

Nexus Between Terrorism and Shadow Economy in Developing Countries: An Empirical Investigation by Using Structural Equation Models (SEMs)

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Abstract

This study delves into the empirical relationship between terrorism and the shadow economy using Structural Equation Modeling (SEM). This study scrutinize the observed indicators and causal factors by employing Confirmatory Factor Analysis (CFA) and Multiple Indicators, Multiple Causes (MIMIC) estimation techniques. To empirically probe this relationship, our investigation utilizes unbalanced panel data spanning 65 developing countries from 2000 to 2019. By introducing terrorism control and the shadow economy as latent variables, we aim to clarify the ambiguous conclusions prevalent in recent empirical studies. Our empirical results validate the widely held notion that unregulated shadow economic activities nurture terrorism, particularly in regions with weak economic and political infrastructures. Notably, expanding the shadow economy in developing nations is associated with diminished terrorism control. Furthermore, our findings highlight the relationship between terrorist activities and ethnic and religious conflicts while underscoring the positive influence of enhanced freedom of movement on counterterrorism accomplishments. Inadequate governance intensifies involvement in the shadow economy, creating fertile ground for the proliferation of terrorism. Moreover, our study clarifies how expanding shadow economies facilitate underground cash flows, fueling terrorism. Governments are urged to prioritize efforts to curb the size of the shadow economy and eliminate hidden financial transactions that intensify internal and external tensions. As policy recommendations based on our empirical findings, the introduction of digital currencies is a deterrent to shadow economic activities and terrorism. Global governments must implement robust economic reforms to foster legitimate economic activities, effectively mitigate the shadow economy and terrorism, and foster inclusive growth, resilience, and prosperity for future generations.

Keywords: Structural Equation Modeling, Confirmatory Factor Analysis, Multiple Indicators, Multiple Causes, Terrorism, Shadow Economy.

Introduction

The shadow economy called the informal or underground economy, encompasses economic activities outside the regulated and tax framework established by governments. This sector, characterized by undeclared income and tax avoidance, is significantly influenced by government

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policies on taxation and regulation, leading to tax evasion and a consequent loss of government revenue (Berdiev & Saunoris, 2018). However, it also poses severe challenges to economic policy and security. One of the most pressing concerns is the complex relationship between the shadow economy and terrorism. Understanding this relationship is essential, as it affects not only the economic stability of developing countries but also their social and political fabric. In developing nations, where governance structures and regulatory frameworks may be weaker, the interplay between the shadow economy and terrorism is particularly relevant. Terrorist organizations exploit the informal sector for money laundering, fundraising, and other financial transactions that support their operations (Schneider & Caruso, 2011). This relationship complicates efforts to combat terrorism and destabilizes regions, posing significant threats to both national and international security.

Understanding how the shadow economy fuels terrorism can inform more effective counterterrorism strategies and economic policies. By addressing the root economic conditions that allow the shadow economy to flourish, policymakers can disrupt the financial networks of terrorist groups, thereby enhancing both economic stability and national security in developing countries (Jadoon & Milton, 2022). The growth of the shadow economy is driven by factors such as excessive tax burdens, over-regulation, and poor governmental performance, making it harder to track illicit financial flows that could fund terrorist activities (Schneider & Buehn, 2018). Furthermore, the informal nature of the shadow economy, acting as a survival mechanism for many, hampers efforts to regulate and monitor financial transactions that could be linked to terrorism (Krstić & Schneider, 2015; Senturk & Ali, 2021). Addressing these challenges requires a multifaceted approach, including enhancing tax policies, improving governance to prevent capital flight through shadow schemes, and systematically tackling informal employment to reduce the financial resources available for supporting terrorism (Arsić et al., 2015; Iqbal & Shahzad, 2020). The interconnection between economic instability and terrorism is particularly pronounced in developing nations, where weak institutional frameworks and socio-economic vulnerabilities provide fertile ground for both shadow economic activities and terrorist recruitment (Schneider, 2017; Iqbal & Raza, 2018).

Defining terrorism poses significant challenges due to its broad scope, encompassing a wide range of terroristic activities. Scholars have not reached a consensus on many aspects of terrorism, leaving numerous issues unexplored. Ganor (2002) highlights this complexity with the adage "one man's terrorist is another man's freedom fighter," illustrating the difficulty in achieving a universally accepted definition. Hence, the lack of consensus on defining terrorism has hindered previous research efforts to establish an authentic connection between terrorism and shadow economies. Consequently, there is a dearth of empirical studies addressing the nexus between the shadow economy and terrorism in developing countries (Elnahass et al., 2022). Therefore, in this research, we have emphasized more on understanding the control of terrorism rather than trying to find its best definition.

The primary objective of this study is to investigate the empirical relationship between terrorism and the shadow economy and formulate and highlight effective policies to combat both simultaneously. This approach aims to contribute to a better understanding of these intertwined illegal activities and provide practical solutions for policymakers.

This research will empirically investigate the relationship between the shadow economy and terrorism control in developing nations and propose policy recommendations based on the findings. This study will employ confirmatory factor analysis (CFA) to identify the indicators of the shadow economy and terrorism control. Additionally, it will use the multiple indicators and

multiple causes (MIMIC) approach to identify the critical economic, social, and political causes that contribute to the shadow economy and terrorism control. By examining the complex relationship between the shadow economy and terrorism control, we will develop strategies that could address the problem of the shadow economy and terrorism simultaneously. Effective policy measures that address the root causes of the shadow economy and its connection to terrorism can lead to enhanced economic development, improved security, and excellent social stability in developing countries.

