2003. He supports the previous studies, which confirm factors such as; population discrimination, democracy, and geography are significant variables affecting terrorism. While his study suggests that GDP per capita doesn't have a significant impact on terrorism. Also, increases in Gini coefficient, i.e., growing the gap between poor and rich, might declines terrorism.

Piazza (2006) assessed the common belief that the root causes of terrorism are due to poverty, injustice, and poor economic development. He adopted multiple regression analyses for the casualties in ninety-six states, from 1986 to 2002. The

results showed the significance of the variables of poverty, hunger, inequality, unemployment, inflation, and weak economic growth, as predictors of terrorism.

Mahmud (2020) studied the impact of terrorism on human development in Iraq through the indicators of education, health, and income. He settles on the idea that terrorism is having a negative impact on education through increasing the illiteracy rate in the years 2005, 2010, and 2011 to 10%, 21.9%, and 22.4 % respectively. The health system also affected badly where doctors became defenseless to murder and abduction; 1243 physicians left the country in 2004 this number decreased to 1166 in 2007, representing 94% and, 78% respectively. The value of the Human development indicator of Iraq in the year 1990 was at its highest 71.2%, while this rate declined to 62.2% in 2013 due to terrorism and political instability.

Richardson (2011) examined the interaction effect of unemployment and higher education, and their correlation with terrorist attacks, during the period 1980-2008, across 56 countries. The results propose that interaction is rather significant in countries of previous terrorist attacks. Increases in unemployment rates, and population, are correlated positively with the number of terrorist incidents, while higher education's relationship with terrorism is insignificant.

Caruso and Schneider (2011) studied the impact of Socio-Economic causes of terrorism, and political violence, in a sample of 12 countries in Western Europe on terrorism, between 1994 and 2007. Their findings showed that 1- lowering the set of current economic opportunities for individuals is increasing people's willingness to perform terrorism. 2- Increase in economic growth might increase terrorism, this finding confirms the Immiserizing Modernization Theory. 3) With the increase of GDP per capita by 1% the change in the anticipated number of terrorist incidents decreases by 5.5%, and a 1% increase in youth unemployment explains a 0.5% increase in terrorist activities, which supports the economic deprivation theory.

This study's significance becomes evident when examining how terrorism risks in Iraq changed from 2000 to 2020 concerning several economic and political determinants, by adopting ARDL short and long-run models, after checking for all the necessary econometrics tests. The researcher realizes the importance of determining these factors to policymakers and counterterrorism establishments, to do the necessary procedures to reduce terrorism in Iraq.

3. The Theoretical Concepts of the Economics of Terrorism

3.1 Definition of Terrorism

Disagreement on a precise definition of terrorism runs deeper than technical arguments about it. This disagreement about defining terrorism reflects doctrinal and ideological opinions about who conducts violence, and why. The term

summarizes a phenomenon of political violence widely condemned in many societies as anti-social, unethical, cruel, and also uncommon (Saul, 2008).

A prolonged horrific era of terror took place in France between 1793 and 1794. Their first definition of terrorism was as follows; 'a state of being terrified, or a state impressing terror.' It was the time when the new authority adopted severe terrorist (death) activities against oppositions (Merriam-Webster). Still, it is difficult to define terrorism due to many concerns, for example; using violence toward whom, performed by whom, and what is the purpose of it. So, the up-to-date definition of terrorism is arguable. Exploiting violence for the achievement of political ends is common to state and non-state groups. Terrorists used several basic types of tactics such as; assassinations, hijackings, armed attacks, kidnappings, bombings, and hostages. The terrorism group's main objectives and executive abilities are determining which tactic is used.

The majority of definitions in use have been inscribed by institutions that are directly associated with government and are systematically biased to exclude governments from the definition. The modern label of "terrorist" is highly derogatory, it denotes a lack of legitimacy, and morality. Terrorism is an approach executed by the performers as part of a bigger military or geo-political plan.

The word Terrorism is defined in the Oxford Dictionary (2022) as; 'The use of violent action to achieve political aims or to force a government to act.'

The United Kingdom's definition of Terrorism was specified in Act 2000 (TACT, 2000), which defines terrorism as "An action that endangers or causes serious violence to a person/people; causes serious property damage; or seriously interferes or disrupts an electronic system" (Constabulary, 2021).

The definition of terrorism in the words of the United Nation Resolution 1566 in 2004 is; "criminal acts, including against civilians, committed with the intent to cause death or serious bodily injury, or taking of hostages, with the purpose to provoke a state of terror in the general public or in a group of persons or particular persons, intimidate a population or compel a government or an international organization to do or to abstain from doing any act" (UN Press, 2004).

The Arab Convention for the Suppression of Terrorism in Cairo, Egypt in year 1998 mentioned terrorism as:

"Any act or threat of violence, whatever its motives or purposes, that occurs in the advancement of an individual or collective criminal agenda and seeking to sow panic among people, causing fear by harming them, or placing their lives, liberty or security in danger, or seeking to cause damage to the environment or to public or private installations or property or to occupying or seizing them, or seeking to jeopardize national resources" (Counter-Terrorism and International Law, 2021).

Because of understanding the aforementioned concepts, the researchers define terrorism as:

Act of generating fear, intimidation, and inflicting physical, psychological, and material harm to civilians in order to obtain illegal gains and positions that cause negative impact on the economy as a whole.

3.2 Global Terrorism Index GTI

The Institute for Economics and Peace (IEP) produces annual reports, mostly relying on the Global Terrorism Database (GTD), and extra sources, to calculate a number of terrorism incidents, deaths, injuries, and damages. In the words of GTD, the Global Terrorism Index GTI is:

"A comprehensive attempt to account for the direct and relative impact of terrorism in 158 countries in terms of its effects on lives lost, injuries, and property damage" (Global Terrorism Index, 2012: 6).

GTD Data is organized by the National Consortium for the Study of Terrorism and Responses to Terrorism (START). For instance, GTD reported that more than 170,000 terrorist incidents occurred between 1970 and 2019. There are four aspects, or components calculated in each country's yearly GTI score in order to show the annual impact of terrorism. Each component has its weight which is used in the Global Terrorism Index, as is shown in table 1.

The GTI index is used to measure the magnitude of humanitarian and economic damages of terrorism in any specific country. GTI is used in many empirical studies such as Abadie (2006), Gries et al. (2011), and Enders and Sandler (2012). This index is found by GTD by using a simple mathematical calculation by giving each type of damage a specific weight and multiplying it by its counter number as is shown in the following hypothetical country example in Table 1.

Table 1. Scoring Procedure of GTI

Dimension	Weights	No. of records for a given year	Score
Total number of incidents	1	20	20
Total number of fatalities	3	34	102
Total number of injuries	0.5	60	30
Sum of property damages measure	2	22	44
Total Score			**196**

Source: GTI report, 2018.

3.3 The Rational Choice of Terrorism

The rational choice concept arose from Scottish and neoclassical economics. It elaborates on what performers' value to achieved by individual or collective actions. This evaluation process is applied to almost any noticeable behavior such as crime, political activities, and drug addiction. Which, imposed on institutional structures, law, legislative and interest group politics, norms, etc. The most common parts of this theory involving; the examination of law, the theory of elections and voting, game theory, and group behavior studies. The power of the rational choice concept is achieved from the effort to decrease certain incentives to some fewer sets of incentives, frequently to benefits, which is moderately sound, assessed by a large variety of backgrounds, and activities (Hardin, 2001).

