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Aging and Terrorism

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ABSTRACT

This paper examines how aging affects terrorism following Ehrlich and Liu (2002). The central theme of this paper is to analyse the tendency of aging societies to resort to the incidents of terrorism. With a relative increase of aged population, the unemployment may fall given the lesser pressure in labour market and consequently, the inclination of youth to resort to terrorism declines. International panel data is composed of 89 countries from 1990-2022 is collected and the negative binomial regression model is applied to confirm the argument proposed in this paper. Furthermore, a rise in the size of the aged population in either democracies or countries with higher income levels is found to discourage terrorism.

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1. Introduction

Pedahzur, Perliger and Weinberg (2003) establish that majority of terrorist attacks in Palestine over 1993-2002 was carried out by the population aged between 16 and 30. A very negligible proportion of the attacks was related to the population above 30 and moreover, there is little evidence showing the population above 65 directly involved in terrorism. Britain's prevent program in the wake of 7/7 attacks also aimed to build resilience among individual and collective youth, specifically Muslim youth, against terrorist ideologies (Thomas, 2016). According to a report by the New America,[1] the average age of terrorists carrying out suicide and non-suicide attacks is around 29, with the median value of 26. Given that young adults are normally perceived as hot heads and vulnerable to be trapped by the terrorist organization, we hypothesize that the aging population leads to a reduction in terrorism. Cross-country empirical literature establishes poverty (Krueger & Malečková, 2003), rule of law (Piazza, 2008), economic condition (Blomberg, Hess, & Weerapana, 2004), education (Azam & Thelen, 2008; De Mesquita, 2005; Ganor, 2011), ethnic tensions (Basuchoudhary & Shughart, 2010), economic integration (Wintrobe, 2006), degree of economic and political freedom Kurrild-Klitgaard, Justesen and Klemmensen (2006), state administration, control and policy (Frey, 2004) and social welfare policies (Burgoon, 2006) are potential determinants of terrorism outbreak across the globe.

Despite the grave consequences terrorism poses to humankind, there is a considerable shortage of existing literature on how changes in the demographic structure affect terrorism. Few studies which explored the relationship between aging and terrorism are found to treat aging as a control variable as opposed to offer a detailed and a thorough analysis. This renders considerable significance to explore this further because the traditional theories emphasized on the role of disaffected/disgruntled youth in resorting to terrorism. However, the aging societies bring in new insights. However, there is a scantiness of research investigating the impact of demographic changes on global terrorism. This paper is also motivated by the recent projections regarding significant changes in aging population - as shown by the United Nations

[1] https://www.newamerica.org/in-depth/terrorism-in-america/who-are-terrorists/ (accessed April 25, 2020).

- the fraction of retired population is estimated to rise from 9% in 2019 to 16% in 2050.[2] This paper develops the Ehrlich and Liu (2006) hypothesis to consider how population aging affects terrorism. The main theoretical prediction is that terrorism falls with population aging as the number of young adults who are more likely to be exposed to the recruitment target of terrorist organization relative to the elderly declines. The logic is similar to Ehrlich and Liu (2006). If the rate of population growth falls, then job opportunities may be doomed to become less rare, leading to a decline in the number of unemployed and disaffected young population who treats the West as their enemy, which can hardly provide the cannon fodder for terrorism. International panel evidence supports this hypothesis. The main argument proposed in this paper is empirically investigated in an international panel data over the period 1990-2022, utilizing the negative binomial regression model. The findings suggest that a rise in the aged population as a share of total population leads to a fall in the incidence of terrorism. The logic is simple yet insightful. Aging population implies more jobs available chased by few individuals, which relieves the pressure of the labour market. Those seeking jobs with higher probability of success would less likely resort to terrorist activities due to higher opportunity cost for involving in terrorism. Consequently, aging leads to a fall in terrorist activities. In addition, this negative relationship holds more firmly in either democracies or countries with higher income levels. The next section describes the data in. Section 3 contains the estimation results, and section 4 concludes.

