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Growth rate of population associated with high terrorism incidents in society

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Abstract. What is the growth rate of population that maximizes fatalities from the terrorist incidents? This is a fundamental problem in studies of terrorism and political violence. The paper confronts this question here by analyzing demographic and socioeconomic factors causing and sustaining terrorism in society. Firstly, the present study suggests non-linear effects between confirmed fatalities for terrorist incident and rates of growth of population. Secondly, empirical analyzes and optimization reveal that a growth rate of population of about 3.6% maximizes the lethality due to terrorist incidents in society. This high growth rate of population associated with terrorism is in some problematic regions such as Iraq, Mali, Sudan, etc. Overall, then, the ethnicity and/or religion are illusory causes of terrorism, because they are not an environmental stressor per se. Instead, a distal cause of terrorism may be a critical demographic mass and high population growth that, in combination with socioeconomic issues and political instability, can induce terrorism as a result. Finally, some socioeconomic policies are suggested to enhance conditions of people to reduce this social issue over the long run.
Keywords. Terrorism, Population, Demographic factors, Neo-Malthusian approaches, Population growth, Income inequality, Human development index, Political stability.
JEL. I24, I30, J10, N30, R23, Q56, Z10.

1. Introduction

This paper has two goals. The first is to show the relationship between growth rates of population and effects of terrorism. The second is to analyze the growth rate of population that can support terrorism in regions with social issues and to suggest policies of growth that ameliorate conditions of people and indirectly reduce the socioeconomic causes of terrorism. These topics are basic problems in society because the terrorism has increased in the last decades both in advanced and developing nations (Coccia, 2018, 2018a; Editorials Nature, 2015; Reardon, 2015; Norris *et al.*, 2013; Rosendorff & Sandler, 2005; Li & Schaub, 2004). In particular, Americans have been targeted in about 25% of terrorist incidents during the past 20 years (Linstone, 2003, p.289; cf., Park & Bali, 2017, p.1). Although many predictors of terrorism are often unclear factors (Krueger & Malečková, 2009), some sources of terrorism are explained with economic factors (Enders *et al.,* 2016; Blomberg *et al.,* 2004, 2004a), political factors (Coggins, 2015), social factors (Schaafsma & Williams, 2012), etc. However, *how* demographic factors in certain regions cause and sustain terrorism are hardly known. This study endeavors to explain some research questions: *What is the growth rate of population that supports the terrorism in regions with social issues? And Why?* The underlying problem of these research questions is to explain the situational factors of terrorism in problematic society. The study here confronts this scientific problem applying statistical analyses and optimization methods to clarify

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whenever possible, one of the causing factors that supports terrorism in society. Findings here can also support long-run economic policies directed to reduce demographic and socioeconomic stress that leads to terrorism in specific regions. In order to position this analysis in the field of terrorist studies, next section begins by briefly reviewing the literature and by developing the theoretical framework of this contribution.

2. Theoretical background and framework

Crenshaw (1981, p.380) argues that terrorism is the systematic inducement of fear and anxiety to control and direct a civilian population. In particular, "Terrorism is an attractive strategy to groups of different ideological persuasions who challenge a nation's authority… to dramatize a cause… to gain popular support, to provoke regime violence, to inspire followers" (Crenshaw, 1981, p.389). Ackoff & Rovin (2003, p.144) claim that terrorism is "violence against innocent". Terrorism can be described by four characteristics: violence, non-combatant targets, a desire for power, and the need to attract attention, send a message, or provoke an extreme response (Linstone, 2003, p.289). Coates (1996, p.298) claims that a terrorist threat exists when, there must be an issue, there must be some group organized and with a purpose related to that issue and the terrorist group must have the technical skills to carry out a terrorist action for a political purpose. Linstone (2007, p.115) identifies a current wave of terrorism, from 1970s to 2020s and argues that terrorism is a form of warfare that violates the conventions of conduct developed in wars between states (cf., Ball, 2005; Schuurman & Horgan, 2016; Rapoport, 2004). In this context, Devezas & Santos (2006), by fitting over 10,000 terrorist incidents since 1961 to a logistic growth curve, argue that current period is only at the very low stage of development of terrorism and that an inflection point will be reached at 2030s or thereabout.