Literature Review

Empirical studies examining the relationship between the shadow economy and terrorism have produced mixed results, mainly due to methodologies and data availability variations. For instance, Jadoon and Milton (2022) have found that countries with larger shadow economies tend to experience higher levels of terrorism, particularly domestic terrorism. This study utilized econometric models to analyze data from developed and developing countries, stressing the importance of economic factors in comprehending terrorism. Schneider and Buehn (2018) have empirically illustrated that the "shadow economy" concept needs to encompass a broad range of activities. This is due to the persistent financial crisis and the rise of terrorism linked to these hidden economic activities. The term can also encompass more widespread and illicit financial transactions, including those related to organized crime, cybercrime, shadow banking, refugees, and immigration.

Additionally, the regulation of the shadow economy has been further complicated by new forms of monetary transactions such as money laundering, capital flight, and offshore financial hubs. Koyuncu and Ünal (2019) have identified that business freedom is the most crucial element of economic freedom. Schneider (2017) has empirically discussed the vital relationship between residents or taxpayers and government officials. He found that individuals who prefer cash without government intervention experience greater freedom, independence, and personal satisfaction. However, he advocated for restricting cash use, arguing that stringent state control over financial flows and personal funds is the most effective method to combat crime, the shadow economy, and terrorism. Hutchinson and O'Malley (2007) have found that terrorist organizations frequently participate in criminal endeavors like drug trafficking, arms smuggling, and human trafficking to finance their operations. This connection between crime and terrorism is especially prominent in regions with large shadow economies, where the absence of regulation allows both criminal and terrorist activities to thrive. Pieth (2017) has identified several factors, such as high tax burdens, excessive government regulation, and ineffective governance, that contribute to expanding the shadow economy. This creates an environment conducive to illicit financial activities, including the financing of terrorist activities. Abu Alfoul et al. (2022) have discovered that in developing countries with limited economic opportunities and weak governance, the shadow economy plays a crucial role in supporting terrorist groups economically. Piazza (2006) has found that socioeconomic conditions, such as poverty and economic marginalization, are significant predictors of domestic terrorism.

Similarly, Enders and Hoover (2012) have emphasized the role of economic inequality in fostering environments conducive to terrorism. Similarly, research conducted by Schneider and Caruso (2011) revealed that countries with extensive shadow economies also experience higher rates of organized crime and terrorism, highlighting the interconnectedness of these phenomena. Elnahass et al. (2022) have argued that there is a lack of comprehensive empirical studies addressing the nexus between the shadow economy and terrorism in developing countries. Most studies focus on

broader economic indicators without delving into the mechanisms by which the shadow economy facilitates terrorism.

Previous studies have highlighted the crucial role of the shadow economy in nurturing terrorism by offering essential resources and safe havens for terrorist operations. However, most researchers have treated these illegal activities as separate entities. While some studies have attempted to explore the relationship between them, they have focused on global samples or specific countries, neglecting the sample of developing countries. Moreover, the lack of consensus about defining terrorism did not allow previous research to investigate a more authentic connection between terrorism and shadow economies. Additionally, many studies have relied on descriptive analysis and lacked modern statistical techniques to explore the connection between terrorism and the shadow economy. Hence, in this study, we tried to empirically investigate these research gaps by employing Structural Equation Models (SEM) to examine how terrorism infiltrates the economic landscape of developing countries through hidden financial channels in the shadow economy.

Methodology

In the first stage, we constructed a Confirmatory Factor Analysis (CFA) model to determine the correlation and direct influence between terrorism control and the shadow economy, both treated as latent variables. The CFA model was essential to validate the measurement model and ensure that the indicators accurately reflected the latent constructs (Brown, 2015). This step involved testing the consistency of the hypothesized factor structure with the actual data. The CFA model can be represented mathematically as follows:

$$Y = \phi\eta + \varepsilon \quad (1)$$

In CFA equation 1, Y is a vector of observed variables. ϕ is a matrix of factor loadings linking observed variables to latent variables. η is a vector of latent variables (e.g., terrorism control and shadow economy). ε is a vector of measurement errors. The CFA model helps in estimating the factor loadings ϕ and the measurement error variances (ε), providing insights into the validity and reliability of the constructs. CFA is beneficial as it allows for the precise modeling of measurement errors and the validation of the theoretical constructs of factor structures. It helps in establishing the construct validity and ensuring that the measured variables accurately reflect the underlying latent constructs (Almenar et al., 2020). Then in the second stage, for investigating the various causes of the terrorism control and shadow economy respectively, we estimated Multiple Indicators and Multiple Causes (MIMIC) models. The MIMIC approach is based on the mathematical concept of immeasurable variables. In the first step, it links the measurement variables and latent variables, thereby simultaneously specifying a feature with the design model (Frey & Weck-Hanneman, 1984; Buehn & Schneider, 2009; Hassan & Schneider, 2016; Schneider & Medina, 2017). The MIMIC model can be described by the following equations:

$$\text{(Measurement Model)} \quad Y = \phi\eta + \varepsilon \quad (2)$$

$$\text{(Structural Model)} \quad \eta = \theta X + u \quad (3)$$

In above equation 2 and 3, Y is a vector of observed indicators. ϕ is a matrix of factor loadings relating indicators to latent variables. η represents latent variables. ε denotes measurement errors. X is a vector of observed exogenous variables. θ is a matrix of regression coefficients. u represents disturbances. Using CFA and MIMIC models together offers several advantages. CFA ensures the accuracy and validity of the latent constructs, while the MIMIC model allows for the examination of complex causal relationships between latent and observed variables. The combined use of CFA

and MIMIC models offers a powerful approach to understanding the complex relationships between the shadow economy and terrorism control. This combined approach provides a robust framework for understanding the intricate dynamics between any two latent variables, enabling a comprehensive analysis of their interdependencies (Schneider & Buehn, 2018).

