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THE ILLUSION OF STABILITY: MACROECONOMIC ADJUSTMENT AND WELFARE DECOUPLING IN AFGHANISTAN AMID COMPOUND CRISES

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ABSTRACT

Purpose– This paper evaluates recent macroeconomic stabilization in Afghanistan as indicative of real economic resilience or an absorption-based adjustment amidst severe structural constraints. It examines the impact of compound shocks on workplaces and household well-being in the post-2021 era, including forced migration, returns to their countries, climate shocks, financial isolation, declining aid, and trade shocks.

Methodology– The research adopts a descriptive-analytical resilience model, which will compare macroeconomic indicators with the labor market conditions, trade relations, and family welfare outcomes. The transmission between the aggregate stabilization and micro-level livelihoods is evaluated using secondary data from the World Bank, UN agencies, and national sources.

Findings– Afghanistan experienced declining GDP per capita, labor market saturation, and deteriorating household welfare despite a 4.3 percent increase in real GDP in 2025 and low inflation. Although real GDP growth was estimated at 4.3 percent and average inflation was low, growth was mainly driven by demographic absorption following high levels of forced returns, rather than by productivity or investment-driven growth. There was an increase in informality, a fall in real wages, an increase in household debt, and worsening food security in conditions of price stability, indicating a high degree of decoupling between macroeconomic stability and welfare.

Conclusion– The post-2021 adjustment of Afghanistan is more about stabilization, compression, and absorption, and does not involve adaptive or transformative resilience. The results warn against using GDP growth and price stability as indicators of recovery in weak, aid-reliant economies and highlight the importance of policy interventions grounded in productivity, employment, and inclusion.

Keywords: Economic resilience, compound shocks, macroeconomic stabilization, labor market stress, welfare decoupling, fragile economies
JEL Codes: E24, E31, O11, F14, Q18

1. INTRODUCTION

In the last ten years, the world economy has become increasingly influenced by overlapping, mutually reinforcing shocks, such as geopolitical conflicts, economic sanctions, financial instability, pandemics, and climate-related disruptions (Azis, 2023; Vina & Liu, 2022). These compound crises have revealed profound asymmetries in countries' ability to withstand shocks, stabilize economies, and save lives. As institutional depth, policy credibility, and fiscal space are effective in countering such shocks, fragile and war-torn states are significantly more vulnerable to them, less able to respond, and have even fewer options to protect welfare (Gauthier & Moita, 2013). In this regard, economic resilience cannot be effectively measured by output growth or macroeconomic stabilization, but rather by an economy's ability to maintain basic financial activities, sustain labor incomes, and avoid a welfare meltdown in the face of sustained stressors (Akhyar & Rahmi, 2024).

The structural fragility, the heavy reliance on foreign aid, the shallow production base, and the country's underperformance in the world's formal markets had already defined the economic state of affairs in Afghanistan before the political transition of 2021 (Rahman Shahbaz, 2025). The economy was mainly engaged in agriculture, low-value trade, and services, all of which were aided. Meanwhile, the private sector's development and successful investment were hindered by inefficient institutions, limited access to finance, and insecurity (H. Qasimzai, 2022). This structure created a weak balancing act in which macroeconomic stability relied heavily on external financial flows rather than internal productive growth. Thus, the post-2021 period is marked by very low internal capabilities in Afghanistan to absorb major economic, financial, and trade shocks, which leave the economy in a highly vulnerable position to sudden disruptions (Pooya, 2025b; M. Najeeb Shafiq & Mohammad Qasim Wafayezada, 2023).

After the regime change in Afghanistan in 2021, an unprecedented economic shock convergence occurred. The sudden halt of international aid, the freezing of foreign reserves, financial sanctions, and the profound functional disruption of the banking system caused a sharp downturn in output, liquidity, and employment (Mowahed et al., 2025; Sadia Abbassy, 2024). Such shocks were also exacerbated by exchange rate volatility, increasing poverty, frequent climatic-related shocks to agricultural output, and mass forced return migration. By 2025, these interrelated crises had worsened and interacted, pushing the economy into a long-term adjustment period amid severe institutional and financial bottlenecks. Nevertheless, under these circumstances, some services of the economy, specifically informal trade, subsistence agriculture, and household coping mechanisms, persisted, which led to the emergence of macroeconomic stabilization and prompts important questions about the character and boundaries of economic resilience in extreme circumstances (WFP, 2025; Pooya, 2025a; Azizi et al., 2024; Kochhar & Knippenberg, 2023).