Several studies endeavor to clarify the direct and indirect factors of terrorism (Newman, 2006; Abadie, 2005). Crenshaw (1981, p.381) claims that it is important for terrorism to separate between preconditions (factors that set the stage for terrorism over the long run) and precipitants (specific events that precede the occurrence of terrorism). Some preconditions of terrorism are economic factors, such as poverty, inequality, etc. (Newman, 2006; Ezcurra & Palacios, 2016). Ackoff & Rovin (2003, p.146) argue that: "countries that are the breeding grounds for terrorists are the least advanced economically". Enders *et al.,* (2016) observe that domestic and transnational terrorist attacks are more concentrated in middle-income countries and the point of concentration is shifted to lower income countries after the rising influence of the religious fundamentalist. Some studies show that poverty, inequality and large numbers of young men facing dim economic prospects, also are likely contributors to terrorism (Ehrlich & Liu, 2002; Coccia, 2017, 2018). Other studies of terrorism analyzepolitical factors, such as government repression, human rights violation, state failure, etc. (Abadie, 2005; Coggins, 2015; Krieger & Meierrieks, 2011). Causes of terrorism are also due to social factors, such as low levels of education, etc. (Choma *et al.,* 2016; van Berger *et al.,* 2015; Burgoon, 2006). Schaafsma & Williams (2012, p.829) argue that social exclusion and rejection among ethnic minority and majority members lead to increased intergroup hostility and stronger fundamentalist religious beliefs. This religious fundamentalism has the capacity to disrupt the stability of society and to generate violence and terrorism (cf., Butler, 2015).

In general, terrorism is growing worldwide and it is essential to understand *why* this is happening in order to defuse the underlying causes. Piazza (2006, p.463) shows that: "variables such as population, ethno-religious diversity, increased state repression and, most significantly, the structure of party politics are found to be significant predictors of terrorism". In particular, demographic issues are a critical factor for understanding the relation between different socioeconomic contexts and terrorism (Piazza, 2006; Parsons, 1991). Scholars show that high population density and population growth can lead to resource scarcity and violence (Christens

& Speer, 2005; Lee, 2016, 2016a; cf., Christian, 1961). The theoretical background of these studies is the theory of Malthus (1817[1798]) presented in the book *An Essay on the Principle of Population* where Malthus wrote that population has geometric growth rates, while food subsistence has arithmetic (*lower*) growth rates. This imbalance of growth rates between population and natural resources creates a looming crisis and environmental conflicts. In fact, Malthus (1817[1798]) is the first scholar to analyze the socioeconomic problems of high growth rates of population that generate scarcity of resources and are a "future cause of strife" (Lee, 2016). Several scholars are current proponents of neo-Malthusian approaches in different research fields to explain economic phenomena and social issues of nations, such as Ehrlich (1968) that foretold a coming crisis from overpopulation and limited resources. Kaplan (2000) argues a possible threat to rich nations because of population increase in poor countries. This research field supports the thesis that high growth rates of population, combined with scarce environmental resources, can lead to conflicts and violence. In fact, Lee (2016) claims that: "Overt violence is site-specific with ties to local relationships and histories, but the larger process of material transformation and power relations plays a crucial role". Visaria (1989) argues that one of the most serious consequences of the acceleration of population growth is the difficulty of generating adequate employment opportunities for the growing labor force within poor nations (cf., Keyfitz, 1993). Cassils (2004) claims that the poorest regions of the world, where population growth is still rapid, will continue to suffer the most and face decreased life expectancy through resource depletion, conflict, and disease. Abernethy (1993, p.417) confirms these results adding that: "rapid population growth causes poverty.... fundamentalism and hate may become more likely when people's expected standard of living is slipping away, beyond control… religious fundamentalism and violence appear together ... to thrive alongside the spread of poverty and unemployment" (cf., Lemsine, 1992). In short, the imbalance between population and economic resources in specific regions can cause problems of violence that revolve around issues of power rather than scarcity of resources (Peluso & Watts, 2001). In particular, overpopulation and social issues have several interconnections that can lead to a growing insecurity worldwide (Cassils, 2004, p.172). In this context, Linstone (2003, p.288, original emphasis) argues that: "The world population is expected to increase from 6.2 billion to 9.3 billion in 2050 and 98% of this growth will be in the poorer countries… billions of frustrated and angry individuals … eager to find release in terrorism". In addition, Ehrlich & Liu (2002, p. 188) observe that:

high population growth rates are expected to continue in many developing nations, with a projected annual growth rate for people aged 20–34 of 2.82% as opposed to a rate of 0.16% in developed countries during the years 2000–2050… In the face of such growth, job opportunities may be doomed to become much rarer. And large numbers of unemployed, disaffected young men, who see the West as their enemy, provide the cannon fodder for terrorism.

