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Abstract

This study investigates the impact of terrorism on international trade among SAARC countries over the period 1990 to 2022. The study used international trade as a dependent variable, while Terrorism, GDP, Exchange rate and Real-world GDP are independent variables. Before going toward cointegration tests, the study used unit root tests and concluded that some variables were stationary at the level while others were stationary at the level. Unit root test results suggested using the PMG-ARDL model to estimate the long and short-run impact among variables. GDP positively correlates with trade, suggesting that economic growth encourages trade activities; exchange rate fluctuations have mixed effects depending on the appreciation or depreciation of the currency; and real-world GDP changes have a positive spillover effect on trade within the SAARC region and a significant positive impact on terrorism. Government policymakers should consider the issues of terrorism, insecurity, and law to reduce investor skepticism and fully actualize the potential of their trade hosting.

Keywords: Terrorism, International trade, Panel data, ARDL model, SAARC nation

1. Introduction

Terrorism is a global scourge that has had far-reaching consequences on various aspects of society, including international trade. The South Asian Association for Regional Cooperation (SAARC) region, comprising countries such as India, Pakistan, Bangladesh, Sri Lanka, Nepal, Bhutan, and the Maldives, has been particularly affected by the menace of terrorism. The research paper aims to investigate the impact of terrorism on international trade within the SAARC region, which is of critical importance given the region's economic interdependence and the potential for cross-border spillover effects. The SAARC region has long been plagued by various terrorist groups and activities, ranging from the India-Pakistan conflict to the rise of the Taliban in Afghanistan. These persistent threats have disrupted trade flows, increased transaction costs, and eroded investor confidence, all of which have had a detrimental impact on the region's economic growth and development. For instance, the 2008 Mumbai attacks in India not only resulted in the loss of lives but also caused significant disruptions to the city's financial and commercial activities, leading to a temporary decline in trade and investment.

The purposely use of violence or the threat of violence is terrorism and aggression by individuals or organizations to achieve certain social or political goals through terrorize the public through threats, assassinations, and other violent acts (Sandler & Enders, 2008). There are many different types of terrorist acts, such as cyberattacks, bombings, hijackings, and assassinations. Targets can range from civilian populations and public infrastructure to government institutions and symbols of authority. The motivations behind terrorism can vary widely, from political grievances and ethnic or religious conflicts to ideological extremism. It's essential that you keep in mind that terrorism does not represent the beliefs or actions of any specific religion, ethnic group, or nationality. The vast majority of people who adhere to any religion or belong to a particular ethnic or national group do not support or engage in terrorism. The fight against terrorism combines law enforcement, intelligence collection, global collaboration, and addressing underlying socio-political factors that contribute to its rise. Counterterrorism measures aim to prevent attacks, disrupt terrorist networks, and hold individuals accountable for their actions. It's essential to approach discussions about terrorism with sensitivity and avoid generalizations or stigmatization of any particular group or community. Open dialogue, understanding, and cooperation among nations and communities are crucial in effectively addressing this global challenge the disaggregated studies by (Bandyopadhyay et al., 2018). In order to accomplish social or political goals, some people or organizations resort to scaring the broader public, including those who are directly affected, by deploying or threatening to deploy aggressiveness and violence. According to Sandler and Enders (2008), terrorist actions include acts of violence such as bombings, suicide assaults, kidnapping, hijacking, threats, and assassinations.