2. Literature Review

A handful of literature investigates how aging can affect terrorism. According to Lee and Mason (2011), there are several reasons due to which the aging societies would be less inclined to resort to terrorist activities. For example, the physical limitations of the elderly, higher degree of risk aversion and higher economic stakes enhance the opportunity cost of resorting to terrorist activities for them and hence they do not involve in terrorism. The recruitment base also contracts and shrinks in aging societies as the share of the young population in these societies gradually and constantly declines (Caldwell, 2008). Although the overall supply of terrorists declines due the contracted base for terrorist recruitment yet a rise in the share of aged population (% of total population) weakens and worsens the capacity and efficiency of state to deal with terrorism. As is aptly put by Jackson and Howe (2008) that a rising share of elderly in the population comes with significanct economic costs such as increased pension, healthcare and elderly care which adversely affects the budget allocation which could have been otherwise spent on defence, intelligence and counter-terrorism activities. Another perspective through which aging can affect terrorism is when the youth migration from other countries takes place. The immigrants occupying resources of the indigenous population in terms of jobs and businesses creates ethnic and religious fractionalisation(Ahmed, Azhar, & Mohammad, 2024). The rift develops even further when it is accompanies by socio-economic exclusion. These factors also lead to homegrown incidents of terrorism (Piazza, 2011). Goldstone, Kaufmann and Toft (2012) argue that the phenomenon of aging societies is not limited to western societies only. Rather societies like China, Russia and Iran are also aging. This puts extra pressure to already shrinking young population which may use coercive policies and indulge in proxy war internationally to consolidate their economies and deflect any external threat(Wided, 2022).

3. Data

Annual panel dataset for this paper is composed of 89 countries between 1990 and 2022.[3] The main dependent variable is the incidence of terrorism. In this paper we define the terrorism as *"acts of violence by non-state actors, perpetrated against civilian populations, intended to cause fear, in order to achieve a political objective"* (Global Terrorism Database)[4]. This definition covers majority aspects of what could possibly be defined as terrorism, yet the definitional consensus is not guaranteed. Apart from the complication attributed to the definition of terrorism, its measurement is complex as well. Cubukcu and Forst (2018) compare the extent of reporting and the nature of biases in open source terrorism database with official account on terrorism events in Turkey from 1960 to 2012.

[2] During the same period, the share of retired population is forecasted to double across Northern Africa and Western Asia, Central and Southern Asia, Eastern and South-Eastern Asia, and Latin America and the Caribbean regions.
[3] The availability of terrorism data precludes using other countries.
[4] https://ourworldindata.org/terrorism

Table 1: Summary Statistics

	Observations	Mean	Standard Deviation	Minimum	Maximum
Incidence of Terrorism	1880	72.16383	242.4993	1	3933
Aged Population	2464	7.36813	5.287174	2.074548	27.04858
Working Population	2464	60.88823	6.967299	45.63317	77.90617
Dependency Ratio	2464	11.57868	7.576005	2.679807	45.03247
Trade	2345	69.6912	36.99793	.0209992	311.3541
GDP per capita (log)	2381	2.177905	.1427528	1.769872	2.408515
Population Growth	2491	1.592611	1.404804	-10.95515	7.917892
Sec: School	1783	74.33945	32.27363	5.21012	163.9305
Democracy	2226	3.893531	6.074436	-10	10
Unemployment Rate	2376	8.532743	6.397744	.16	37.25
Government Size	2090	29.56333	12.96405	3.787	182.178
Inequality	1256	44.27118	6.376774	24.92401	62.85039