Validation and Robustness Checks

To assess the fitness of the model, we have used several fit indices in this research, including the Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), and Coefficient of Determination (CD). We also conducted sensitivity analyses to test the robustness of the model results. This involved varying key parameters and observing the effects on the model outputs. Such analyses ensure that specific assumptions or data anomalies are independent of the findings.

Indicators of Shadow Economy

The shadow economy refers to economic activities and income derived from them that operate outside governmental regulation, taxation, and oversight. This section explores the different indicators and factors influencing the unobservable shadow economy, as investigated in the literature.

GDP per Capita as (Officially Declared Average Income)

Gross Domestic Product (GDP) per capita measures the average economic output per person, calculated by dividing a country's total GDP by population. This indicator represents the officially recognized economy and the average annual income, usually in dollars. Empirical studies have consistently shown an inverse relationship between the size of the official economy and the shadow economy. For instance, Tafenau et al. (2010) have found that as officially declared income increases, the prevalence of shadow economic activities tends to decrease. This phenomenon reflects a substitution effect, wherein individuals and businesses are less inclined to engage in unregulated activities when official income levels are higher.

Cash Holdings (Ratio of M0/M1)

Cash transactions are a vital characteristic of the shadow economy, offering anonymity and security for individuals and businesses involved in informal economic activities. The ratio of M0 (physical currency) to M1 (a broader measure of money supply, including demand deposits) is used as a proxy for cash holdings within an economy. Dreher and Schneider (2010) observed that higher cash holdings are associated with increased operations in the shadow economy. This is because cash, a form of narrow money, is not easily traceable and enables unreported transactions, thus supporting the shadow economy.

Rate of Labor Force Participation (LFPR)

The Labor Force Participation Rate (LFPR) measures the percentage of the population that is either employed or actively seeking employment. This indicator is crucial for understanding the dynamics between the formal and informal sectors. Giles (1998) has emphasized the complexity of this relationship, noting that changes in the LFPR can cause resources to shift between the official and shadow economies. While some studies (Buehn & Schneider, 2009; Dreher &

Schneider, 2010) suggest that a higher LFPR may lead to a shift of labor from the formal to the informal sector, other research suggests the opposite.

Causes of Shadow Economy

Government Spending/Size (Regulatory Burden)

Government spending includes expenditures on goods, services, and public sector investments, serving as a proxy for the regulatory burden imposed by the state. Higher government spending often correlates with increased taxation and regulatory oversight. Dreher and Schneider (2010) empirically identified that this can drive shadow economic activities, especially in countries with inefficient tax collection systems and widespread corruption. Excessive government expenditure and overregulation incentivize individuals and businesses to avoid official channels, expanding the shadow economy.

Business Freedom

The index of business freedom evaluates the ease of starting, operating, and closing a business in a country, with scores ranging from 0 to 100. Higher scores indicate a more favorable regulatory environment for businesses. Dell'Anno (2007) and Giles (1998, 2002) have argued that an efficient regulatory framework reduces the size of the shadow economy by lowering the costs and barriers of formal business operations. Therefore, greater business freedom is associated with a smaller shadow economy.

Regulatory Quality

Regulatory quality measures the government's ability to develop and implement policies that support private sector growth. It is expressed as a percentile rank. This indicator reflects the effectiveness and efficiency of regulatory frameworks. Bayar (2016) explained that higher regulatory quality curbs the growth of the shadow economy by keeping business operations cost-effective and transparent. On the other hand, poor regulatory quality leads to increased informal economic activities due to higher compliance costs and bureaucratic inefficiencies.

Rate of Unemployment

Unemployment rates have a complex effect on the shadow economy. High unemployment can drive individuals to seek informal jobs and cheaper goods in the shadow economy. However, unemployed individuals' limited purchasing power can also restrict shadow market activities. Buehn and Schneider (2009) emphasize that the net effect depends on the balance between the income and substitution effects. Sahnoun and Abdennadher (2019) add that this impact varies by development status, with unemployment positively correlating with shadow economic activity in advanced economies but negatively in developing countries.

Economic Globalization

Economic globalization, marked by the increased movement of goods, services, technology, and capital across borders, affects the shadow economy in various ways. Dreher (2006) used economic globalization indices to study its impact on the shadow economy. Researchers (Aleman-Castilla, 2006; Farzanegan & Hassan, 2017) have concluded that globalization can reduce the shadow

economy by boosting productivity, promoting formal economic growth, reducing labor market rigidity, improving institutional quality, and lowering trade barriers. As a result, economic globalization generally hurts the size of the shadow economy.

Indicators of Terrorism Control

This study evaluated terrorism control, which inversely reflects the level of terrorism in developing nations. A high score indicates more robust control over terrorist activities based on the observed factors discussed below. Conversely, a low score suggests a higher likelihood of terrorist acts. The following sections detail the indicators and causes of terrorism control.

Military in Politics

This observed variable indicates the extent of military participation in government, where lower risk ratings signify greater military involvement in politics and a higher risk of political violence. Since military leaders are not elected, their political involvement undermines democratic accountability. Additionally, this engagement can significantly increase the threat of terrorism. A perceived or actual internal or external terrorist threat may prompt the military to intervene in government, distorting government policies to prioritize defense spending over developmental projects. In some developing nations, the fear of a military coup can compel elected governments to alter their policies or replace administrations more aligned with military interests. This can lead to various liberation movements and resistance efforts framed as terrorism. The most significant threat is establishing a full-fledged military government, which might bring short-term stability and reduce investment risks. However, in the long term, such regimes often become corrupt, and their survival is likely to provoke armed opposition, exacerbating the terrorism threat.