The costs of terrorism, both direct and indirect, are high for the economy. Lives lost, medical bills incurred, property destroyed or damaged, and other immediate financial losses are all direct consequences of terrorism. Terrorist attacks have far-reaching indirect consequences, such as higher security expenditures, slower GDP growth, higher unemployment, less foreign direct investment (FDI), higher insurance premiums, and higher expected compensations for affected areas. Damage to a region's infrastructure and the national economy are two outcomes of terrorist attacks (Rasheed and Tahir, 2012). The South Asian Association for Regional Cooperation (SAARC) represents a diverse group of eight member countries, including Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, and Sri Lanka. Formed in 1985, SAARC aimed to foster regional cooperation and economic integration among its member states. However, despite shared historical, cultural, and economic ties, intra-regional trade among SAARC countries has remained relatively low compared to other regional groupings (Arshad & Mukhtar, 2019; Mitra & Nanda, 2023; Audi & Ali, 2018). This limited trade integration can be attributed to various factors, including political tensions, inadequate infrastructure, trade barriers, lack of connectivity, and economic disparities among member countries (Rai & Sharma, 2020; Huwang, 2019). Historical disputes and ongoing political tensions, particularly between India and Pakistan, have hindered efforts to deepen economic cooperation and trade relations within the region (Ahmed & Bhatnagar, 2018; Alzahrani & Salah, 2020; Naik, 2020). Additionally, inadequate transportation networks, border crossings, and customs procedures pose significant challenges to trade facilitation and increase transaction costs for businesses engaged in cross-border trade (ADB, 2019). Non-tariff barriers, such as regulatory

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restrictions and administrative procedures, further impede the flow of goods and services within the region (World Bank, 2020). Despite these challenges, SAARC member countries have undertaken various initiatives to promote intra-regional trade and economic cooperation. Efforts such as the South Asian Free Trade Area Agreement and regional connectivity projects aim to enhance trade liberalization and improve physical and digital connectivity within the SAARC region (SAARC Secretariat, 2021). Strengthening political dialogue, addressing trade barriers, and investing in infrastructure are essential for realizing the full potential of intra-SAARC trade and fostering sustainable economic development across the region.

The existing literature on the topic has provided valuable insights into the association between terrorism and trade, but the SAARC region presents unique challenges and dynamics that warrant a dedicated study. The region's diverse economies, varying levels of economic development, and complex political and security landscapes require a nuanced understanding of the specific factors that shape the influence of terrorism on trade. The key objective of the study is to examine the impact of terrorism on international trade for SAARC countries using panel data. The findings of this study will have important policy implications, as they can inform policymakers in the SAARC countries on the need to prioritize investments in counter-terrorism efforts, strengthen regional cooperation, and implement measures to protect critical infrastructure and supply chains. Ultimately, this research seeks to cause to the ongoing efforts to enhance regional security and economic integration in the face of the persistent threat of terrorism.

This article's format is as follows: following the "Introduction," the authors review related literature and examine, from a variety of angles, the effects of terrorism, GDP, exchange rate, and real world GDP on international trade. In addition, the study's data sources, and methodology were covered in the "Methodology" section, while the study's results were reviewed in the "Results and discussion" section. Findings and policy implementation make up the study's last section. In addition, we looked at the study's weaknesses and offered some suggestions for further research.

2. Literature Review

In various contexts and regions, there has been some theoretical and empirical research conducted to investigate the trade-terrorism association in conjunction with the conventional location control variables, including Gross Domestic Product, Exchange Rate, and Real World GDP. The association between terrorism and international trade has been researched extensively, with varying results. Some researchers have discovered that terrorism has a detrimental influence on trade, while others have reported more complex effects. Abadie and Gardeazabal (2008) discovered that foreign direct investment is reduced by approximately 5% when the risk of terrorism increases by 10%. According to Nitsch and Schumacher (2004), bilateral trade is substantially adversely affected by terrorism. In contrast, Blomberg and Hess (2006) posited that the influence of terrorism on trade is less significant than is generally believed. The product composition of international trade is also influenced by terrorism. According to disaggregated studies conducted by (Bandyopadhyay et al., 2018; Sun & Chang, 2020), domestic terrorism can result in a rise in the shipment of primary resources and a reduction in developing nations' exports of manufactured goods. This can further diminish the already limited proportion of higher value-added trades (Bandyopadhyay, et al., 2018; Irfan & Sohail, 2021; Mealli, 2021; Andreou, 2021). The orientation of international trade is also influenced by terrorism. According to Chang Hoon Oh's research, the commerce between developed countries is augmented by technological disasters and terrorist attacks. By cultivating a more stable political climate, less developed countries can enhance their trade appeal (Oh, 2017; Mordecai & Akinsola, 2021; Wang, 2023) While nations facing a high terrorist threat see a decline in exports, countries with lower terrorist threats can take advantage of the rising demand for commodities whose supply chains have been impacted by the threat, leading to higher prices (Bandyopadhyay, et al., 2016; Cizakca, 2024). The costs of international commerce are exacerbated by terrorism. Blomberg, Hess, and Orphanides concluded that the combined effect of terrorism and external and internal conflicts corresponds to a 30% tariff when evaluating the impact of violent acts on trade processes. This is a substantial barrier to entry, given the evolution of the average levied duties. Despite the fact that the aforementioned study did not distinguish between terrorism and other violent conflicts, the Global Terrorism Index data indicates that terrorism is closely associated with other violent conflicts. Consequently, the study's findings clearly demonstrate the detrimental effects on economies that are impacted by terror by proxy. Marsai and Tarrósy (2022) introduced an additional significant dimension to this discourse by examining the cases of Boko Haram and al-Shabaab. They argue that violent extremist organizations (VEOs) capitalize on crisis situations, such as the COVID-19 pandemic, and demonstrate a greater capacity to adapt to changing circumstances than central governments, particularly in "ungoverned spaces" (Marsai & Tarrósy, 2022), thereby exacerbating insecurities. The relationship was estimated using the Ordinary Least Squares regression model. The study's results indicated a detrimental correlation between terrorism and commerce.