Moreover, Krieger & Meierrieks (2010, p.914) claim that terrorism as a random event is more likely in a larger country: "Terrorism is also positively linked to larger populations, but this may simply indicate that terrorism is more likely in more populous countries". In general, population growth in specific regions may support social issues and deteriorated human behavior and, as a consequence, violent crime and terrorism (cf., Altman, 1975; Coccia, 2018; Curtis, 1975). Hence, high growth rates of population, mainly in poor and unstable regions, can increase socioeconomic problems and possibly give rise to more violence and terrorism (Cassils, 2004; Coccia, 2018a). Although many studies about causing factors of terrorism, the growth rate of population associated with high lethality due to terrorism incidents in society is unknown. Next section presents the methodology of the study here that endeavors to investigate and explain, whenever possible the growth rate of population that supports terrorism in regions with social issues.

3. Materials and methods

3.1. Measures

Demographic indicators of this studyare:

- Annual population growth rate 1975-2002 and 2002-2015-acronym POPGROWTH (Norris, 2015)
- Population ages 0-14 (% of total) for year 2006 (World Bank, 2008)
- *Economic indicators* are (World Bank, 2008):
- Gross Domestic Product (GDP) per capita, Purchasing Power Parity (PPP) international $, year 2006
- Income Gini coefficient, year 2002: Measure of the deviation of the distribution of income among individuals or households within a country from a perfectly equal distribution. A value of 0 represents absolute equality, a value of 100 absolute inequality.

Socioeconomic and *political indicators* are:

- Human Development Index –HDI– (years 1975 and 2005) based on United Nations Development Programme data (cf., Norris, 2015). The HDI is a composite index that measures the average achievement of human development: a long and healthy life (life expectancy at birth), the education (mean of years of schooling for adults aged 25 years) and the standard of living dimension based on gross national income per capita (UNDP, 2016).
- Freedom House Index of democracy (standardized value) for year 2000 (Norris, 2015). It assigns ratings of political rights and civil liberties for each independent nation (electoral process, political pluralism and participation, and government functioning).
- Religious fractionalization, year 2002 (cf., Norris, 2015). This index, defined by Alesina *et al.,* (2003), uses the term "fractionalization" to represent the religious plurality of countries. Alesina *et al.,* (2003, pp. 158ff) compute the fractionalization as one minus Herfindahl index of religious group shares, and find that two randomly selected individuals from a population belong to different groups. The formula is: $\mathrm{FRACT_j} = 1 - \sum_{i=1}^{N} s_{ij}^2$ where *sij* is the share of group *i* (*i =1,…,N*) in country *j*. It indicates a measure of fragmentation (heterogeneity) based on a broader classification of religious groups.
- Kaufmann political stability, year 2006 (cf., Norris, 2015). It measures perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically-motivated violence and terrorism.
- *Indicator of terrorist incidents* for 2002-2014 period is (Global Terrorism Database, START, 2015):
- Number of total confirmed fatalities for the incident. This number includes all victims and attackers who died as a direct result of the incident. It is the arithmetic mean over 2002-2014 period per country.
- Sources of data are Democracy Cross-National Data by Norris (2015), World Development Indicators (World Bank, 2008) and Global Terrorism Database (START, 2015). In particular, the Global Terrorism Database (GTD) is an open-source database including information on terrorist events and incidents around the world (more than 140,000 cases) from 1970 to 2014.

3.2. Data analysis procedure

The total sample of the study is *N*=132 countries. This study also considers a sub-sample of *N*= 50 countries divided in three cultural zones to show differences of key indicators across geoeconomic areas (see Appendix A). Regional categories are given by: North America (3 countries), Western Europe (24 countries), and Middle East & North Africa (23 countries). The preliminary analysis is performed with descriptive statistics between macro regions just mentioned.

The main analysis of this study, based on sample of N=132 countries, applies bivariate correlation between population growth and confirmed fatalities from terroristic incidents. Moreover, these variables are analyzed with regression analysis and optimization methods as follows.