Despite the growing body of research on economic resilience, sanctions, and post-conflict recovery, there is a paucity of empirical data on how compound crises interact in severely constrained economies. The literature tends to examine shocks individually or focus on short-term macroeconomic outcomes. Still, it does not account for the cumulative and reinforcing effects of demographic, climatic, financial, and trade shocks. In Afghanistan, there is a lack of systematic, data-driven studies on the post-2021 economic direction, especially for 2025. The vast majority of the existing literature is devoted to a single shock dimension, including sanctions, aid dependence, climate vulnerability, or conflict. It does not treat macroeconomic stabilization shocks and household welfare outcomes on the same analytical footing.

This observation inspires the current research and thus offers a systematic empirical evaluation of the Afghan economic performance in 2025 during compound crises. The paper uses a descriptive-analytical approach to resilience by systematically cross-sectionalizing macroeconomic indicators with labor market conditions, trade dynamics, and household welfare evidence to assess whether the observed stabilization is truly evidence of welfare-transmitting resilience. The analysis explicitly looks at the transmission or the lack of transmission between aggregate stability and livelihoods in the face of extreme constraint, rather than positive GDP growth or low inflation becoming a sufficient indication of recovery.

This work adds to the body of literature in three significant aspects. First, it promotes knowledge of economic resilience in vulnerable and conflict-ridden economies by empirically showing that compound shocks can create macroeconomic stabilization without associated welfare gains. Second, it places current resiliency paradigms in the context of forced back migration, climate stress, and financial isolation, and emphasizes resiliency built around absorption and adjustment, rather than productivity-based change. Third, it presents an analytically relevant policy based on the discussion of sanctioned and aid-dependent economies and the risks of defining macroeconomic stability as recovery, as labor markets, incomes, and access to food continue to decline. In this way, the study will contribute to a more complex and generalizable conceptualization of resilience in the case of compound and persistent crises.

The rest of the paper is structured as follows. Section 2 will review the relevant literature and theoretical framework; Section 3 will describe the data and methodology; Section 4 will present the findings and discussion; and Section 5 will provide a conclusion and policy implications.

2. LITERATURE REVIEW, THEORETICAL FRAMEWORK, AND CONCEPTUAL MODEL

2.1. Literature Review

The growing body of recent scholarship acknowledges that modern economies are under conditions of chronic uncertainty, determined by concurrent and mutually reinforcing shocks. The frequency and systemic characteristics of crises have become considerably higher due to globalization, profound financial integration, climate change, pandemics, and geopolitical instability, and convert the disturbances on a local scale into disruptive shocks on a system-wide level with long-term consequences (Gondauri et al., 2025; Zhang et al., 2024; Occhipinti et al., 2023). It is also historically proven that economic crises are not aberrations but structural features of modern developmental patterns, as reflected in the prevalence of systemic financial, currency, and macroeconomic crises over the last decades (Wang et al., 2021; Laeven et al., 2011). In this respect, economic resilience has become a primary analytical tool for assessing economic shock absorption, core functioning, and adaptation under sustained stress.

Economic resilience has become not just a one-dimensional concept focused on the speed of recovery, but a dynamic, multidimensional construct that encompasses resistance, absorption, adaptation, and transformation. Current studies underline that resilience is both path-dependent, i.e., it is responsive to external shocks in the manner in which economies adapt institutional structures, policy frameworks, and production forms (Trippl et al., 2023; Gomes et al., 2023; Wang et al., 2021). This has shifted the analytical focus from short-term changes in output to stability, learning, and long-term adaptive capacity, especially in an environment where shocks occur frequently, and policy space is small (Hu et al., 2021). Notably, these sources warn that favorable aggregate signals may be accompanied by structural frailty, particularly when adjustment occurs through compression and absorption rather than productivity-enhancing change.