The incentives to perform terrorism through perspectives of rational choice factors show terrorism as a logical political choice among other choices (Crenshaw, 1990). This choice assists terrorists in selecting violence. For instance, global mass media exposure of terrorist violence and its aims can be advantageous to terrorist groups. Timing is another aspect of rational thinking of terrorist choices, such as an enemy's national holiday, or the anniversary of some specific event. Another example of the timing aspect is the blew up of the Alfred P. Murrah Federal Building, in Oklahoma City, on the second anniversary of the deaths of the Branch Davidians in Waco, Texas by Timothy McVeigh (Purpura, 2013).

3.4 The Relationship between Terrorism and the Macroeconomic Indicators

The economic determinants have a significant correlation with terrorism as do politics, irrespective of the overall wealth of a country or region. For instance;

- The Gini Index of income inequality has a significant correlation with terrorism. The high rates of income inequality cause social instabilities that in turn lead to violence or terrorism. This topic deals with the theory of relative deprivation, as it deals with the rule of law. Therefore, income inequality's role is more significant than a deterioration of socio-economic determinants (Krieger and Meierrieks, 2016).

- High rates of inflation might have a significant impact on terrorism. As Shahbaz (2013) suggested; increase in inflation, and economic growth are major factors of terrorism.
- Unemployment rate has a significant impact on terrorism; however, it explains a small share of the overall terrorist danger (Goldstein, 2005). In many countries' youth raises concerns about youth participation in terrorism and unrest due to unemployment corruption and the absence of law. Therefore, youth unemployment has a direct relationship with domestic terrorism (Adelaja and George, 2020).
- Poverty is a big dilemma in each country, and attempts to reduce its rates remain basic to the development process. Income inequality along with poverty should be taken into more consideration because both of the two factors might facilitate and create the appropriate circumstances for terrorist recruitment (Duffield, 2005).
- Due to black market transactions, 16 of 18 African countries have lost US$97 billion each year (UNDP, 2020) leading to increased violent. Therefore, in order to reduce violence, the policy makers must make decisions for sustainable development.
- Political independence, geography, and population classification have significant relationship with terrorism (Abadie, 2004). In Nigeria political factors which represented by flawed parliamentary role have a significant role for producing terrorism, rather than situations of relative deprivation (Aron, 2015).
- Human development has a substantial role in reducing the terrorist activities, rising the economic growth in the developing countries. Human development index measures the rate of population wellbeing status in the country. Considering the rate of Human development indicator of Iraq in year 1990, it was at its highest 71.2%, while this rate declined to 62.2% in 2013 due to terrorism and political instability. Terrorism has imposed harmful impact on wide-ranging human development in Iraq throughout:

    a- Increasing the number of dropouts which led to reduce the levels of education.

    b- Increasing the rates of illiteracy, Shortages on spending on education, destruction of schools, universities and scientific foundations.

    c- Falling the level of health services along with the increasing migration of doctors as a result of terrorist threats on their lives (Mahmud, 2020).

- However, education has a noticeable role in recruiting people in terrorist groups. Looking at both sides of supply and demand of terrorism. Krueger and Maleckova (2003) suggest that for some people with high degrees of education terrorism may offer more benefits, such as seeking for leadership positions, get identified with more respect than less educated persons, or they might get more wages than if they work in a legal institution, which is analogous application of occupational choice model of Roy (1951). Another cause is that terrorist groups higher more educated

people due to their determination and commitment. On the other side, the demand of terrorism isn't paid much attention. The personal economic gains of suicide bombers are not promising, although their families might get some benefit which in turn might increase the willingness to participate in terrorist activities. But their basic passionate support for their program, and organization is more motivating to participate in terrorist activities. So, to Krueger and Maleckova (2003), poverty and low education levels are not substantial causes of terrorism.

Some literatures confirm that Income inequality accompanied with population growth, survival stress, and political instability have positive significant effect on terrorism, particularly in some geo-economics countries. Such as, East and South Asia, Middle East and North Africa, and Sub- Saharan Africa. While, in some developed countries other factors related to foreign policy and politics cause terrorism (Coccia, 2018). Underdevelopment, poverty, and income inequality provide a suitable environment for new terrorists' recruits (Bukhari and Masih, 2016). Political instability reduces the volume of investment, raises unemployment, and inflation which upsurges the terrorist activities through lessening the purchasing power of individuals (Naz et al., 2021).

4. Data Analysis and Econometric Models of Terrorism in Iraq

4.1 The Descriptive Statistics Analysis of Terrorism Related Data

Terrorism in Iraq has direct and indirect costs, these costs are summarized in an index, which is called Terrorism Index, as mentioned in the previous section 3.2. Iraq's terrorism index recorded extremely high scores starting from 2004 to 2020. This index reached 10, which is its highest point between 2014 and 2017. The direct costs were significantly high, represented as the number of deaths due to terrorism attacks. The highest number reported is 13965 deaths in 2014, which is corresponding to the highest figure of terrorist incidents 3933, for the same year, as shown in Table 2.

Table 2. Number of Terrorist Attacks and Deaths in Iraq during the Period 2000-2020

Years	No. of Attacks	No. of Deaths	TI
2000	10	10	3.7
2001	3	9	4
2002	6	10	4.09
2003	102	391	6.56
2004	323	2171	8.03
2005	617	3384	8.65
2006	838	4612	9.1
2007	1047	6665	9.45
2008	1106	2864	9.33
2009	1137	2585	9.33
2010	1179	2074	9.22
2011	1308	1870	9.11
2012	1437	2679	9.56
2013	2852	7042	9.01
2014	3933	14095	10
2015	2751	8885	10
2016	3360	12276	9.96
2017	2466	6619	10
2018	1956	1432	9.75
2019	1131	799	9.241
2020	495	525	8.682

Source: GTD annual reports.

As in Table 2, the number of terrorist attacks in Iraq decreased significantly in 2019 and 2020 to reach 1131 and 495 respectively. Correspondingly, the number of deaths from terrorism decreased to 799 and 525 in 2019 and 2020, as also illustrated in Figure 1.

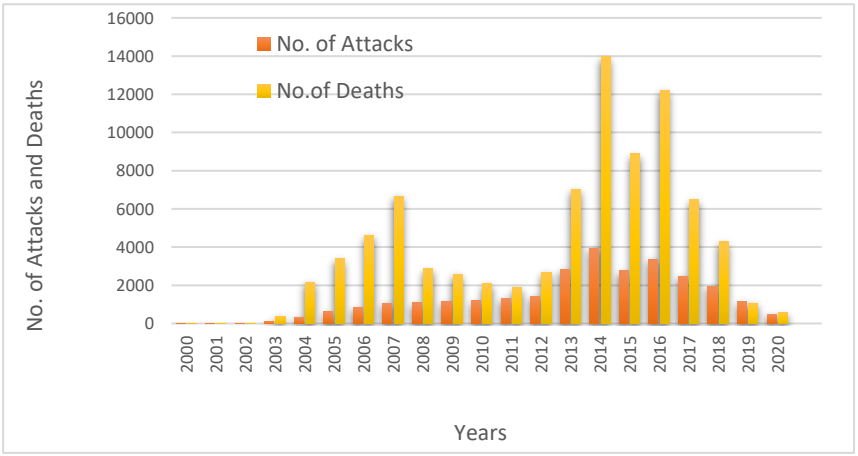

Figure 1. The Number of Terrorist Attacks and Deaths in Iraq between 2000 and 2020
Source: Research finding, based on Table 2.