Suppose that:

a) Terrorism is a specific type of violent crime
b) Terrorism is affected by high population
c) Number of total confirmed fatalities for the terrorist incident is a proxy of lethality due to terroristic incidents in society

This study hypothesizes a non-linear relation between terrorism and population growth rate to explore the possibility of quadratic effects. The goal is to understand if there exists a rate of population growth associated with high lethality due to terrorism incidents in society. The specification of the relation is that number of total confirmed fatalities for the terrorist incident over 2002-2014 (in natural logarithmic scale) is a function of annual population growth rate over 1975-2002. The model of regression is given by a quadratic function:

$$\log y_{i,t(2002\text{-}2014)} = \beta_0 + \beta_1 \, x_{i,t(1975\text{-}2002)} + \beta_2 x^{2}_{i,t(1975\text{-}2002)} + u_{i,t} \qquad (1)$$

where

$y_{i,t}$= Number of total confirmed fatalities for the terrorist incident 2002-2014
$x_{i,t}$= Annual population growth rate (POPGROWTH) 1975-2002
$u_{i,t}$= Error term (country $i=1, \ldots, n$; $t=time$)

The square of the annual population growth rate in model [1] is introduced to take into account the possibility of non-linear effect between variables under study, as shown by some scholars for investigations about economic development (cf., Valli & Saccone, 2011, pp.7-9). In addition, this equation [1] suitably fits scatter data.

The relation [1] is estimated by Ordinary Least Squares (OLS) method. In particular, the estimated relationship [1] is an objective function of *one* (real) variable represented by a polynomial function of an order higher than the first order. This, the estimated Eq. [1] is a continuous and infinitely differentiable function; it can be analyzed by differential calculus to find the optimal rate of population growth associated with the highest number of total confirmed fatalities for the terrorist incident. Statistical analyses are performed by using the Software IBM Statistics SPSS® version 21.0.

4. Results

Understanding *where* and *how* terrorism happens can provide vital information to explaining *why* it happens.

In particular, terrorism cannot be understood without having accurate knowledge of the environmental determinants (e.g., demographic, economic, geographic and social factors) in which it occurs. First of all, terrorism here is considered a specific type of crime that leads to violent crime in society (Rice, 2009); a proxy of the effects of this violent crime is given by number of fatalities for incidents of terrorist attacks. Table 1 shows the annual population growth rate in 1975-2002 and in 2002-2015 period considering three macro-regions: North America, Western Europe and Middle East. The cultural zones of Western countries, had over 1975-2002, an average annual population growth rate of 1.37% in North America and 0.89% in Western Europe, respectively *versus.* Middle East that had 3.1%. The period 2002-2015 confirms that Western countries had an average annual population growth rate lower than Middle East (see, Table 1, 2nd row). The effect of this trend on population ages 0-14 (% of total) is that Western Europe in 2006 had 16.66 per cent of young people (% of total), North America had 22.75 per cent, whereas Middle East had the highest value, 30.33 per cent of

total. These results indicate a population structure of young in the regions of Middle East. Table 1 also shows descriptive statistics of socioeconomic variables and total number of fatalities from terrorist attacks between macro regions. In short, this statistical analysis shows, in the Middle East, a high average population growth combined with problematic socioeconomic factors, especially poverty, low democracy, low HDI and political stability. Ackoff & Rovin (2003, p.146) claim that inequality of the distribution of wealth, low opportunities for development and low quality of life contribute to "the frustration and alienation that give rise to terrorism". A study for the Heritage Foundation in 2002 argues that countries prone to terrorism are the least advantaged economically (Ackoff & Rovin, 2003, p.146).

Table 1. *Descriptive statistics of some indicators across three macro regions*

	North America	Western Europe	Middle East&North Africa
Annual population growth rate 1975-2002[(1)]	1.37 (0.55)	0.89 (0.8)	3.10 (1.28)
Annual population growth rate 2002-2015[(1)]	0.97 (0.25)	0.55 (0.66)	1.98 (0.73)
Population age 0-14% total, year 2006	22.75%	16.66%	30.33%
GDP per capita PPP in U$ 2006y[(2)]	$23,371 ($16,001.86)	$25,715 ($11,104.06)	$2,748 ($2.004.13)
Gini coefficient 2002y[(1)]	41.80 (10.84)	31.58 (2.91)	39.44 (2.26)
Human Development Index[(1)] (HDI) 1975y	0.80 (0.10)	0.81 (0.05)	0.58 (0.13)
Human Development Index[(1)] (HDI) 2005y	0.91 (0.07)	0.94 (0.02)	0.78 (0.10)
Freedom House Stand. scale 100pts 2000y[(1)]	92.82 (12.37)	96.58 (4.37)	34.57 (18.48)
Religious fractionalization [(1)] 2002y	0.57 (0.34)	0.35 (0.20)	0.26 (0.24)
Kaufmann political stability[(1)] 2006y	0.28 (0.67)	0.89 (0.40)	–0.64 (1.02)
Total Number of Fatalities from terrorist attacks 2002-2014 [(3)]	0.63 (2.57)	0.23 (3.07)	2.81 (13.97)