The accumulating literature emphasizes that the recent crises are becoming increasingly complex. They are caused by the convergence of multiple stressors, such as economic, financial, climatic, and political ones. Compound shocks create a ripple effect that cuts across sectors, regions, and boundaries and can often overwhelm traditional policy tools used to respond to local disruptions (Keenan et al., 2021; Ranger et al., 2021). Global value chains are essential to enhancing these dynamics, as shocks at individual nodes may multiply through trade flows, prices, and financial connections, amplifying macroeconomic volatility and welfare losses (Pietrobelli et al., 2021; Miroudot, 2020). Empirical data also show that indirect welfare losses are disproportionately magnified by compound climate-economic shocks through price and trade transmission mechanisms, especially in non-diversified, import-dependent, and low fiscal capacity economies (Middelanis et al., 2023; Kuhla et al., 2021; Hallegatte et al., 2010; Balla et al., 2022).

The quality of institutions and their governance capacity are always key determinants of resilience outcomes. Strong institutions reduce the susceptibility to shocks by coordinating the actions of economic agents, increasing the credibility of policy, and responding promptly and efficiently (Akhyar et al., 2024; Lagutin et al., 2020). Resilience, according to cross-country analyses, is related to political stability, fiscal capacity, and regulatory quality, and none of these factors is adequate across all time horizons (Alessi et al., 2019). These effects of institutions are especially pronounced in weak and crisis-ridden economies, where even minor advances in governance and human capital may yield disproportionately high returns on resilience (Afolabi et al., 2024). On the other hand, poor administrative capacity and corruption adversely affect recovery by undermining the effectiveness of fiscal support, income protection systems, and social safety nets (Ngono et al., 2025).

Policy flexibility is a complementary aspect of economic resilience. Structural reforms and social protection systems, together with adaptive fiscal and monetary frameworks, help economies to absorb shocks and minimize welfare losses during downturns (Akhyar et al., 2024; Lazorec et al., 2023). The Covid-19 crisis has revealed the necessity of fiscal-financial interventions to stabilize aggregate demand, maintain liquidity, and avoid scarring effects of a crisis on labor markets and productive capacity in the long term (Ranger et al., 2021; Abdelkawy et al., 2024). Simultaneously, the literature underscores that resilience operates at varying temporal scales, offering short-term stabilization and shaping longer-term adjustment trajectories that can either strengthen or weaken future growth and welfare outcomes (Kharazmi et al., 2021; Reuveni, 2024).

Spatial and sectoral studies also show that resilience is highly context dependent. Systemic shocks were found to be relatively more resistant to agricultural activities, especially where subsistence production and local use of resources are predominant, compared to service sectors, especially those that rely on mobility, demand contact, and urban concentration (Gaki et al., 2025; Sdrolias et al., 2022; Stastna et al., 2023). The economic diversity, patterns of urbanization, the endowment of human capital, and local competitive advantages also contribute to building regional resilience, underscoring the significance of structural and place-based factors in predicting crisis responses and recovery paths (Begley et al., 2024; Kitsos et al., 2016).

Despite the scope of this literature, there is still a heavy focus on empirical evidence from advanced and emerging economies. Weak and war-torn countries with persistent, overlapping, and compounding impacts of weak institutions and limited policy space are a very understudied area of shock. The existing literature on Afghanistan tends to study sanctions, aid dependence, climate stress, or conflict separately, providing little information on the interactions among demographic, financial, climatic, and trade shocks and their reinforcement over time. This is a significant empirical gap, given Afghanistan's chronic exposure to a range of shocks and its extreme structural constraints. Filling this gap, the current research is an advancement in the literature by offering a coherent and integrated evaluation of economic resilience during the compound crisis in one of the most shock-prone and institutionally constrained economies in the world, and by explicitly defining the differences between macroeconomic and welfare-based resilience.