Terrorism costs in Iraq such as fatalities, injuries, and property damages that are measured by terrorism index is illustrated in Figure 2, which shows the increasing trend, the dotted line, of Iraq's GTI between 2000 and 2020. This index was 10, i.e., at its highest score during the period 2014 to 2017, indicating that Iraq suffered from severe terrorism consequences during these four years. Specifically, during the period of ISIL extensive threats on the country.

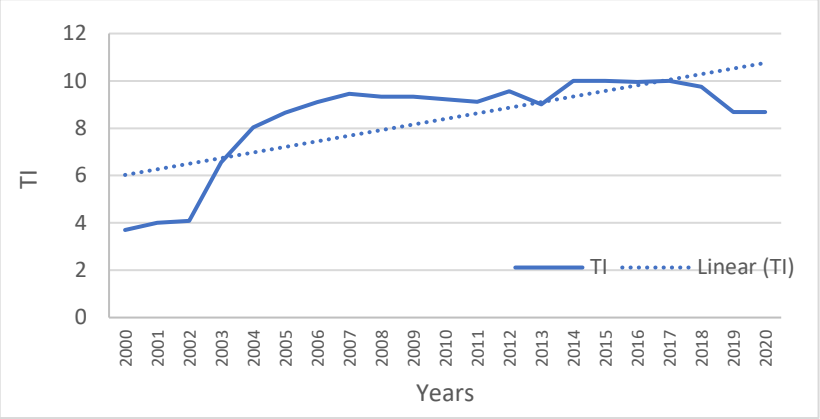

Figure 2. The Trend of Terrorism Index in Iraq during the Period 2000-2020
Source: Research finding, based on Table 2.

Measurements of descriptive statistics are calculated for the data under study such as the mean, maximum and minimum values, standard deviation, and Jarque-Bera statistic for data normality test and its probability in Table 3. The average of terrorist attacks in Iraq is 1336, where the maximum number of attacks reached 3933 in 2014, and the minimum was 3 attacks in 2001. The mean of the deaths from terrorism was nearly 3857 people, with the maximum number of deaths being 14095 in 2014, and the minimum was 9 people in 2001.

Because of the variables entered in the econometric models of this study; the mean score of terrorism index TI was 8.4, the maximum score was 10 reported between 2014 and 2017, and the minimum score was 3.7 in 2000. The mean unemployment rate is 9.77%, with a maximum rate of 14% and a minimum rate of 7.96%. We can observe that the data of unemployment is distributed normally because the p-value of the Jarque-Bera test is 0.112 which is higher than the 0.05 significance level. The mean score of the Income inequality index GINI is 0.348. Meanwhile, the average GDP growth in Iraq is 4.44%. The price levels of goods and services are high in the period under study in Iraq, where the mean inflation rate is 10.61%. In addition, the mean of the political stability indicator is around -2.31, which means that Iraq is quite unstable politically.

Table 3. The Descriptive Statistics of Number of Terrorism Attacks, Deaths, TI, and the Economic Determinates

	Mean	**Maximum**	**Minimum**	**Std. Dev.**	**Jarque-Bera**	**Probability**
No. of Attacks	1336.048	3933.00	3.00	1148.514	2.184353	0.335486
No. of Deaths	3857	14095	9.00	4025.813	5.5392	0.062686
TI	8.391048	10	3.7	2.023857	8.973795	0.011256
GDPG	4.444286	53.39	-36.66	15.98226	15.64722	0.0004
INF	10.61429	53.2	-10.1	15.42606	7.258686	0.026534
UEMP	9.779381	14.088	7.96	1.904312	4.361406	0.112962
GINI	0.348571	0.59	0.23	0.108503	6.093245	0.047519
PS	-2.31381	-1.61	-3.18	0.406626	0.219087	0.896243

Source: Research finding, using Eviews 13.

4.2 Model Specification and Data Sources

Several determinants might affect terrorism in Iraq. To show the impact of these determinants this study adopts the ARDL approach for time series data. The dependent variable represents the terrorism index of Iraq TI, while the independent variables are; the unemployment rate UEM, income inequality GINI, inflation rate INF, gross domestic product growth GDPG, and political stability index PS, see Table 4. Thus, we can write Iraq's terrorism index relation as a function of some economic variables as key variables and one controlling variable which is represented by PS as;

TI = f (UEMP, GDPG, GINI, INF, PS).

Table 4. Variables Measurements and Data Sources

Acronym	Description	Measurement	The expected sign of the variables	Source
TI (dependent variable)	Terrorism Index	Ranges from 0 to 10	+ for TI lags	The Institute for Economics and Peace (IEP); Annual GTD reports
INF	Inflation rate	% Rate	+	World Bank
GDPG	Annual GDP growth	% Rate	-	World Bank
GINI	Income inequality index	Ranges from 0 to 1	- or +	Trading economics website; Statista website
UEMP	Unemployment	% Rate	- or +	World Bank and macrotrends website
PS	Political Stability index	Ranges from -2.5 (weak); to 2.5 (strong)	-	Theglobaleconomy website

4.3 The ARDL Model Specification of Terrorism in Iraq

The ARDL model contains the endogenous variable which involves TI lags, and Xi exogenous variables in current and lagged values, including; INF, UEM, GDPG, GINI, and PS. The general model specification of ARDL (p, q) is as the following:

$$TI_t = \gamma_{0i} + \sum_{i=1}^{p} \delta_i \quad TI_{t-1} + \sum_{i=0}^{q} B_i \; X_{t-i} + \; \varepsilon_{it} \qquad (1)$$

where TI_t is the dependent variable, which represents a vector of the terrorism index, and X_t is a vector of economic variables (independent variables), that could be purely in order I (0), I (1), or a mix of both. δ and B are coefficients, γ is the constant, i =1, 2, 3, ..., k, p is the optimal lag order for TI, and q is the optimal lag for X, and ε_{it} is the vector of the error term. The steps of ARDL model construction are:

4.3.1 Detecting the Lag Length of the Model

Selecting the appropriate lag length is the first crucial step in performing the ARDL model building. Eviews13 provides five criteria that are used for lag length selection, such as; Schwarz information criterion SIC, Akaike information criterion AIC, Hannan-Quinn information criterion HQC, Final prediction error FPE, and LR sequential modified LR. Implementing this test on the entered data series variables, a one-year lag length has been selected, see the asterisks in Table5.

Table 5. Selecting the Lag Lengths

Endogenous variables: TI						
Exogenous variables: C GDPG GINI UEMP INF PS						
Lag	**Log L**	**LR**	**FPE**	**AIC**	**SC**	**HQ**
0	-15.25506	NA	0.560932	2.237374	2.535618	2.287849
1	-2.289830	16.37713*	0.161435*	0.977877*	1.325828*	1.036764*
2	-2.284693	0.005947	0.182786	1.082599	1.480258	1.149899

Source: Research finding, using Eviews 13.