Source (1): Norris (2015); (2): World Bank (2008); (3): START (2015).
Note: First number of geo-economic areas is the arithmetic mean; Standard Deviation (SD) is in round parenthesis.

Table 2. *Parametric estimates, OLS results of number of fatalities from terrorist attacks 2002-2014 on annual population growth rate 1975-2002*

Regression Analysis				Model Fit	
Predictors	Unstandardized Coefficients		Sig.	Adjusted R Square (Std. Error of the Estimate)	F (Sign.)
	B	Std. Error			
POPGROWTH	1.01	0.250	0.001	0.16	12.141
POPGROWTH ^{2}	–0.14	0.054	0.001	(1.32)	(0.001)
(Constant)	–1.50	0.280	0.001		

Note: Dependent variable is *log* (Number of Fatalities from terrorist attacks 2002-2014); *log* has base *e* (natural logarithm)

Statistical analysis also shows a coefficient of correlation of about 0.27 (p-value<0.05) between total number of fatalities from terrorist attacks 2002-2014 and annual population growth rate 1975-2002 between countries.

The geometric representation of the estimated relationship between growth rates of population and total number of fatalities from terrorist attacks shows an inverted-U curve (Figure 1). In order to determine the rate of population growth that supports total number of fatalities from terrorist attacks, the maximum of the estimated relationship is calculated as follows (cf., table 2).

Let:

$$\log y_{i,2001\text{-}2014} = \lambda_0 + \lambda_1 POPGROWTH_{i,1975\text{-}2002} + \lambda_2 POPGROWTH^{2}_{i,1975\text{-}2002} + u_{i,t} \quad (2)$$

$$\log y_{i,2001\text{-}2014} = -1.50 + 1.014\, POPGROWTH_{i,1975\text{-}2002} - 0.141\, POPGROWTH^{2}_{i,1975\text{-}2002} + u_{i,t} \quad (3)$$

y= Total number of fatalities from terrorist attacks and $POPGROWTH$= average population growth (annual %) for 1975-2002.

Let $logy = k$ and h=POPGROWTH, the necessary condition to maximize Eq. [3] is:

$$\frac{dk}{dh} = k'(h) = 1.014 - 0.282h \quad (4)$$

The first derivative equal to 0 is:

$$k'(h) = 0;\ 1.014 - 0.282h = 0 \Rightarrow Max = h^* = \frac{1.014}{0.282} = 3.60\% \quad (5)$$

Hence a growth rate of population of about 3.6% seems to support a high number of fatalities from terrorist attacks (in natural log scale) between regions with social issues.