Businesses and governments frequently incur elevated security expenses as a consequence of terrorism. It has the potential to disrupt transportation and logistics networks, resulting in the delay of shipments and an increase in the costs associated with ensuring secure transit (Rose, 2004; Siddiqi et al., 2014). Countries that are engaged in terrorist activities may experience a decrease in foreign direct investment as a result of the increased perceived risks and uncertainty. Investors may refrain from investing in regions or countries that are perceived as unstable or hazardous (Blomberg et al., 2004). Supply chains can be disrupted by terrorist attacks, resulting in delays in the production and delivery of products and services. This can have a detrimental effect on economic efficiency and trade flows (Berrebi & Ostwald, 2011; Ahmad et al., 2018). Insurers may adjust their risk assessments to account for potential losses due to terrorist acts, which may result in higher insurance premiums for businesses in regions that are susceptible to terrorism (Nitsch & Schumacher, 2004; Khalid et al., 2022; Ahmad et al., 2022).

Individuals or groups engage in terrorist acts when they use or threaten to use violence and hostility to accomplish social or political goals, with the aim of scaring both the general public and those directly affected. According to Sandler and Enders (2008), terrorist acts can take several forms, including bombings, suicide assaults, kidnappings, hijackings, threats, and assassinations. Terrorism is linked to both direct and indirect monetary costs. The primary expenses of terrorism encompass the tragic loss of human lives, the expenses incurred from injuries, the destruction of goods and infrastructure, and additional immediate setbacks in business and trade. The indirect ramifications of terrorist operations encompass escalated expenditures on security, diminished GDP growth, heightened unemployment rates, diminished foreign direct investment, amplified insurance premiums, and augmented anticipated

compensations for perilous areas. Terrorist activities not only undermine the financial well-being of a country but also cause damage to the infrastructure of a specific region (Rasheed & Tahir, 2012). Regardless of whether the source country is a developed or developing economy, it has a detrimental effect on FDI (Anwar & Mughal, 2013; Gasimli et al., 2022). The economic health and performance of a country are reflective of its Gross Domestic Product (GDP), which has a substantial influence on international trade. Imports and exports can be stimulated by higher GDP levels, which are generally associated with increased consumption, production, and demand for goods and services. Frankel and Rose discovered that the volume of trade is significantly and positively influenced by GDP in their analysis. They contend that higher GDP levels indicate increased economic activity, which in turn results in a greater demand for imports and a greater capacity for exports. Furthermore, they propose that trade volumes are also influenced by components of GDP, including government expenditure, investment, and consumption. An exchange rate is the rate at which one currency can be exchanged for another. It is a representation of the value of one currency in relation to another. Exchange rates are typically expressed in pairs, which denote the quantity of one currency required to acquire one unit of another currency. The volume and composition of international trade are influenced by exchange rate fluctuations, which alter the relative prices of products and services in various countries. Glick and Rogoff (1995) conducted a study that demonstrates the substantial influence of exchange rate fluctuations on trade flows. They discovered that a 10% depreciation in a country's currency can result in a 1.5% to 2% increase in its exports. The trade balance of a nation, which is the difference between imports and exports, can be influenced by fluctuations in exchange rates. A currency's depreciation may enhance the trade balance by increasing exports and decreasing imports. Alternatively, a currency's appreciation may exacerbate the trade balance by decreasing exports and increasing imports.