Note: * Indicates lag order selected by the criterion.

4.3.2 Data Stationarity Test (Unit Root Test)

Unit root test shows the stationarity status for each data series. Therefore, before running an ARDL model for time series data, each variable data has to be stationary at its original level of integration I(0), or at its first difference of integration I(1), or a mix of both of I(0) and I(1).

Augmented Dicky Fuller ADF, and Philips- Peron approaches are adopted to show the results of the unit root test. Where the hypotheses of these tests are:

H_0: the series has a unit root (not stationary)

H_1: the series hasn't a unit root (stationary)

Table 6 shows the results of the unit root test at the original level of the data i.e., I(0) level of integration, and at their first differences i.e., I(1) of integration. Some of the series are stationary at level, with intercept, intercept, and trend such as TI, GDPG, and GINI, at 10%, 1% alpha significance level. While all of the economic determinants are stationary at their corresponding first difference i.e., I(1) level of integration, with intercept, or intercept and trend. Because the corresponding t-statistic's p-value of each series is significant at %1, %5, and %10 significance level. Therefore, we can reject the null hypothesis H_0, which says the series has a unit root, and accept the alternative hypothesis H_1, which states that the series doesn't a unit root i.e., stationary.

Summing up, the ARDL method could be applied to the data of this study because all data series are stationary at either I(0), or I(1), and mix of I(0) and I(1) of integration.

4.3.3 Johansen Cointegration Test

Johansen cointegration test is adopted to examine the long run cointegration among the data series via two different methods, the first method is the Trace, and the second is Maximum Eigenvalue as shown in Table 7. The hypotheses are as follows:

H_0: there is no long run cointegration equation among the data series.

H_1: there is long run cointegration equation among the data series.

The trace approach shows three cointegration equations because the trace statistic is more than its corresponding 0.05 critical value, with their P-values significant at 1% level. Therefore, we reject H_0. While maximum eigenvalue approach suggests two cointegration equations, because the maximum eigenvalue statistic is more than its corresponding 0.05 critical value, with their p-values significant at 1% level. Therefore, we reject H_0 and accept H_1, which says the series are cointegrated in the long run. Thus, adopting either approach we can conclude that there is a long-run cointegration equation among the data series.

4.3.4 The ARDL Model of Terrorism in Iraq

After checking for data stationarity at I(0) or I(1), and existence of long run cointegration equation among the data series, now the ARDL model estimation could be performed, the empirical results are demonstrated in the following Table8 using Eviews 10.

Table 6. ADF and PP Unit Root Test

Variables		Level		First Difference	
		Intercept	**Intercept and trend**	**Intercept**	**Intercept and trend**
TI	ADF	-2.9516 0.0571*	-1.1867 0.8857	-2.9422 0.0591 *	-4.1410 0.0211 **
	PP	-2.8719 0.0665 *	-1.0809 0.9072	-2.9202 0.0616 *	-4.1393 0.0211 **
GDPG	ADF	-5.9626 0.0001 ***	-5.7920 0.0008 ***	-7.9476 0.0000 ***	-7.7077 0.0000 ***
	PP	-7.2954 0.0000 ***	-7.0290 0.0001 ***	-17.2085 0.0000 ***	-18.5216 0.0001 ***
INF	ADF	-2.6447 0.1010	-4.0708 0.0230 **	-4.4769 0.0028 ***	-4.3315 0.0156 **
	PP	-2.5717 0.1150	-4.0729 0.0229 **	-8.5218 0.0000 ***	-8.1631 0.0000 ***
UEMP	ADF	0.9978 0.9947	-0.7389 0.9551	-1.2226 0.6390	-2.6493 0.2669
	PP	1.1472 0.9964	0.5206 0.9985	-3.6238 0.0153 **	-7.4587 0.0000 ***
GINI	ADF	-5.5623 0.0003 ***	-1.9516 0.5890	-2.6729 0.1014	-3.9741 0.0352 **
	PP	-3.2826 0.0298 **	-1.5298 0.7839	-5.3665 0.0004 ***	-14.1354 0.0001 ***
PS	ADF	-2.2094 0.2091	-2.9783 0.1672	-4.0514 0.0063 ***	-3.9970 0.0276 **
	PP	-2.2620 0.1927	-2.1570 0.4858	-4.0425 0.0064 ***	-3.9856 0.0282 **

Source: Research finding, using Eviews 10.

Note: * Significant at a %10 level. ** Significant at a %5 level. *** Significant at a %1 level.

Table 7. Johansen Cointegration Test

Trace					Maximum Eigenvalue				
No. of CE(s)	**Eigenvalue**	**Trace Statistic**	**0.05 Cr. Value**	**Prob.**	**No. of CE(s)**	**Eigenvalue**	**Max-Eigen St.**	**0.05 Cr. Value**	**Prob.**
None *	.9999	311.905	95.7536	0.0000	None *	.9999	83.085	40.0775	0.0001
At most 1 *	.9786	128.820	69.8188	0.0000	At most 1 *	.9786	3.0916	33.8768	0.0000
At most 2 *	.7462	55.7290	47.8561	0.0077	At most 2	.7462	6.0533	27.5843	0.0775
At most 3	.5173	29.6757	29.7970	0.0516	At most 3	.5173	3.8406	21.1316	0.3783
At most 4 *	.4616	15.8351	15.4947	0.0444	At most 4	.4616	1.7667	14.2646	0.1197
At most 5 *	.1927	4.06841	3.84146	0.0437	At most 5 *	.1927	.06841	3.84146	0.0437

Source: Research finding, using Eviews 10.

Note: * Denotes rejection of H_0 at 0.05 level.

Table 8. The Estimated ARDL Model for Economic Determinants Regressed on Terrorism Index TI of Iraq between 2000 and 2020

Dependent Variable: TI				
Selected Model: ARDL (1, 0, 1, 0, 1, 0)				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
TI (-1)	0.180697	0.129800	1.392110	0.1914
GDPG	-0.024724	0.011143	-2.218717	0.0485
INF	0.014657	0.006473	2.264286	0.0448
INF (-1)	0.015327	0.007610	2.014131	0.0691
UEMP	-0.183912	0.067927	-2.707496	0.0204
GINI	-0.043148	2.143589	-2.012920	0.0693
GINI (-1)	-0.122057	4.382969	-2.784809	0.0178
PS	-0.587544	0.322169	-1.823715	0.0955
C	13.04882	2.529024	5.159627	0.0003
R-Squared	0.986293	Mean Dependent Var		8.625600
Adjusted R-Squared	0.976324	S.D. Dependent Var		1.759392
S.E. of Regression	0.270718	Akaike Info Criterion		0.526687
Sum Squared Res.	0.806172	Schwarz Criterion		0.974766
Log Likelihood	3.733132	Hannan-Quinn Crite.		0.614157
F-Statistic	98.93715	Durbin-Watson Stat		2.528723
Prob(F-statistic)	0.000000			

Source: Research finding, using Eviews 13.