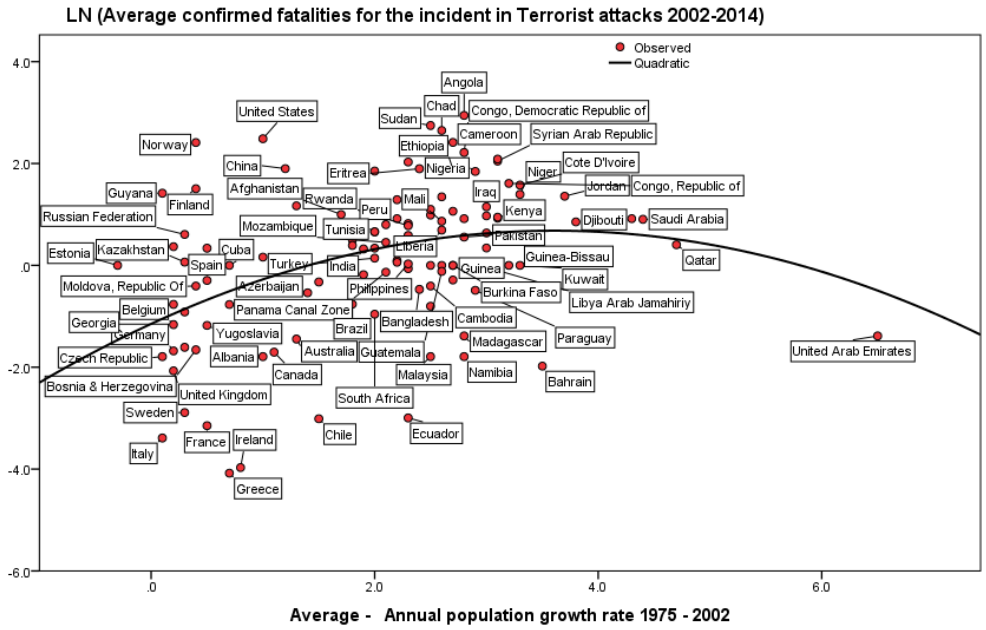

Figure 1.
Inverted-U curve fitted to countries data (concave downwards)

Finally, if $logy = -1.15 + 1.014(3.6) - 0.141(3.6)^2$ (*log* has base *e*)
$logy = 0.67$
$y = e^{0.67} = 1.95$ max average total confirmed fatalities for terrorist incident over 2002-2014.

Figure 1 suggests, with empirical data, that high growth rates of population, combined with a high number of confirmed fatalities from terrorist incidents, are in Iraq, Kenia, Sudan, Mali, Liberia, Niger, etc.

5. Discussion

Why and *how* growth rates of population higher than 3.5% support terrorism?

In general, high density of population has often been investigated as an environmental stressor since it is predicted to have a significant negative influence on social relations and psychological health (Baum & Paulus, 1991). Large numbers of people, as stressful factor, may lead to social overload and threaten regulation of interaction in society (Altman, 1975; Baum & Koman, 1976; Baum *et al.,* 1982; Desor, 1972; Laird, 1973; Schulz-Gambard *et al.,* 1988; Valins & Baum, 1973). Animal studies also demonstrate large negative effects in the presence of high density (Christian, 1961; Calhoun, 1962; Thiessen & Rodgers, 1961). In particular, violent crime is strongly associated with disorganized and distressed

regions having high population density, high levels of economic deprivation and ethnic heterogeneity (cf., Christens & Speer, 2005; Cahill & Mulligan, 2003). Many studies indicate that a higher population density and a lower level of household income are associated with increased residential crime (Cahill & Mulligan, 2003). The positive correlation between higher population density and crime can be explained with the theory of association between density and poverty (Curtis, 1975). Sociological studies consider the perspective that high density of population and crowding produce mental stress and deteriorated human functioning that can lead to crime (Altman, 1975). Especially, environmental stressors, because of unfavorable socioeconomic and demographic conditions, can generate cultural deviance and behavioral problems (Lepore *et al.,* 1991; Regoeczi, 2003). Studies reveal that frustration generated by high levels of population density can stimulate aggression and violent behavior between individuals (Mackintosh *et al.,* 1975; Regoeczi, 2003). As a matter of fact, frustration may increase in response to decreasing environmental resources due to high population density (Altman, 1975; Verbrugge & Taylor, 1980). Hence, high density of population can increase levels of environmental aversion conducive to violent crime (Cahill & Mulligan, 2003, p.585). In addition, high growth rates of population modify the demographic structure of nations, increasing the younger age classes. The age composition of population, interacting with poverty and other socioeconomic factors, is a neglected factor for terrorism studies (cf., Ehrlich & Liu, 2002). Instead, regions with young population can have high human resources and low economic resources, generating a population pressure (population-resource imbalance). The increasing young age category of individuals, combined with poverty (cf., "blockage of goal-seeking behavior", Agnew, 1985, *passim*) is often evoked as the source of stress in society that leads to aversive environments, violence and terrorism as a result (cf., van Bergen *et al.,* 2015). Ehrlich & Liu (2002, p.187) argue that the vast majority of terrorists were young adult males: "Based on the information from the FBI's most wanted terrorist list… approximately 90% of those on the list were all males and from 22 to 34 years old when their first alleged terrorist act took place". These students or young professionals may be disillusioned with the prospects of changing society and see little chance of access to the system despite their privileged status (Crenshaw, 1981, p.384). In general, the prevalence of young population in poor socioeconomic environments can induce collective and/or personal deprivation, social exclusion that lead to frustrated and angry individuals using violence (cf., van Bergen *et al.,* 2015). In particular, the source of terrorism can be also due to increasing young individuals –in the presence of problematic socioeconomic environments and connectedness to mainstream society– that become frustrated and anger and may turn to terrorism as a result (Ackoff & Rovin, 2003; Rice, 2009). Moreover, within rich countries, many terrorists today are also young, well-educated, and middle class in background (Butler, 2015). Overall, than, high growth rates of population are basic factors to reinforce aversive environment and intergroup hostility leading to violent crime and terrorism in society (cf., Cahill & Mulligan, 2003; Choma *et al.,* 2016; Christens & Speer, 2005; LaFree & Dugan, 2009; Regoeczi, 2003¸ Rice, 2009; Schaafsma & Williams, 2012; van Bergen *et al.,* 2015).