Their findings indicate a considerable systematic discrepancy between open-source terrorism database and official accounts as the former is found to be under-reported in the terrorism incidents. There are several databases widely used including the International Terrorism: The Attributes of Terrorist Events (ITERATE), the RAND Database of Worldwide Terrorism Incidents (RDWTI), and the Global Terrorism Database (GTD). Among these we prefer the Global Terrorism Database following (LaFree & Dugan, 2007). The data compiled by GTD is publicly available and covers more and most recent events of terrorism.[5] As shown in Table 1, on average, 72.16 events of terrorism occur across our sample. However, the standard deviation, 242.49, indicates some countries are easily targeted by the terrorists compared with others. Data for the measure of population aging, the fraction of the population aged 65 or above, is collected from the World Development Indicators. Its mean value from 6.17 in 1990 to 8.82 in 2022 indicates a growing share of the aged population. Nonetheless, the standard deviation, 5.28, paints a stark comparison that some societies are with more demographic changes in our sample than the remainder. Besides, control variables including the share of the working-age population (between 15 and 64), trade (as a share of GDP), GDP per capita, population growth rate, secondary school enrolment rate (to measure human capital), government size (measured by government expenditure as a share of GDP) as in Freytag et al. (2011), democracy (following (Eubank & Weinberg, 1994), unemployment rate (as in Bagchi and Paul (2018) and inequality (as in Krieger and Meierrieks (2019) are employed in the empirical analysis.

4. Empirical Analysis

The technique of Ordinary Least Squares estimation is not a good option for this paper as the dependent variable, terrorism, is a count of event implying a skewed dataset as most value of it is zero (Long & Freese, 2006). The method of Poisson regression is a well-known estimation technique for the event count variables. It is recommended for a dataset fulfilling the equi-dispersion property which means that the mean and variance of the dependent variable are equal. However, our dataset confronts the problem of over-dispersion due to unobserved heterogeneity across countries. Thus, the negative binomial regression model is chosen for this paper as it allows for under-dispersion or over-dispersion attributed to unobserved heterogeneity across countries. Column 1 of Table 2 reports regression taking terrorism and aged population as main regressors. The sign of the estimated coefficient is negative and it is statistically significant at 1% level. A relative increase in aging population is found to reduce terrorism events. This finding is consistent with the hypothesis of this paper developed on Ehrlich and Liu (2006). A relatively higher share of aged population implies less demand for and more availability of jobs in the labour market. This may lead to higher opportunity cost for resorting to terrorism for youth and, hence, they do not involve in terrorist event leading to a decline in terrorism.

Few control variables including working population, trade (% GDP), GDP per capita, population growth rate, secondary school enrolment rate, democracy and unemployment rate are added in the following column. A reduction in terrorism incidence is found with a rise in the

[5] The range of RAND extends to 2009 only.

proportion of population constituted by aged people. Among controls the coefficient estimate of working population is estimated to be positive and significant at 1% level. With a rise in the share of working population, terrorism is found to increase. This is indirectly the confirmation of the main argument of this paper. A rise in working population (decline in aging population) implies relative scarcity of jobs for those seeking work and may thus force them to terrorism out of resentment against society and leaders. Economic integration, as reported by coefficient estimate of trade, is found to reduce terrorism (Blomberg, Hess, & Weerapana, 2004; Burgoon, 2006; Bussmann & Schneider, 2007; Lai, 2007). The positive sign of secondary school enrolment rate is positive suggesting more education leads to increase incidents of terrorism (Berrebi, 2007; Krueger, 2008; Krueger & Malečková, 2003). A negative sign of unemployment rate may indicate reverse causality between terrorism and unemployment. More incidents of terrorism may cause higher unemployment rate.