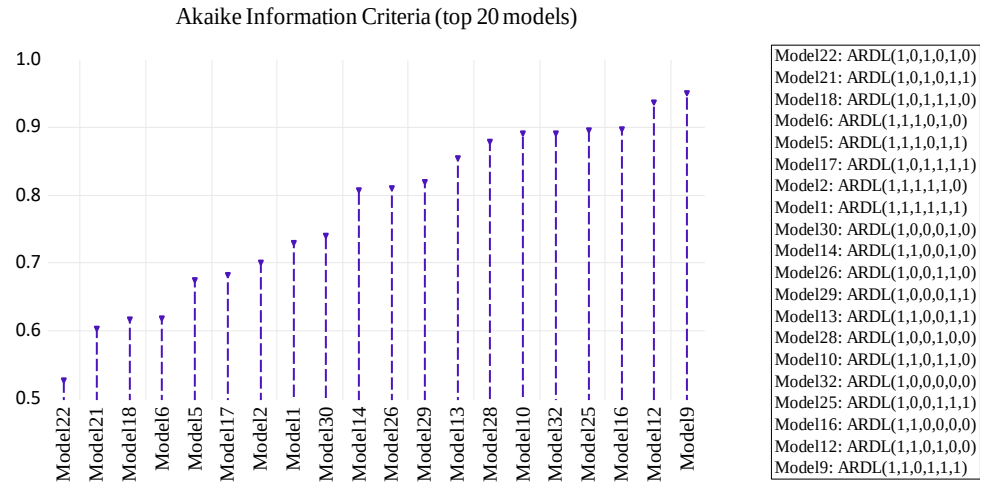

Figure 3. The Best Estimated ARDL Model for Terrorism in Iraq
Source: Research finding, using Eviews 13.

Hence, we can introduce the general ARDL equation as the following:

$$TI = 13.0488 + 0.180\ TI_{t-1} - 0.0247GDPG + 0.0146INF + 0.0153\ INF_{t-1} - 0.1839UEM - 0.0431GINI - 0.1220GINI_{t-1} - 0.5875PS \quad (2)$$

Adopting Akaike information criteria the best ARDL ($p, q_1, q_2, q_3, q_4, q_5$) model is ARDL (1, 0, 1, 0, 1, 0), as demonstrated in Figure 3.

4.3.5 Long Run and Short Run Impact of The Economic Determinants

4.3.5.1 Long Run Cointegration (F-Bounds Test)

F- Bound's test is adopted to examine the presence of long-run relationships among the data series of the estimated ARDL model (2).

We can specify the hypotheses as follows:

H_0: There is no long-run cointegration among the data series.

H_1: There is long-run cointegration among the data series.

Table 9. F- Bound's Test of the Economic Determinants

F-Bounds Test		**Null Hypothesis: No levels of relationship**		
Test Statistic	Value	Sig.	I (0)	I (1)
F-statistic	12.12529	10%	2.080	3
k	5	5%	2.390	3.380
Actual Sample Size	20	1%	3.060	4.150

Source: Research finding, using Eviews 13.

Since the F-Bounds statistic is 12.12529, which is more than the upper bounds I(1), are 3, 3.38, and 4.15 at each of 10%, 5%, and 1% significance levels, respectively. Thus, we can reject the null hypothesis H_0, which says there is no cointegration among the data series in the long run. Rather we accept the alternative hypothesis H_1 which suggests the existence of long-run relationship

among the series. Accordingly, we can estimate the long run model estimates, as is illustrated in Table10.

Table 10. The Estimated Long Run Model of Terrorism in Iraq

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDPG	-0.030177	0.011115	-2.714981	0.0201
INF	0.036596	0.013014	2.812083	0.0169
UEMP	-0.224474	0.073655	-3.047662	0.0111
GINI	-0.201642	0.014207	-14.19273	0.0000
PS	-0.717126	0.402838	-1.780184	0.1026

Source: Research finding, using Eviews 13.

From Table 10, notice that the estimated coefficients GDPG, INF, and UEM, all are significant at a 5% level, while GINI is significant at a 1% level. As for PS is significant at an 11% level. The inflation rate is taking a positive sign, meaning that it has a significant direct impact on terrorism in Iraq in the long run. This positive relationship agrees with that of Piazza, 2006; Shahbaz, 2013; Malik and Zaman, 2013; Gulzar and Zhaohua, 2016; Tahir, 2018; Ajide and Alimi, 2021. Thus, as INF increases by one percent, TI increases by 0.036 points, ceteris paribus.

GDP growth showed an inverse relationship with terrorism (Blomberg Hess and Weerapana 2002; Crain and Crain 2006; Gaibulloev and Sandler 2011; Shahbaz 2013; Chinar 2017; and Zakaria Jun and Ahmed 2019). So, as GDPG increases by 1% terrorism reduces by 0.03 points, ceteris paribus.

The GINI coefficient also showed a negative relationship with terrorism in Iraq. The indirect association between income inequality and terrorism does not appear to be consistent with economic theory, however certain studies, such as Goldstein (2005), Abadi (2006), and Azam and Thelen (2008), support the inverse relationship. The empirical results showed as GINI rose by 1% in Iraq, terrorism fell by 0.21 points, and all other factors remained constant. Furthermore, Piazza (2013) discovered a negative association between the Gini coefficient and terrorism in semi-autocratic countries with low levels of human development. The plausible explanation for this form of relationship is due to limited resources and scarcity, as well as the type of controlling power in the country as militias and mercenary forces are having a substantial role. As the income inequality gap is wide in autocratic countries, and the authority system prohibits political freedom practices and bans several civilian activities, therefore, the consequences of terrorism may jeopardize their ability to maintain power and rule. Unemployment impacts terrorism adversely, due to the potential direct relationship between income inequality, explained in the previous paragraph, and unemployment. Therefore, as a 1% increase in UEM terrorism decreases by 0.22 points, ceteris

paribus. One justification for this inverse relationship is as during terrorism actions, common people are feeling insecure, they prefer to stay at home rather than being targeted, and they decide to consume less (Yaseen 2019).

Also, the factor of political stability PS has a negative sign, meaning that it adversely affects TI. Therefore, in the long run, as PS increases by one unit, terrorism reduces by 0.71 points, ceteris paribus. As a result, the long-term influence of political stability on terrorism is comparatively stronger.

4.3.5.2 The Short-Run Impact of the Economic Regressors on Terrorism in Iraq

The impact of economic regressors in the short run is illustrated in the ARDL Error Correction Regression Table 11 below.

Table 11. The Short Run impact of the Economic Regressors on Terrorism in Iraq

ECM Regression				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	13.04882	2.529024	5.159627	0.0003
D(INF)	0.014657	0.003112	4.709609	0.0006
D(GINI)	-0.043149	0.008775	-4.917091	0.0005
Coint, Eq (-1)*	-0.819303	0.076346	-10.73139	0.0000
R-Squared	0.923677	Mean Dependent Var		0.249100
R-Squared	0.923677	Mean Dependent Var		0.249100
Adjusted R-Squared	0.914697	S.D. Dependent Var		0.745604
S.E. of Regression	0.217766	Akaike Info Criterion		-0.073313
Sum Squared Res.	0.806172	Schwarz Criterion		0.076047
Log Likelihood	3.733132	Hannan-Quinn Criteria		-0.044157
F-Statistic	102.8683	Pr F(0.0000)	Durbin-Watson Stat	2.528723

Source: Research finding, using Eviews 13.