6. Concluding observations

Terrorism is expected to increase in the future, though rising economic growth, higher investments in R&D and the vital role of research labs that support technology transfer and enforcement technologies to reduce and/or prevent this social issue (Ackoff & Rovin, 2003; United Nations, 2016). In fact, The literature shows that manifold factors affect terrorism (Crenshaw, 1981; Coggins, 2015; Enders *et al.,* 2016; Schaafsma & Williams, 2012). Piazza (2006) argues that a popular hypothesis is that terrorism and other forms of political violence are due to poverty and poor distribution of economic resources as "expression of

socioeconomic discontent and desperation" (Piazza, 2006, p. 160). The UN General Assembly claimed that the crisis of international terrorism can be due to issues of poverty, inequality, underdevelopment and the absence of social justice in the developing world (United Nations, 2016). Terrorist organizations can use poor socioeconomic conditions of people as a base to support their criminal activities (cf., Enders & Hoover, 2012; Krieger & Meierrieks, 2010). As a matter of fact, low levels of socioeconomic development increase the appeal of political extremism, encourage political violence and instability in society (Piazza, 2006).

However, in the field of terrorism, convincing studies that explain the relationship between demographic factor and terrorism are scarce. In particular, many studies do not explain the precise level of population growth leading to terrorism, and a number of important factors linked to terrorism and population in problematic regions has been largely ignored, such as age composition of population, religious fractionalization, political stability of countries, etc.

The statistical evidence above seems in general to support the hypothesis that a high lethality due to terrorist incidents in society can be explained by growth rates of population higher than 3.5%, combined with poverty and political instability, other things being equal. As a matter of fact, the ethnicity and/or religion are illusory causes of terrorism, because they are not an environmental stressor *per se,* whereas a basic determinant of terrorism may be a critical demographic mass that, in certain environments with problematic socioeconomic factors, leads to disrupt the stability of societies/communities, and to increase frustration and anger of people, generating terrorism as a result (cf., Butler, 2015).

The findings here can clarify, as far as possible, some important features of terrorism, such as:

(1) The theoretical framework assigns a central role to high growth rate of population to explain general causes of terrorism.

(2) This study shows that terrorism seems to be fueled with growth rates of population higher than 3.5%, combined with poverty, political instability, etc., other things being equal.

(3) The theoretical framework and evidence here are also able to explain that terrorism originates in certain aversive environments with high growth rates of population that can generate cultural deviance, frustration and anger of young individuals, and terrorism as a result.

(4) A consequence of the study here is that low growth rates of population, combined with high standard of living for young generations, are not likely to produce terrorism.

(5) Another consequence of the study here is that current trend of high growth rates of population in regions (and communities) with social issues can continue to feed terrorism and terroristic threat for many years to come.

Since terrorism can arise out of an inability to cope effectively with aversive environments, there is a clear need to focus on a long-run strategy of economic aid for a conflict dissolution of this critical problem in society: "means to redesign either the society that has the problem or its environment in such way as to eliminate the problems or the conditions that caused it" (Ackoff & Rovin, 2003, p.10). Currently, deterrence policy, preventive actions, imposing sanctions on actual and presumptive terrorist countries, cut off national financing, etc. have short-term effects and do not reduce the social issues of terrorism in the long run. Ackoff & Rovin (2003, p.145) argue that: "containment and isolation of terrorists have not been particularly effective because they do not weaken the terrorists' beliefs… sanctions imposed on such societies do not reduce their resolve". Other counter-terrorism strategies remove regimes that sponsor terrorists and/or use military actions but they can generate instability of target nations and unknown social effects. Linstone (2003, p.292) states that: "military means to pre-empt the terrorists or root them out can reduce, but not eliminate, the terrorist threat. Indeed, it may actually increase it by radicalizing many young" (cf., Editorials Nature, 2015).