Real-world GDP growth has a substantial impact on the dynamics of international trade, affecting the competitiveness of exports and the demand for imports. Rose (2000) conducted a study that investigated the correlation between GDP growth and trade flows in a large sample of countries over the course of several decades. The results indicated a robust positive correlation between economic expansion and international trade, as higher GDP growth rates are correlated with increased trade volumes. The competitiveness of exports and imports can be influenced by real GDP growth, which in turn affects currency exchange rates. The domestic currency may be strengthened and foreign investors may be attracted by the expectation of higher interest rates as a result of robust economic growth. The trade balances can be impacted by a stronger currency, which can increase the cost of exports for foreign purchasers while simultaneously decreasing import costs.

The literature review unequivocally indicates that terrorism has a detrimental effect on international commerce. There is a need for additional research on the main factors that influence international trade in regions such as SAARC, as well as on terrorism. The objective of this investigation is to address the existing literature lacuna in this area.

3. Research Methodology

The study used panel data to examine the impact of terrorism on international trade for SAARC countries and data is obtained from World Bank and Global Terrorism Database covering time period from 1990 to 2022. The variables taken in study are International Trade, Terrorism, Gross Domestic Product, Exchange rate and Real-World GDP where the international trade is dependent variable while rest are independent variables. The description of variables is given below:

Table 1: Description of the study's variables

Variables	Symbol	Description	Source
International trade	ITrade	Measured in % of GDP	WDI (2023)
Terrorism	TI	Measured in Index: log (1+ incident, deaths, injuries)	GTD (2023)
Gross domestic product	GDP	Measured in Constant US Dollar (2017)	WDI (2023)
Exchange rate	ER	Measured in US Dollar	WDI (2023)
Real of world GDP	RWGDP	Measured in Constant US Dollar (2015)	WDI (2023)

The study used cointegration tests and unit root tests were implemented prior to the estimation of the association among international trade and terrorism and other control variables. Most of the time, time series data has problem of unit root that is why researcher used unit root tests to examine whether the data has problem of unit root or stationery at first difference.

The Hausman test was conducted prior to the estimation of the PMG-ARDL model. In order to ascertain the more suitable model between PMG and MG, the Hausman test was implemented. The null hypothesis of the Hausman test is specified as the PMG-ARDL, which asserts that it is the appropriate model. Conversely, the alternative hypothesis asserts that the MG is the appropriate model. The pooled mean group/autoregressive distributed lag model was employed to estimate the long and short run association between the variables of this study after conducting the Hausman test and verifying for cross-sectional dependence and unit roots. If all variables are mix integrated then the study employed PMG-ARDL. The short-run coefficients, intercept, and error variance are permitted to be heterogeneous in PMG estimators, while the long-run coefficients are required to be homogenously distributed. The long term equilibrium association between variables was consistent across groups for a variety of reasons, including the use of common technologies by all groups, arbitrage, and the solvency problem. the empirical model of the study is given below:

$$ITRADE = f(TI, GDP, ER, RWGDP)$$

Where the ITRADE shows international trade, TI shows terrorism, GDP shows Gross Domestic Product, ER shows Exchange rate, and RWGDP shows the real world gross domestic product respectively. The study investigated the impact of terrorism on international trade for SAARC countries using PMG-ARDL model. The study model is given below:

$$\ln ITRADE_t = \beta_1 + \beta_2 \ln TI_t + \beta_3 \ln GDP_t + \beta_4 \ln ER_t + \beta_5 \ln RWGDP_t + \epsilon_t$$

Where, \ln shows the natural log of the variables, β_1 shows the intercept, and $\beta_{2,3,4,5}$ shows the slope of the variables and at last ϵ_t shows the error term. ITRADE shows international trade, TI shows terrorism, GDP shows Gross Domestic Product, ER shows Exchange rate, and RWGDP shows the real world gross domestic product respectively.