Through the estimated ARDL Error Correction Model in Table 11, we can observe the direct relationship between the Inflation rate, and terrorism, in the short run, and the indirect relationship between the GINI coefficient and TI. We can notice that the Inflation rate affects terrorism in Iraq in the short run at a 1% significant level, because the corresponding t statistics is 4.5>2, other factors being constant. So, if D(INF) increases by one percent, D (TI) will rise by 0.014 points, which is quite small. If GINI increases by one unit, TI will decrease by 0.043 points.

Because of the error correction coefficient or the speed of adjustment -0.819, the empirical results show that it is negative in the sign, and significant at the %1 level. This indicates that 81.9% of any activities into disequilibrium are corrected for, within one period, which is one year in this study. In other words, the rate of speed of adjustment from the previous year's disequilibrium in TI is added to the current year's equilibrium by 81.9%.

4.4 Some Diagnostic Tests for the Robustness and Goodness of Model Specification

The reliability tests of our estimated ARDL model of terrorism, are illustrated in the following Table 12, which support our estimations and good model specification.

Table 12. The Reliability Check for the Estimated ARDL Model of Terrorism in Iraq

Inspections	**Test ***	**The Hypotheses**	**F Statistics**	**P Value**	**H_0**
Autocorrelation	Breusch-Godfrey Serial Correlation LM test	H_0: there is no autocorrelation between the residuals. H_1: there is autocorrelation between the residuals.	2.35698	0.1503 F (2,9)	Accepted
Heteroscedasticity	Breusch-Pagan-Godfrey test	H_0: residuals are not heteroscedastic. H_1: residuals are heteroscedastic.	0.887372	0.5562 F (8,11)	Accepted
	ARCH	H_0: residuals are not heteroscedastic. H_1: residuals are heteroscedastic.	3.081206	0.0972 F(1,17)	Accepted
Correct specification of the model	Ramsey Reset test	H0: the model is specified correctly. H1: the model is mis-specified.	0.00059	0.9810 d.f(1,10)	Accepted
Residuals Normality Distribution	Jarque-Bera	H_0: the residuals are distributed normally. H_1: the residuals are not distributed normally.	Jarque-Bera Statistics = 0.119984	0.9417	Accepted

Source: Gujarati and Porter, 2009; Gujarati, 2011; calculated by Eviews 13.

4.4.1 CUSUM and CUSUM Square Test

CUSUM cumulative sum of recursive residuals, and CUSUM of Squares, are two graphical tests used to reveal the stability of coefficients βs of any estimated time series multiple linear regression model; $y = \beta Xi + \varepsilon$, via detecting the structural breaks in the estimated regression by computing iterative sequence of sums of recursive residuals (Wu, 2005).

We apply this test to detect a nonzero mean of the recursive residuals due to changes in the model coefficients. But, if there is more than a coefficient change, the CUSUM test may lose its power. Therefore, the CUSUM Squares plot is adopted. Reminding, that various changes may compensate their influences by the means of the recursive residuals. If the curve crosses the dotted lines, which represents 5% significance error, a structural instability is identified. The value of intercept C depends on the preferred significance level, the sample size T, and the number of independent variables (Lutkepohl and Kartzig, 2004). As for the terrorism model of Iraq Equation 2, the CUSUM and CUSUM of Squares test plotted in Figures 4 and 5 respectively.

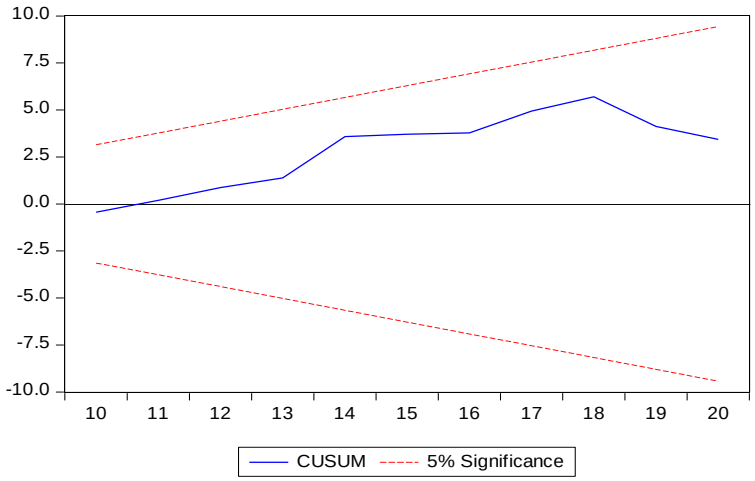

Figure 4. CUSUM Test of the Estimated Model of Terrorism in Iraq
Source: Research finding, using Eviews 13.

Figure 4 exhibits the CUSUM test, where the curved line of the estimated model lies between the bounds of the two dotted lines at a %5 significant level. This indicates that the coefficients of the estimated model are stable.

The CUSUM Squares test, which is illustrated in Figure 5 shows that the estimated model lies between the bounds of the two dotted lines at a %5 significant level. Thus, we can conclude that the model fits well, and the estimated coefficients are having the stability characteristic.

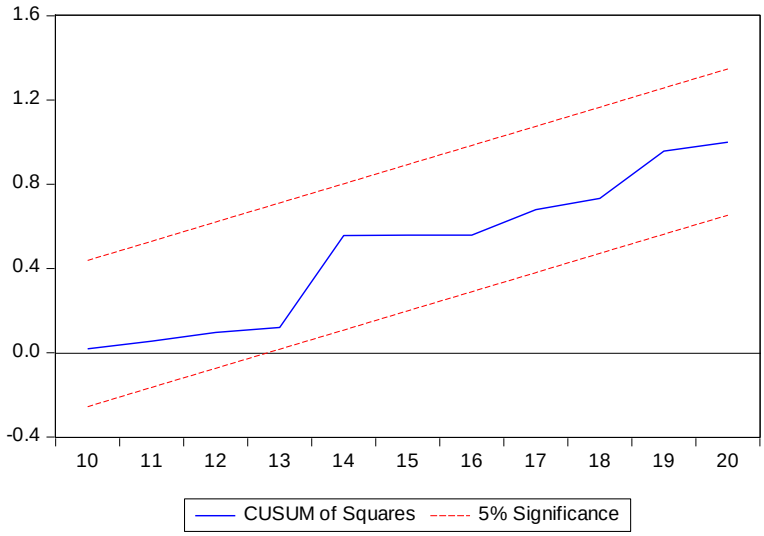

Figure 5. CUSUM Test of the Estimated Model of Terrorism in Iraq
Source: Research finding, using Eviews 13.

4.5 Variance Decomposition VD Analysis

In the auto regression the amount of information each variable contributes to the other variables is examined by variance decomposition. This approach shows how much of the forecast error variance of each variable could be explained, by exogenous shocks, to the other variables (Lutkephol, 2005). VD determines the extent of the variability in the dependent variable that explained by the independent variables, that is the strength of independent variables to explain the volatility in the dependent variable over time. To know the rate of the variances that each independent variable such as GDPG, INF, UEMP, GINI, and PS makes to the dependent variable TI, we applied VAR analysis, then the variance decomposition developed by adopting the Cholesky method as is shown in Table 13.