Considering the problematic demographic and socioeconomic factors of terrorism discussed here, a policy to reduce the terrorism from nations that are its principal sources can require a program of economic aid to reduce economic inequality, increase standard of living and work opportunities in society (cf., Ehrlich & Liu, 2002; Ackoff & Rovin, 2003; Frey & Luechinger, 2003). The aim is to provide education and economic opportunity to young population reducing environmental stress and unemployment (cf., Krieger & Meierrieks, 2010). This economic policy—supporting wealth, wellbeing and goal-seeking behavior of people in populated regions—can reduce environmental aversion, frustration and anger of young individuals and, likely, one of the principal sources of terrorism (cf., Agnew, 1985; Rice, 2009). Hence, the rising economic prosperity of problematic regions may help to lower economic and demographic causes of terrorism in society. In fact, Krieger and Meierrieks (2010, p.902) confirm that social policies ameliorate short-run and long-run socioeconomic conditions of poor areas within and between countries (e.g., unemployment, poverty, inequality, and dissatisfaction), and indirectly reduce terrorism. In short, terrorism in societies with high growth rates of population and socioeconomic problems can also be fought by developmental programs to support education and work opportunity that raise economic prosperity. In fact, more generous welfare regimes may help both to lower short-run sources of collective deviance and frustration in society, and to lower long-run inequality, poverty and population growth that set the stage for terrorism.

Overall, then, the findings of the study can clarify whenever possible, one of principal sources of terrorism in society. However, the study here, based on a partial model, did not permit some intervening variables that may have been useful in providing a deeper and richer explanation of these social issues. To conclude, the results here are of course tentative since we know that situational factors causing terrorism are often not equal over time and space. This study here investigates specific demographic factors that are important but not sufficient determinants to understand the comprehensive reasons for and the general implications of terrorism in modern society. There is need for much more detailed research into the relations between terrorism, population and economic factors of nations to explain manifold factors of this critical social issue in current and maybe future societies.

Appendix

Appendix A. Countries

North America: Canada, Mexico, United States.

Western Europe: Andorra, Austria, Belgium, Cyprus, Denmark, Finland, France, Germany, Gibraltar, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, Vatican City, Germany.

Middle East & North Africa: Algeria, Bahrain, Egypt, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Libya, Morocco, North Yemen, Qatar, Saudi Arabia, South Yemen, Syria, Tunisia, Turkey, United Arab Emirates, Gaza Strip, Western Sahara, Yemen.

Appendix B.

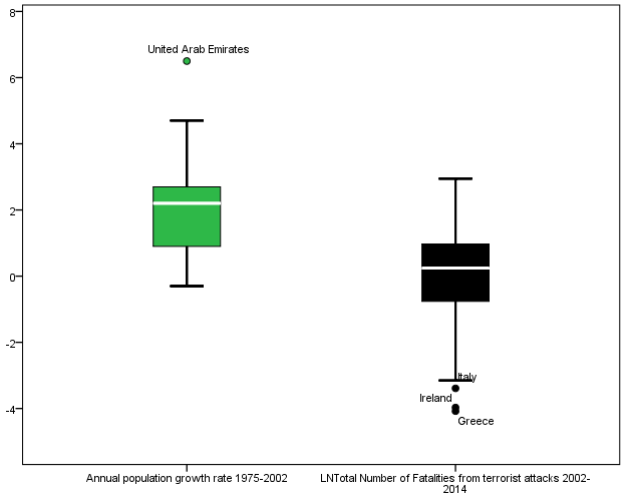

Figure 1B.

Boxplot of variables with *outliers* (United Arab Emirates, Italy, Ireland and Greece)

Table 1B. Descriptive key statistics

	Annual population growth rate 1975-2002	Total Number of Fatalities from terrorist attacks 2002-2014	LN Annual population growth rate 1975-2002	LN Total Number of Fatalities from terrorist attacks 2002-2014
Mean	1.92	2.20	0.38	0.10
Std. Deviation	1.21	3.24	0.96	1.44
Skewness	0.19	2.74	-1.31	-0.60
Std. Error of Skewness	0.21	0.21	0.22	0.22
Kurtosis	0.48	8.60	0.74	0.41
Std. Error of Kurtosis	0.42	0.42	0.43	0.44

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