Internal Conflict

This estimate assesses the country's level of political violence and its impact on governance. The highest rating is given to countries with no armed or civil resistance to the government and where the government does not engage in unnecessary violence against its people. Conversely, a country amid a civil war receives the lowest rating. The risk rating comprises three sub-dimensions, each with a maximum score of four points and a minimum score of zero points. These subcomponents are civil war or coup threat, political violence, and civil disorder. A score of four points indicates very low risk, while a score of zero indicates Very High Risk. A higher score on the military in politics index reflects a competent administration with strong counterterrorism measures, thereby positively indicating terrorism control.

External Conflict

The external conflict scale measures the threat of foreign actions against the established government, ranging from nonviolent to violent external pressures. Nonviolent pressures include diplomatic pressures, withholding assistance, trade restrictions, territorial conflicts, and sanctions. Violent pressures encompass a spectrum from cross-border disputes to full-scale war. External conflicts can adversely affect foreign business through operational limitations, trade and investment penalties, inefficient allocation of economic resources, and violent socio-economic shifts. The risk rating comprises three subcomponents: war, cross-border conflict, and foreign

pressures, each scoring between 0 and 4 points. A score of 4 points indicates minimal threat, while a score of 0 indicates severe risk. A higher external conflict index value suggests a safer environment with effective terrorism control. Thus, this index also positively indicates terrorism control.

Causes of Terrorism Control

Ethnic Tensions

This estimate reflects a country's racial, national, and linguistic tensions. Countries with significant racial and national conflicts receive lower scores, as opposing groups are resistant and reluctant to cooperate. Conversely, nations with minimal conflict achieve higher scores. Thus, this measure positively impacts terrorism control: higher scores indicate better control over terrorism.

Religious Tensions

The prevalence of a single religious group dominating society with aspirations to replace civil law with religious doctrine and marginalize other faiths from political and social engagement can exacerbate religious tensions. Additionally, when a particular religious faction seeks administrative control, religious freedoms are repressed, and religious communities strive to assert their identity and achieve independence from the broader nation, it fuels religious tensions. The risks associated with these situations range from inexperienced individuals implementing misguided policies to political unrest and even civil conflict. A higher score on this assessment indicates lower religious tensions within the country, while a lower score suggests heightened tensions. Therefore, addressing such factors positively influences terrorism control.

Freedom of Movement

This index pertains to the extent of freedom individuals and groups have regarding movement and residency. It signifies the right of citizens to live and travel within their country or to leave and return without encountering limitations or barriers. In a terrorism-controlled environment, this freedom of mobility and travel is crucial. A lack of mobility and travel options is directly linked to societal and individual instability and insecurity (Alomosh & Al-Khattar, 2011). The index is measured on a scale from 1 to 4. "Restricted severely" indicates minimal freedom of movement, where citizens cannot choose their residence or travel domestically or internationally. "Restricted fairly" suggests some international travel and residency options exist, but certain groups face various restrictions. "Restricted modestly" signifies modest limitations on travel and residency, primarily in isolated cases but not as a general ban. Finally, "unrestricted" denotes complete freedom of movement and residency. Hence, it is evident that this index correlates positively with terrorism control.

Autocracy Index

Autocracies encompass many political systems characterized by a lack of regularized political competition. These systems typically restrict or eliminate participation in competitive political activities. Once in power, their leaders operate with minimal institutional constraints despite being selected through formal processes within the political elite. The Polity IV project has standardized the assessment of political engagement, encompassing factors such as regulated participation,

transparent and competitive executive recruitment, and constraints on executive power. The autocracy scale, ranging from 0 to 11, is based on these criteria. In tightly controlled autocracies, terrorists face limited strategic opportunities to engage in terrorism despite potential frustrations stemming from restricted political access (Chenoweth, 2006; Gaibullov et al., 2017). This suggests that this variable positively influences terrorism control.

Economic Globalization

The term "economic globalization" denotes the increasing interconnectedness of the global economy, facilitated by heightened international trade in goods and services, cross-border financial flows, and rapid dissemination of technology. Countries that have embraced economic globalization may experience more excellent stability in the long term, while those undergoing integration or facing globalization shocks may encounter increased instability or challenges (Bussmann & Schneider, 2007). Additionally, historical trends that reduced territorial boundaries and fostered global trade have been found to deter conflicts (Chisadza & Bittencourt, 2018). This research considers the KOF overall indicator of economic globalization, which ranges from 0 to 100 and incorporates measures of capital flows, trade openness, and restrictions on international trade. A higher value indicates greater economic globalization, while a lower value suggests limited integration with the global economy. Thus, heightened economic integration correlates positively with terrorism control efforts.