Table 13. Variance Decomposition of TI (Cholesky Ordering: TI UEMP INF GDPG GINI PS)

Period	S.E.	TI	UEMP	INF	GDPG	GINI	PS
1	0.605736	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.982628	74.74489	4.008463	0.634072	20.58220	0.018097	0.012275
3	1.166236	64.43184	3.506660	1.234670	28.51114	1.790025	0.525668
4	1.188169	63.49789	3.394908	1.222559	29.44344	1.890528	0.550676
5	1.213074	62.22883	3.366397	1.181439	30.48604	2.123372	0.613920
6	1.219586	61.72330	3.330947	1.271064	30.48783	2.486332	0.700519
7	1.223089	61.38093	3.398862	1.544092	30.33001	2.616548	0.729560
8	1.225292	61.16050	3.441483	1.670579	30.22168	2.745768	0.759989
9	1.229079	60.81735	3.459303	1.963372	30.07197	2.891855	0.796153
10	1.232999	60.43361	3.525513	2.267376	29.89205	3.047460	0.833991
11	1.236787	60.11985	3.558318	2.600379	29.71189	3.150988	0.858575
12	1.239734	59.83442	3.613869	2.852004	29.57084	3.245938	0.882931
13	1.241802	59.68582	3.614953	3.038353	29.48107	3.287092	0.892714
14	1.243644	59.52803	3.630530	3.223419	29.40641	3.312566	0.899050
15	1.245086	59.45768	3.636324	3.318229	29.37151	3.316377	0.899884
16	1.245544	59.41722	3.637529	3.367023	29.36352	3.315089	0.899618
17	1.245836	59.40751	3.635832	3.379842	29.36360	3.313946	0.899272
18	1.246109	59.39661	3.634430	3.383654	29.36764	3.317631	0.900033
19	1.246334	59.37956	3.634240	3.384472	29.36928	3.329701	0.902744
20	1.246732	59.34300	3.642221	3.396447	29.35696	3.353130	0.908247
21	1.247203	59.29820	3.649215	3.421390	29.33763	3.379172	0.914393

Source: Research finding, using Eviews 13.

In Table 13, TI explains 100%, 74.7%, and 64.4% of the variances in TI in the first, second, and third periods (year) respectively. Then the variances in TI decline gradually during 21-year periods until they reach 59.34%, and 59.29% in years 20th, and 21st, respectively. Each of the exogenous variables; INF, UEMP, GDPG, GINI, and PS, are not having any contemporaneous effect on TI, i.e., in the first period. This validates the accuracy of estimating a dynamic model such as ARDL, as previously done. The GDP growth explains 20.58% of variances in TI in the second year rising to 29.33% in year 21st. Therefore, we can say that GDPG has the heaviest weight for explaining the variances in TI compared to the remaining independent variables. Next comes the unemployment rate, which explains 4% in the first year and keeps decreasing till reaches 3.65% in the last year. Thus, all independent variables have a long-run impact on TI, where the GDP growth rate explains most of the variances in TI, compared to the remaining exogenous variables, next comes the unemployment rate.

4.6 The Impulse Response Analysis IRA

In economics, and particularly in modern macroeconomic modeling impulse response functions are employed to represent how the economy responds over a period of time to exogenous impulses known as shocks, and often used in the framework of a vector auto-regression. (Lutkepohl, 2005; Stock and Watson, 2001). The following panels (A-F) in figure 6 show the reaction of TI when each variable gets one standard deviation shock or innovation during 21 years, as shown in Table 14.

Table 14. Cholesky Impulse Response of TI

Period	TI	UEMP	INF	GDPG	GINI	PS
1	0.605736	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.595642	0.196733	-0.078245	-0.445795	0.013219	-0.010887
3	0.393237	-0.094817	0.103298	-0.434797	0.155472	-0.083852
4	0.141728	-0.015269	-0.021601	-0.166987	0.048406	-0.024990
5	0.138921	0.040134	-0.011226	-0.181523	0.067506	-0.035496
6	-0.048360	0.002452	0.038990	-0.069685	0.075730	-0.037220
7	-0.012665	-0.036070	0.064754	0.015753	0.046484	-0.022235
8	-0.001128	-0.028692	0.044523	0.003075	0.045620	-0.022275
9	0.022393	-0.024271	0.067663	-0.023404	0.049619	-0.024839
10	0.005873	-0.036611	0.069363	-0.012900	0.051426	-0.025535
11	-0.029236	-0.028838	0.072841	0.006393	0.043229	-0.021309
12	-0.001000	-0.033369	0.063696	-0.000792	0.041101	-0.020904
13	-0.027915	-0.014219	0.054955	0.011552	0.028306	-0.014006
14	-0.017095	-0.020160	0.054785	0.013966	0.023335	-0.011785
15	-0.032342	-0.014837	0.039818	0.022680	0.013341	-0.006723
16	-0.007128	-0.007758	0.028193	0.014531	0.004226	-0.002476
17	-0.016778	0.000360	0.014949	0.014657	-0.002525	0.001086
18	-0.015299	0.001705	0.009064	0.016194	-0.008929	0.004234
19	-0.008238	0.004173	-0.005626	0.013782	-0.014355	0.006866
20	-0.004572	0.012654	-0.014823	0.009992	-0.019930	0.009721
21	-0.000606	0.012312	-0.020686	0.006658	-0.021083	0.010309

Source: Research finding, using Eviews 13.