Table 2: Estimation Results

	(1)	(2)	(3)	(4)	(5)
				OECD	**Non-OECD**
Aged Population	-0.1092***	-0.1205***	-0.1217***	-0.0259	-0.2711***
	(0.0071)	(0.0181)	(0.0296)	(0.0333)	(0.0556)
Working Population		0.0627***	0.0289	-0.1917***	0.0357
		(0.0147)	(0.0238)	(0.0509)	(0.0318)
Trade		-0.0160***	-0.0220***	-0.0192***	-0.0228***
		(0.0014)	(0.0019)	(0.0024)	(0.0036)
GDP per capita		-0.9276	-4.7156***	-10.8027**	-3.7278*
		(0.8289)	(1.4893)	(4.4521)	(2.0977)
Population Growth		0.0054	-0.2677*	0.0052	-0.5355**
		(0.0743)	(0.1454)	(0.2041)	(0.2325)
Sec: School		0.0057*	0.0127**	0.0074	0.0053
		(0.0035)	(0.0053)	(0.0062)	(0.0071)
Democracy		-0.0030	-0.0016	-0.1253	0.0223
		(0.0119)	(0.0160)	(0.0909)	(0.0193)
Unemployment Rate		-0.0323***	-0.0154	0.0840***	-0.0433***
		(0.0081)	(0.0114)	(0.0237)	(0.0121)
Government Size			0.0129	-0.0438***	0.0700***
			(0.0095)	(0.0113)	(0.0140)
Inequality			-0.0233	-0.0535**	-0.0855***
			(0.0194)	(0.0267)	(0.0297)
lnalpha	0.9773***	0.8427***	0.6394***	0.0407	0.7705***
	(0.0270)	(0.0350)	(0.0492)	(0.0867)	(0.0624)
Observations	1861	1155	624	252	372
Countries	89	89	89	15	74

Table 3: Estimation Results

	(1)	(2)	(3)	(4)	(5)
				OECD	**Non-OECD**
Dependency Ratio	-0.0765***	-0.0925***	-0.0788***	0.0166	-0.1807***
	(0.0048)	(0.0113)	(0.0188)	(0.0206)	(0.0332)
Trade		-0.0151***	-0.0220***	-0.0189***	-0.0229***
		(0.0014)	(0.0019)	(0.0024)	(0.0035)
GDP per capita		0.5819	-4.4008***	-12.0244***	-3.1788
		(0.7653)	(1.4451)	(4.3134)	(1.9760)
Population Growth		-0.1278**	-0.3101***	-0.1140	-0.5568***
		(0.0502)	(0.1030)	(0.2124)	(0.1492)
Sec: School		0.0079**	0.0136***	0.0083	0.0066
		(0.0035)	(0.0052)	(0.0063)	(0.0070)
Democracy		0.0004	-0.0028	-0.2793***	0.0238
		(0.0119)	(0.0159)	(0.1015)	(0.0192)
Unemployment Rate		-0.0412***	-0.0180*	0.0693***	-0.0445***
		(0.0075)	(0.0109)	(0.0244)	(0.0118)
Government Size			0.0117	-0.0505***	0.0689***
			(0.0095)	(0.0113)	(0.0137)
Inequality			-0.0201	-0.0546**	-0.0817***
			(0.0193)	(0.0270)	(0.0295)
lnalpha	0.9755***	0.8490***	0.6431***	0.0813	0.7733***
	(0.0271)	(0.0350)	(0.0491)	(0.0864)	(0.0624)
Observations	1861	1155	624	252	372
Countries	89	89	89	15	74

The relative size of aged population is found to discourage terrorist events in column 3 when government size and inequality are added as controls. The coefficient estimates of both control variables lack statistical significance. However, the estimated coefficient for GDP per capita is negative and statistically significant. With higher economic development, societies improve their capacity to tackle terrorism (Blomberg, Hess, & Weerapana, 2004; Gurr, 1970). The sample is decomposed into the OECD and non-OECD countries and the coefficient estimates are reported in column 4 and column 5 respectively. Across non-OECD countries, a rise in aged population as a share of total population is found to reduce terrorism.