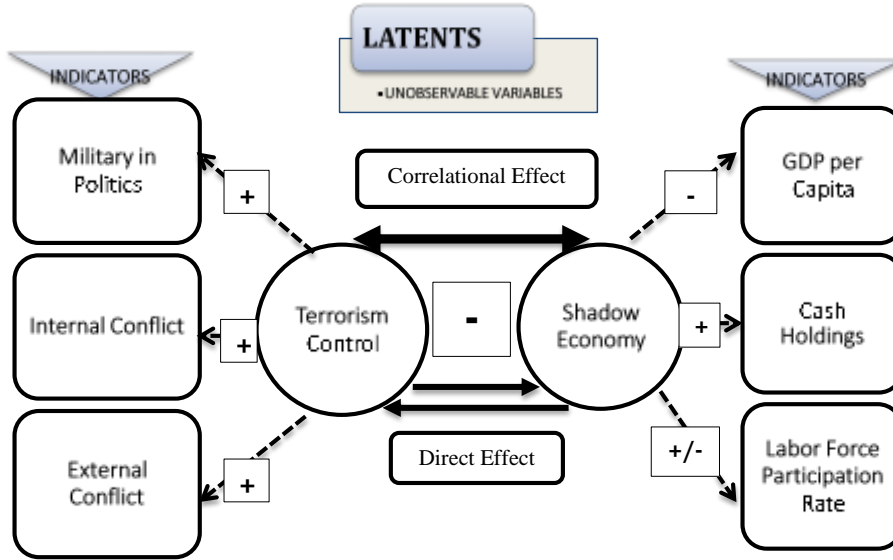
Political Globalization

Political globalization entails disseminating a singular political system worldwide, enabling various nations to adopt it and contributing to expanding the geopolitical system's size and complexity. Presently, political globalization often involves the spread of Western democratic ideals to the developing world, potentially challenging indigenous cultures and religions (Cronin, 2002) leads to increased internal conflicts. This study incorporates the KOF overall index of political globalization, ranging from 0 to 100, which considers factors such as a country's diplomatic presence, participation in international organizations, treaty engagements, and involvement in United Nations peacekeeping missions. A higher value indicates greater political globalization, while a lower value suggests limited engagement with global political dynamics. Consequently, heightened political openness is associated with diminished effectiveness in terrorism control efforts.

Structural Equations Model Frameworks

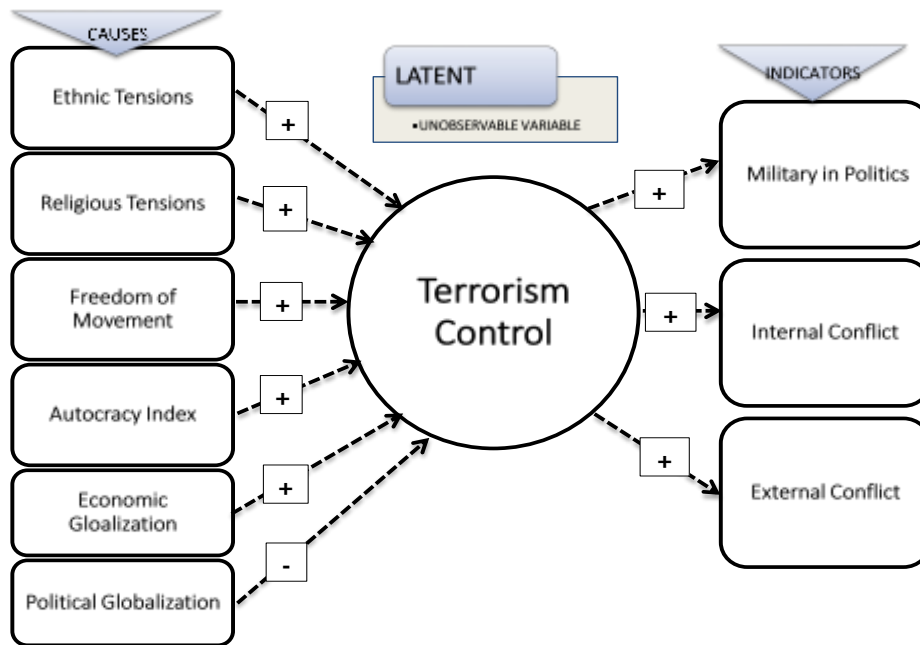
After selecting the causes and indicators, Figure 1 illustrates both the CFA correlational and direct causal effect model framework between the shadow economy and terrorism control. Indicators are depicted within squares and connected by arrows to corresponding latent variables in circles. Each arrow represents the anticipated hypothetical relationship between the latent variables and their factor loadings. In this diagram, terrorism control and its indicators are shown on the left, while the shadow economy and its indicators are on the right.

Figure 1: CFA Correlation & Direct Effect of Terrorism Control and Shadow Economy

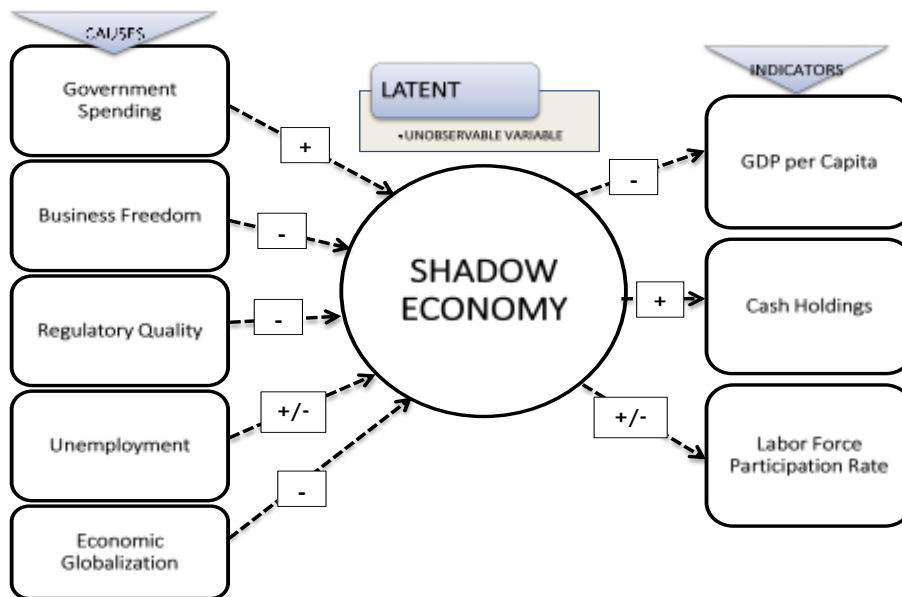


Source: Own Elaboration

Figure 2: Terrorism Control MIMIC Model Framework



Source: Own Elaboration

Figure 3: Shadow Economy MIMIC Model Framework

Source: Own Elaboration

The MIMIC model framework is illustrated in figure 2, detailing the theoretical relationships between selected causes and indicators of terrorism control. Figure 3, on the other hand, displays the MIMIC model framework for the shadow economy, complete with its pertinent indicators and causes. The indicators in the MIMIC models shown in figures 2 and 3 for terrorism control and the shadow economy are identical to those in figure 1 of the CFA model. Each cause associated with the shadow economy and terrorism control indicates its hypothesized relationship sign in figures 2 and 3. In these MIMIC models, the cause variables are represented in the squares on the left side, while the unobservable variables are on the right side.