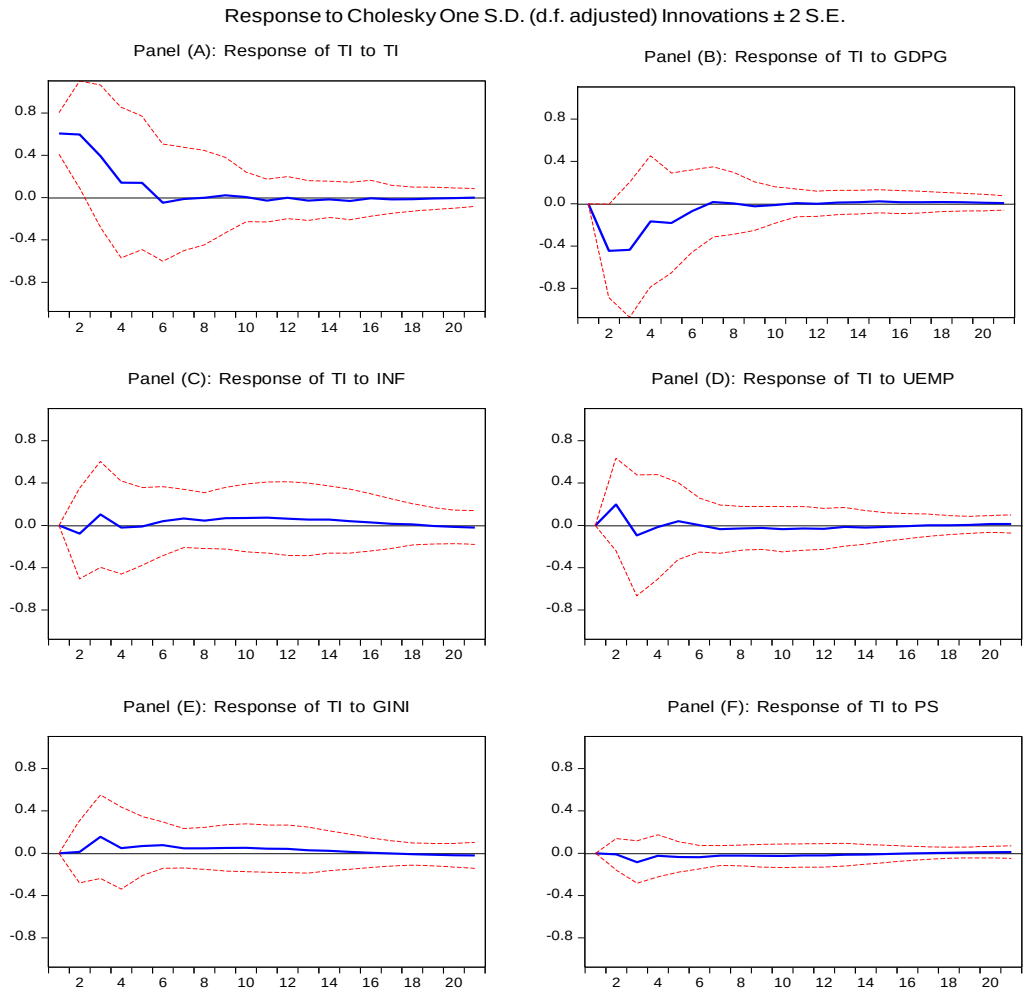

Figure 6. Entails the Panels A to F of Impulse Responses on Iraq's Terrorism Index TI
Source: Research finding, using Eviews 13.

Observing panels, A to F in Figure 6, the X-axis represents the periods (21 years), and the Y-axis is the percentage variations. We can see that one standard deviation innovation of each of the exogenous variables is affecting the endogenous variable TI significantly at a 5% significant level. Since the blue curves are located between the two red boundary curves of standard error confidence bands, therefore, if one standard deviation shock or innovation is given to:

- TI explains 0.60 % of the variations in TI in the first period. Afterwards, TI declines to reach -0.05% in period 6. The rate of the variations would be almost zero or steady starting from period 7, i.e., in the long run, see Figure 6 panel A.
- GDP growth doesn't cause variations in TI in period one, then in periods two, and three it starts to decline to -0.45% and -0.42% respectively. Then these variations in shocks in GDPG keep fluctuating till period 13 when they start

incline, but at rather small rates, and be in a steady state till period 21, in the long run. As illustrated in Figure 6 panel B.

- Inflation rate, TI inclines slowly and positively in period tow and onwards. In periods 17 and onwards TI will be almost steady, i.e., in the long run.
- Unemployment rate makes TI to incline in period two with 0.20% then declines rapidly to -0.09% in period 3, then it starts to incline in period 4 and onwards with small fluctuations and will be almost steady starting from period 13, i.e., in the long run, see panel D.
- GINI coefficient, TI rises starting from period 1 till period 13. Afterwards it declines to become almost steady from period 13 with positive sign in panel E.
- Political stability, TI declines in periods 2 to -0.08%. Afterward it rises slowly with minus sign till period 17 and onwards, where it'll be almost steady, as illustrated in Figure 6 panel F. Therefore, shocks in PS have negative impacts on TI almost all of the time.

5. Conclusion

- Iraq's terrorism index reached 10, which is its highest score during years 2014 to 2017, indicating that Iraq suffered from severe terrorism consequences during these four years. Specifically, during the period of ISIS extensive threats on the country. The number of deaths was 13965, the highest in year 2014, which is corresponding to the highest number of incidents 3933 in 2014, as shown in Table 4.2. The Number of terrorist attacks in Iraq decreased significantly in recent years 2019 and 2020 to reach 1131, and 495 respectively. Correspondingly, the number of deaths from terrorism decreased to 1054, and 564 for the same years 2019, and 2020.
- Annual growth rates fluctuate for each indicator compared to its previous year's figure. Considering TI in the year 2003 terrorism increased by 60.39%. Iraq's GDP dropped to 36.66% in the same year. In 2014 the year of the ISIS attacks, TI increased by 11% compared with year 2013, unemployment increased by 14.31%, and inflation increased by 15.79%. Political stability experienced an anticable decrease of 8.87% in 2015 compared to the year 2014.
- The consequences of terrorism growth in Iraq for the entire period of the study 2000-2020 was 4.36%, associated with a 2.62% increase in GDP growth, a 2.42% increase in unemployment, and a 1.89% increase in the growth of political stability, which is a slight increase comparing to period (1), 2000-2002, the era of Bath party authority in Iraq.
- The inflation rate has a positive relationship with terrorism in Iraq in the long run. Therefore, as INF increases by one percent, TI increases by 0.036 points, ceteris paribus. And GDP growth, unemployment, income inequality, and Political stability are having an inverse relationship with terrorism in the long run.

Therefore, if each of these variables increases by one unit, individually, terrorism reduces by 0.03, 0.22, 0.20, and 0.71 points, respectively, ceteris paribus. In the long run political stability has a quite high impact on TI in Iraq.

- Concerning the short-run impacts, if the inflation rate increases by one percent, the terrorism index increases by 0.014 points. If the GINI coefficient increases by one unit, TI will decrease by 0.043 points.
- The coefficient of ECT = 0.819, which means that 81.9% of any activities into disequilibrium are corrected within one period, which is one year in this study. In other words, the speed of adjustment from the previous year's disequilibrium in TI is added to the current year's equilibrium by 81.9%.
- The analysis of variance decomposition shows that TI explains 100%, 74.7%, and 64.4% of the variances in TI in the first, second, and third periods (year) respectively. Then the variances in TI decline gradually during the 21-year periods until they reach 59.34%, and 59.29% in years 20th, and 21st, respectively. Each of the exogenous variables; INF, UEMP, GDPG, GINI, and PS, are not having any contemporaneous effect on TI, i.e., in the first period. This validates the accuracy of estimating a dynamic model such as ARDL, as previously done. The GDP growth explains 20.58% of variances in TI in the second year rising to 29.33% in year 21st. Therefore, we can say that GDPG has the heaviest weight for explaining the variances in TI compared to the remaining independent variables. Next comes the unemployment rate, which explains 4% in the first year and keeps decreasing till reaches 3.65% in the last year. Thus, all independent variables have a long-run impact on TI, where the GDP growth rate explains most of the variances in TI, compared to the remaining exogenous variables, next comes the unemployment rate.
- The figures of Impulse Response on Iraq's Terrorism Index TI which are illustrated in panels A to F in Figure 6, show that one standard deviation shock to each economic determinant is affecting the endogenous variable TI significantly at a 5% significant level.

6. Recommendation

Weakness in preventing or slow pace of reducing terrorist activities in Iraq is generally due to shortages in funding and resources, inadequate arrangement and organization, deprived distribution of resources, deficiency of consciousness and education, unintended growth, beliefs, and culture (Al-Dahasha et al., 2018). Sluggish responses to disasters might not suspend the instant outcome of the disaster, as a result, the response might be fragmented, unproductive, and useless leading to an augmented number of casualties, deaths, and indirect costs. Therefore, we recommend that authorities work on reducing the rate of inflation, increasing GDP growth, creating more job opportunities, and safeguarding

political stability. Also, working on improvements in; policy and administrative decisions, actions, and technologies, which are main factors should be taken into concern to reduce terrorist incidents in Iraq.

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