4. Results and Discussion

The influence of terrorism on international trade was empirically researched in this research. The table 2 displays the descriptive statistics of the variables employed in the study. The descriptive statistics emphasize the data series' primary attributes. International trade, the terrorism index, gross domestic product, the exchange rate, and actual world GDP have been incorporated into the study.

Table 2: Descriptive statistics of the data

Variable	Mean	Max	Min	Std. Dev
<i>ln</i> TRADE	1.59	1.95	1.19	0.16
TI	2.55	4.04	0.30	0.88
<i>ln</i> GDP	11.61	13.00	10.48	0.65
<i>ln</i> ER	1.82	2.31	1.24	0.21
<i>ln</i> RWGDP	13.76	13.95	13.56	0.12

Before using panel cointegration models, the study used unit root tests to investigate whether they have a problem of unit root or stationarity at level, this study has carefully tested for unit root and cointegration. It is shown in Table 3 that results of the stationarity tests were conducted by utilizing a variety of techniques, namely Im-Pesaran-Shin (IPS) and Levin-Lin-Chu (LLC) Test. The results indicated that Terrorism and GDP are stationary at level while the rest are integrated as first difference. Further the study suggested to use PMG-ARDL test for cointegration because some variables are stationary at level while some are stationary at first difference.

Table 3: Results of Panel unit root tests

	IPS		LLC		Integration
	At level	1 st Difference	At level	1 st Difference	
<i>ln</i> TRADE	-1.10	-5.94*	-1.37	-6.12*	I(1)
TI	-2.72**	--	-2.54**	--	I(0)
<i>ln</i> GDP	3.97*	--	2.54**	--	I(0)
<i>ln</i> ER	1.16	-5.78*	-1.25	-3.88*	I(1)
<i>ln</i> RWGDP	2.06	-7.72*	1.50	-8.97*	I(1)

Note: *, and ** show significant levels of 1% , and 5% respectively.

The results of the cointegration test are presented in Table 4. As the p-values exceed 0.05, it is possible to infer that the variables are not integrated. The variables are not cointegrated, as the p-values are greater than 0.05, as indicated by the Pedroni residual cointegration test results. The null hypothesis of no cointegration among the variables International Trade, Terrorism, GDP, Exchange Rate and Real World GDP is not rejected. The test statistics for both the common and individual AR coefficient hypotheses do not provide sufficient evidence to suggest cointegration at conventional significance levels.

Table 4: Pedroni Test for Cointegration

	Statistic	P-value
Panel v-Statistic	1.37	0.09
Panel rho-Statistic	0.16	0.57
Panel PP-Statistic	-0.57	0.28
Panel ADF-Statistic	-0.22	0.41

Table 5 shows the results of PMG-ARDL models which shows the long and short run impact of terrorism, GDP, Exchange rate, and Real World GDP on International trade which indicated that the coefficient of TI has a statistically significant negative long-run impact on the international trade. A one-unit increase in TI leads to a decrease of approximately 0.03 units in the dependent variable, holding other variables constant. Terrorist attacks often target transportation infrastructure such as ports, airports, and highways, disrupting trade routes and logistics networks (Smith, 2016). For example, the closure of key shipping lanes due to security concerns can lead to delays and increased costs for exporters and importers alike (Enders & Sandler, 2012). Research by Enders and Sandler (2012) using panel data techniques demonstrates that higher levels of terrorism reduce bilateral trade flows between countries. The coefficient GDP has a highly significant positive long-run effect. This suggests that a one-unit increase in GDP results in an increase of approximately 4.94 units in the international trade, all else being equal. Economic growth, represented by GDP, is positively associated with international trade volume. Countries with higher GDP levels generally engage in more extensive trade relationships due to increased production and consumption capacities (Rose, 2007; Estrada et al. 2015; Estrada et al. 2018). The coefficient of Exchange rate also shows a significant positive long-run relationship with international trade. A one-unit increase in ER corresponds to an increase of about 0.75 units in the international trade. Stable exchange rates enhance the competitiveness of exports and imports, mitigating the adverse effects of terrorism-induced uncertainty on trade activities (Rose, 2007; Khan & Ruiz Estrada, 2016). Real world GDP shows a positive short-run effect, but impact is insignificant. Changes in *ln*RWGDP may not be significantly associated with changes in the dependent variable in the short term. Short results indicated that terrorism index has negative and significant