Results and Discussion

Data Collection

We have gathered a sample comprising 65 developing countries, utilizing panel data from 2000 to 2019. All data variables utilized in this research are sourced from publicly available data⁵ outlets. Consequently, across different model configurations, we assign a coefficient of -1 to GDP per capita and +1 to cash holdings concerning the shadow economy. Similarly, we attribute a coefficient of +1 to the military in politics based on our theoretical discussions⁶ in sections 2 and 3. All data was standardized to estimate standardized coefficients in order to ensure consistency across different measurement scales.

⁵ The secondary data of World Bank listed developing countries from years (2000 to 2019) were obtained from various reputable sources World Development Indicators (WDI), World Governance Indicators (WGI), Govdata360⁰, Global State of Democracy Indices (GSoD), International Monetary Funds (IMF), Heritage Foundation, KOF Globalization Indices and International Country Risk Guide (ICRG).

⁶ See Bollen (1989).

Table 1 presents the estimated results of the correlational CFA between the shadow economy and Terrorism control across four model specifications. Different combinations of selected indicators for both latent variables are utilized in each model. In CFA model specification 1, all specified indicators of both the shadow economy and terrorism control are included for estimation—subsequently, CFA models 2 through 4 employ distinct combinations of indicators for each latent variable. The reported results in Table 1 and subsequent tables are standardized estimated coefficients derived from CFA and MIMIC models.

Table 1: CFA Correlation Effect between of Shadow Economy and Terrorism Control

Model Specification	Specification ⁷ 1 3-2-3		Specification 2 2-2-3		Specification 3 2-2-2		Specification 4 2-2-2	
Indicator/Latent	SE	TC	SE	TC	SE	TC	SE	TC
Internal Conflict		0.72*** (0.0292)		0.75*** (26.76)		0.52*** (13.66)		0.58*** (16.02)
External Conflict		0.55*** (0.0281)		0.55*** (20.93)				
Military in Politics		0.74*** (0.0303)		0.71*** (24.65)		0.98*** (16.33)		0.88*** (18.73)
GDP Per Capita	-0.93*** (6.69)		-0.54*** (9.66)		-0.81*** (8.49)		-0.66*** (9.60)	
Cash Holdings	0.21*** (4.42)		0.36*** (8.37)				0.29*** (7.33)	
Labor Force Participation Rate	0.22*** (6.42)				0.26*** (6.44)			
Covariance SE and TC	-0.38*** (5.23)		-0.62*** (9.92)		-0.47*** (7.96)		-0.62*** (8.18)	
Degree of Freedom	8		4		1		1	
CFI	0.827		0.881		0.977		0.953	
SRMR	0.06		0.05		0.02		0.03	
R ²	0.96		0.81		0.98		0.88	

Note: *, **, *** symbolizes 1%, 5% and 10% levels of significance. High values of CFI and low values of SRMR shows model is a good fit. Similarly, the value of R² close to 1 indicates that model is perfect fit (Kline, 2005). Degree of freedom should be ≥ 0 for Model identification.

Table 2 presents three model specifications, each with statistically significant standardized coefficients for the shadow economy and terrorism control. These coefficients align with theoretically hypothesized signs, as illustrated in figure 1. As discussed in section 3, an increase in the values of indicators used for terrorism control signifies lower intensities of terrorism. For example, higher values of internal and external conflict indicators imply a decrease in occurrence. Similarly, a high military value in politics indicates minimal military interference in political affairs.

⁷The CFA model specifications in tables 1 and 2 represent the number of indicators for the terrorism control, the number of indicators for both latent variables, and the number of indicators for shadow economy, respectively.

Table 2: CFA Direct Effect Between Shadow Economy and Terrorism Control

Model Specification	Specification 1 2-2-3		Specification 2 2-2-2		Specification 3 2-2-2	
Indicator/Latent	SE	TC	SE	TC	SE	TC
Internal Conflict		0.75*** (26.76)		0.52*** (13.66)		0.58*** (16.02)
External Conflict		0.55*** (20.93)				
Military in Politics		0.71*** (24.65)		0.98*** (16.33)		0.88*** (18.73)
GDP Per Capita	-0.54*** (9.66)		-0.81*** (8.49)		-0.66*** (10.10)	
Cash Holdings	0.36*** (8.37)				0.30*** (7.33)	
Labor Force Participation Rate			0.26*** (6.44)			
Shadow Economy → Terrorism Control	-0.62*** (9.92)		-0.47*** (7.96)		-0.62*** (8.18)	
Degree of Freedom	4		1		1	
CFI	0.881		0.977		0.953	
SRMR	0.05		0.02		0.03	
R ²	0.77		0.96		0.82	

Note: *, **, *** symbolizes 1%, 5% and 10% levels of significance. High values of CFI and low values of SRMR shows model is a good fit. Similarly, the value of R² close to 1 indicates that model is perfect fit (Kline, 2005). Degree of freedom should be ≥ 0 for Model identification.