Although the sign of coefficient estimated of aged population within the OECD countries is negative, it is not statistically significant. Alpha (lnalpha) values throughout Table 2 are statistically significant at 1% level except for the OECD countries. The statistical significance implies the null hypothesis, Poisson regression is preferred over negative binomial regression, is not accepted. Thus, this justifies negative binomial regression model chosen for this paper. Table 3 mimics Table 2 replacing aged population with dependency ratio. A rise in the share of dependent population is found to decrease incidences of terrorism. The coefficient estimates of dependency ratio throughout Table 3 are statistically significant besides OECD sub-sample. The results of Table 3 are consistent with the main argument of this paper and the findings of Table 2.

Table 4: Estimation Results

	(1)	**(2)**	**(3)**	**(4)**
Aged Population	0.2692***	2.2835***		
	(0.0560)	(0.5463)		
Aged Population*Democracy	-0.0401***			
	(0.0051)			
Aged Population*GDP per capita		-1.0310***		
		(0.2333)		
Dependency Ratio			0.1948***	1.3194***
			(0.0393)	(0.3712)
Dependency Ratio*Democracy			-0.0270***	
			(0.0035)	
Dependency Ratio*GDP per capita				-0.5973***
				(0.1580)
Working Population	-0.0309	-0.0048		
	(0.0241)	(0.0252)		
Trade	-0.0240***	-0.0226***	-0.0238***	-0.0226***
	(0.0018)	(0.0018)	(0.0018)	(0.0019)
GDP per capita growth	-1.9675	2.7211	-2.8215**	1.7646
	(1.5558)	(2.2159)	(1.4301)	(2.1272)
Population Growth	0.0440	-0.0282	0.1323	-0.0171
	(0.1406)	(0.1577)	(0.1180)	(0.1302)
Sec: School	0.0063	0.0102**	0.0063	0.0109**
	(0.0049)	(0.0051)	(0.0049)	(0.0051)
Democracy	0.2664***	0.0275*	0.2737***	0.0223
	(0.0346)	(0.0164)	(0.0360)	(0.0166)
Unemployment Rate	0.0174	-0.0229**	0.0164	-0.0213**
	(0.0117)	(0.0113)	(0.0114)	(0.0107)
Government Size	-0.0020	0.0066	-0.0057	0.0063
	(0.0091)	(0.0094)	(0.0092)	(0.0094)
Inequality	-0.0386**	-0.0384**	-0.0407**	-0.0348*
	(0.0174)	(0.0189)	(0.0170)	(0.0189)
lnalpha	0.5573***	0.6133***	0.5646***	0.6241***
	(0.0498)	(0.0494)	(0.0498)	(0.0493)
Observations	624	624	624	624
Countries	89	89	89	89

Next, the aged population is interacted with democracy in column 1 of Table 4. This helps us analysing how changes in the relative size of aging in democracy affect terrorism. According to coefficient estimate of the interaction term, an increase in aged population in democracy reduces terrorism. To analyse how aging at high and low income levels affect terrorism, we interact aged population with income levels (log (GDP per capita)) in the

following column. A rise in aged population at higher levels of income is found to reduce terrorist incidence. Column 3 and column 4 repeat column 1 and column 2 with dependency ratio instead of aged population. The results are consistent implying a rise in the relative size of dependent population leads to a fall in terrorism.

5. Conclusion

This paper investigates how aging societies affect terrorism. Utilizing international panel data over 1990-2022 and the negative binomial regression model, we find that a rise in the size of the aged population leads to a reduction in the events of terrorism. The findings firmly hold among the OECD and non-OECD countries. Furthermore, a rise in the proportion of the population constituted by aging in democratic regimes or countries with higher income levels is also associated with lower terrorism incidences. As a result, it is advised that the policy makers specifically in weak democratic regimes or countries with lower income levels where the size of the young population is still growing should attempt to create more jobs for the young and engage them in productive activities as a counter-terrorism strategy. For future research, more data availability will help researchers to derive more insightful results and therefore, terrorism could be handled effectively.

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