impact on international trade while GDP, Exchange rate and real world GDP have insignificant impact on international trade. The effects of terrorism on global trade have been the subject of contradictory studies. There appears to be little short-term impact, according to some research, while others detect substantial negative impacts. According to Bandyopadhyay et al. (2018), trade in manufactured goods is greatly affected by local and international terrorism, but primary commodities are mostly unaffected. According to Equatora et al. (2023), Pakistan's foreign trade is greatly affected by the costs of terrorism. The impact on commerce between industrialized and developing nations is found to be statistically significant negative, according to Haq et al. (2018). The immediate effects of international terrorism on bilateral and multilateral trade, according to Egger and Gassebner (2014), are insignificant, and the possible medium-term consequences won't become apparent for another 18 months. It appears from these contradictory results that variables like the commodities exchanged, the nations concerned, and the time period under consideration may influence the effect of terrorism on trade. ECT shows error correction term which indicated the dynamic stability of the model. The value of ECT should be negative and should be statistically significant. Table 5 shows that ECT has negative coefficient and have significant value which shows the model is dynamically stable.

Table 5: Findings of PMG-ARDL model

Long Run Results				
Regressors	Coefficient	Std. Dev	p-Value	
TI	-0.03	0.01	0.00*	
lnGDP	4.94	0.60	0.00*	
lnER	0.75	0.09	0.00*	
lnRWGDP	0.09	0.01	0.00*	
Short Run Results				
TI	-0.01	0.00	0.06***	
lnGDP	11.15	6.55	0.10	
lnER	0.19	0.41	0.65	
lnRWGDP	2.34	0.45	0.25	
ECT	-0.337935	0.14	0.02**	

Note: *, ** and *** show significant levels of 1%, 5% and 10% respectively.

5. Conclusions and Policy Recommendations

Terrorism appears to be the primary obstacle that SAARC countries are facing in their efforts to attract trade. The main objective of the study is to empirically investigate the influence of terrorism on international trade in case of SAARC countries using panel data and study covered time period from 1990 to 2022. the study used international trade as dependent variable while Terrorism, GDP, Exchange rate and Real-world GDP are taken as independent variables. Before going toward cointegration tests the study used unit root tests and concluded that some variables are stationary at level while others are stationary at level. The results of unit root tests suggested to use PMG-ARDL model to estimate the long and short run impact among variables. GDP has a positive correlation with trade, suggesting that economic growth encourages trade activities; exchange rate fluctuations have mixed effects depending on the appreciation or depreciation of the currency; and real-world GDP changes have a positive spillover effect on trade within the SAARC region and a significant positive impact on terrorism. Nevertheless, inward terrorism is significantly exacerbated by international trade. Lastly, the empirical results for the variable terrorism confirmed that terrorism has deterred international trade and harmed the financial well-being of SAARC countries during the specified period. Consequently, it is anticipated that the SAARC countries will implement the necessary measures to enhance trade in the region. The government policy makers should give careful consideration to the issue of terrorism, insecurity, and law and order in order to reduce investor skepticism and fully actualize the potential of their trade hosting.

5.1. Limitations of the Study

The sample size has been restricted because of the non-availability of data for SAARC countries such as Afghanistan, Bhutan, and Maldives.

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