Therefore, the results in tables 1 and 2 suggest that all these indicators positively influence terrorism control. Empirical evidence demonstrates that an increase in ongoing conflicts can elevate the terrorism threat to potentially uncontrollable levels. Moreover, military involvement in governance and political affairs tends to escalate internal and external conflicts, thereby exacerbating terrorism. Similarly, the findings regarding shadow economy indicators align with those of terrorism control indicators in tables 1 and 2. Thus, the conclusions drawn from the analysis of both sets of indicators corroborate the theoretical and empirical research discussed in sections 2 and 3.

In table 1, all estimated covariance coefficients between the shadow economy and terrorism control are significantly negative. Similarly, in table 2, all estimated coefficients demonstrate that the shadow economy has a highly significant negative direct causal influence on terrorism control. This suggests that countries with significant shadow economies experience hidden financial flows toward terrorism, resulting in a loss of control over it and vice versa.

Table 3: Terrorism Control Multiple Indicator and Multiple Causes Standardized Estimates

Model Specifications	Specification ⁸ 1 6-1-3	Specification 2 4-1-3	Specification 3 5-1-3	Specification 4 4-1-3
Causes				
Ethnic Tensions	0.32*** (11.21)		0.28*** (9.65)	0.29*** (10.19)
Religious Tensions	0.28*** (9.17)		0.16*** (5.07)	0.16*** (5.03)
Freedom of Movement		0.45*** (17.79)	0.29*** (10.24)	0.28*** (9.60)
Autocracy Index	0.12*** (4.70)	0.18*** (6.64)	0.15*** (5.78)	
Economic Globalization	0.35*** (11.65)	0.49*** (19.04)	0.34*** (11.96)	0.33*** (11.46)
Political Globalization		-0.17*** (5.42)		
Indicators				
External Conflict	0.51*** (20.35)	0.57*** (23.46)	0.53*** (21.76)	0.54*** (21.89)
Internal Conflict	0.74*** (35.50)	0.72*** (33.63)	0.72*** (36.74)	0.74*** (33.77)
Military in Politics	0.74*** (36.51)	0.72*** (33.47)	0.75*** (39.84)	0.73*** (37.76)
CFI	0.88	0.823	0.875	0.88
SRMR	0.04	0.05	0.04	0.04
R ²	0.55	0.54	0.61	0.59
Degree of Freedom	27	27	35	27
Observations	1196	1196	1196	1196

Note: *, **, *** symbolizes 1%, 5% and 10% levels of significance. High values of CFI and low values of SRMR shows model is a good fit. Similarly, the value of R² close to 1 indicates that model is perfect fit (Kline, 2005). Degree of freedom should be ≥ 0 for Model identification.

After establishing a theoretical economic model to explain the expected relationship between the latent variable and its causes, as depicted in figures 2 and 3, MIMIC models were employed to empirically evaluate these underlying assumptions and confirm the expected signs of different indicators and causes of the latent variables under discussion. The standardized estimates of the MIMIC frameworks were estimated using the maximum likelihood (ML) technique. It is essential to understand that these MIMIC frameworks can only illustrate a trend in the sizes of terrorism control and the shadow economy. They demonstrate how the shadow economy index and terrorism control index change from year to year.

⁸The MIMIC model specifications in tables 3 and 4 represent the number of causes, the number of latent variables, and the number of indicators, respectively.

Table 4: Shadow Economy Multiple Indicator and Multiple Causes Standardized Estimates

Model Specification	Specification 1	Specification 2	Specification 3	Specification 4
Causes				
Government Spending/Size	0.33*** (8.16)	0.30*** (7.57)	0.32*** (7.80)	0.32*** (7.60)
Business Freedom	-0.47*** (8.98)	-0.48*** (10.22)	-0.47*** (8.65)	-0.56*** (11.20)
Regulatory Quality	-0.17*** (3.21)		-0.18*** (3.28)	
Unemployment Rate	-0.52*** (9.93)			
Economic Globalization		-0.30*** (6.86)	-0.20*** (3.77)	-0.28*** (6.07)
Indicators				
GDP Per Capita	-0.49*** (13.65)	-0.65*** (16.11)	-0.63*** (15.41)	-0.60*** (15.59)
Cash Holdings (M ₀ /M ₁)	0.13*** (4.32)	0.16*** (4.21)		
Labor Force Participation Rate	0.45*** (14.54)	0.36*** (11.77)	0.34*** (10.53)	0.36*** (11.11)
CFI	0.677	0.840	0.912	0.983
SRMR	0.06	0.04	0.03	0.02
R ²	0.99	0.65	0.72	0.75
Degree of Freedom	27	27	20	14
Observations	1196	1196	1196	1196

Note: *, **, *** symbolizes 1%, 5% and 10% levels of significance. High values of CFI and low values of SRMR shows model is a good fit. Similarly, the value of R² close to 1 indicates that model is perfect fit (Kline, 2005). Degree of freedom should be ≥ 0 for Model identification.

Based on the findings of the MIMIC calculations of terrorism control, table 3 indicates that ethnic and religious tensions have a positive sign as expected and are statistically significant at the 1% confidence level. Higher indices of ethnic and religious tensions indicate more control over these social pressures, while lower values suggest more intensity of ethnic and religious disputes. These results reveal that all terrorist activities are concentrated in areas where pressures of ethnic and religious tensions prevail. On the other hand, the freedom of movement and autocracy indexes significantly and positively influence terrorism control, as expected and discussed in the literature. This implies that a country with more freedom of movement will be considered safe to travel, ultimately improving control over terrorism. The most essential aspect in table 3 is the positive impact of economic globalization and the negative impact of political globalization on terrorism control, a similar relation theoretically concluded in previous studies reviewed in section 2. Similarly, the findings of the MIMIC calculations of the shadow economy, table 4 indicates that the government size has a positive (theoretically expected) sign and is statistically significant at the 1% confidence level. This suggests that shadow economic activity would develop if there is a significant regulatory burden due to an increased government size. Conversely, a performance-

based regulatory structure would diminish the scale of the shadow economy. The regulatory quality variable shows the theoretically predicted positive sign and is statistically significant at the 1% confidence level. The results in table 4 align with most of the conclusions of the previous study discussed in sections 2 and 3. As explained by Sahnoun and Abdennadher (2019), the calculated coefficient of the unemployment rate is highly statistically significant and has a negative sign. This indicates that when more people become unemployed, they have less money to spend on products and services, even in the shadow economy where prices may be lower. This decrease in demand restrains the operations of shadow economy companies, leading to a negative relationship. The business freedom index exhibits the expected negative sign and is statistically highly significant at the 1% confidence level. Similarly, the economic globalization index displays the predicted negative sign and is statistically significant. This negative sign suggests that economic globalization may limit the development of the shadow economy by enhancing productivity and expansion in the official sector.

Conclusion and Policy Recommendations

The present study adds to the discussion concerning the nexus between terrorism control and the shadow economy by using SEM. We have employed CFA and MIMIC estimating techniques for estimating different parameters of observed indicators and causes of the shadow economy and terrorism control. Recent empirical studies on the relationship between the shadow economy and terrorism have yielded mixed results, mainly due to methodologies and data availability variations. Our empirical findings support the maxim that unregulated shadow economic activities contribute to the sustenance and proliferation of terrorism, particularly in regions where formal economic and political structures are weak or absent. Empirical findings of our research indicate that an increase in the shadow economy in developing countries reduces the control of terrorism (Abu Alfoul et al., 2022; Hutchinson & O'Malley, 2007; Jadoon & Milton, 2022; Pieth, 2017; Schneider & Buehn, 2018). Our results also conventionally demonstrated that all terroristic acts are concentrated in locations where ethnic and religious conflicts predominate. A country with greater freedom of movement will be deemed safer to travel in, improving counterterrorism. Without an efficient government that provides enough accountability and an effective law and enforcement framework, corruption primarily encourages individuals to participate in the shadow economy. Finally, it is empirically evident in this study that expanding shadow economies provide a robust platform with hidden cash flows suitable for the growth of terrorism (Schneider, 2017; Schneider & Caruso, 2011). Governments should pay more attention to it and make more efforts to reduce the size of the shadow economy and stop all those hidden financial transactions facilitating internal, external, ethnic, and religious conflicts and tensions.

Most importantly, it is also empirically evident that cash in hand is an essential indicator of a shadow economy. Therefore, introducing digital cash in developing countries could be crucial in curtailing shadow economies and terrorism (Buehn & Schneider, 2009; Schneider & Buehn, 2018). Similarly, the government might mitigate some of the other negative repercussions of the shadow economy, particularly those related to excessive regulatory burdens and business-friendly possibilities, with minimal effort (Schneider & Medina, 2017). Excessive government size and economic interference are other factors that reduce economic and business freedom, ultimately driving people to engage in shadow economy activities (Koyuncu & Ünal (2019). The findings of

this research make it clear that governments of every country have to adopt solid economic reforms based on incentives to make the official economy a more appealing place for economic activity. If these policies are successfully implemented, there is a high possibility that the shadow economy, corruption, and terrorism will be effectively controlled. In conclusion, our study contributes significantly to the discourse on the relationship between terrorism control and the shadow economy by applying Structural Equation Modeling (SEM). Leveraging Confirmatory Factor Analysis (CFA) and Multiple Indicators, Multiple Causes (MIMIC) estimation techniques, we precisely examined various parameters of observed indicators and causal factors associated with the shadow economy and terrorism control because the heterogeneous outcomes of recent empirical studies on the correlation between the shadow economy and terrorism have highlighted the need for methodological consistency and comprehensive data availability.

Our empirical findings reinforce the widely accepted concept that unregulated shadow economic activities serve as a breeding ground for terrorism, particularly in regions characterized by weak or absent formal economic and political infrastructures. Notably, our research emphasizes that an expansion of the shadow economy in developing nations relates to a reduction in terrorism control (Abu Alfoul et al., 2022; Hutchinson & O'Malley, 2007; Jadoon & Milton, 2022; Pieth, 2017; Schneider & Buehn, 2018). Moreover, our results verify the concentration of terrorist activities in regions marked by ethnic and religious conflicts. Similarly, enhanced freedom of movement is associated with improved counterterrorism efforts. However, the absence of effective governance fosters participation in the shadow economy, providing a conducive environment for the proliferation of terrorism. Our study empirically demonstrates that expanding shadow economies facilitate hidden cash flows, which serve as a fertile ground for the growth of terrorism (Schneider, 2017; Schneider & Caruso, 2011). Hence, governments should prioritize efforts to curtail the size of the shadow economy and eliminate hidden financial transactions that fuel internal, external, ethnic, and religious tensions.

Furthermore, our empirical findings also validate the importance of cash transactions as a critical indicator of the shadow economy (Buehn & Schneider, 2009; Schneider & Buehn, 2018). Hence, producing the frequent use of digital currency and discouraging-in-hand transactions in developing countries could be crucial in curbing shadow economic activities and controlling terrorism. Moreover, according to our results, policies must be formulated to mitigate other negative consequences of the shadow economy, such as excessive regulatory burdens and limited business opportunities, which warrants proactive government intervention (Schneider & Medina, 2017). Hence, in light of our research empirical findings, it becomes imperative for governments globally to implement solid and simple economic reforms for legitimate economic activities. This will not only promise to control the shadow economy and terrorism effectively but also foster a more conducive environment for lawful economic activities, nurture inclusive growth, and build more resilient and prosperous societies for future generations.

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