2.2. Theoretical Framework and Conceptual Model: Economic Resilience during Compound Crises

Traditional growth, recovery, or convergence models are insufficient to explain the dynamics of economic sectors in weak, war-ridden economies. Economies in these circumstances are continually subjected to intersecting and reinforcing shocks that simultaneously pressure political stability, institutional capacity, environmental conditions, and macroeconomic performance. Drawing on the resilience literature, this paper will operationalize economic resilience as a dynamic, constraint-based process through which economies can absorb, adapt, and endure compound crises rather than return to pre-shock growth paths (Occhipinti et al., 2023; Ranger et al., 2021).

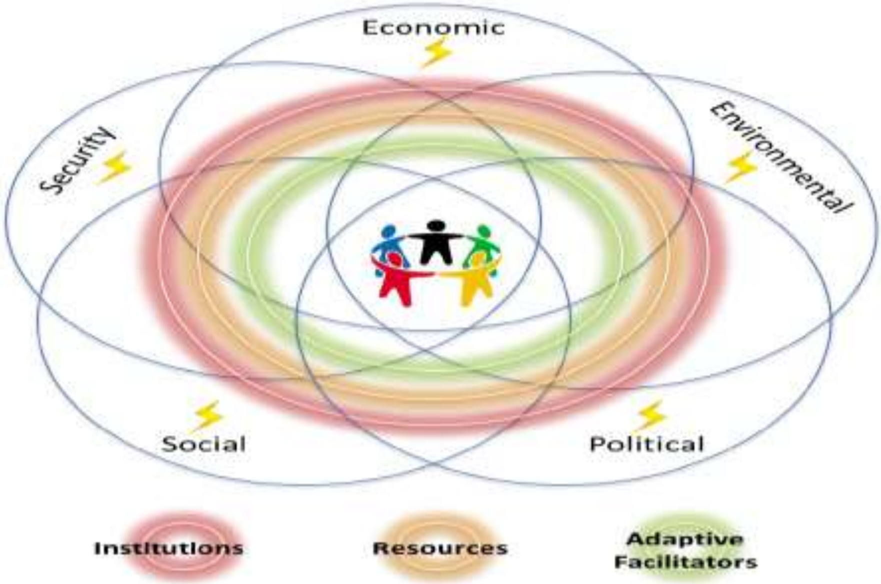
Compound crises occur when multiple shocks (financial disruption, climate stress, geopolitical conflict, and demographic pressures) interact over time, with cascading impacts on economic systems. In economies such as Afghanistan, these shocks are embedded in structural weaknesses, including limited fiscal space, weak institutions, high import dependence, and narrow productive bases (Balla et al., 2022; Bizhan, 2018). Consequently, the shocks are unable to dissipate but accumulate, imprisoning the economy in a prolonged period of vulnerability.

In this context, resilience is not characterized by quick recovery or a stagnant increase in production. Instead, it indicates the economy's ability to preserve essential economic processes and stabilize key macroeconomic indicators when institutional and financial conditions are harsh (Lazorec et al., 2023; Lagutin et al., 2020). Resilience is therefore perceived as a dynamic process that depends on the quality of institutions, the availability of resources, and adaptive capacity, which may result in short-term stabilization but not structural change or welfare (Gomes et al., 2023; Hu et al., 2021).

The spread of compound shocks occurs through three channels that are related to each other. First, institutional capacity is a mediating factor in resilience outcomes because it determines policy credibility, coordination, and effectiveness. The space for fiscal and monetary policy is constrained by weak governance and a lack of administrative capacity, thereby increasing the economic cost of the crisis (Ngono et al., 2025; Alessi et al., 2019). Second, resource constraints, e.g., poor access to finance, low capital accumulation, and limited integration into global value chains, require adjustment through consumption compression and low-productivity reallocation rather than investment-based growth (Pietrobelli et al., 2021; Miroudot, 2020). Third, adaptive mechanisms are already present, mainly at the household and informal-sector levels, such as adjustments in labor supply, informal activities, remittances, and humanitarian aid. Although these processes allow taking advantage of short-term absorption, they frequently damage welfare and potential long-term growth (Betts et al., 2022; McCartney et al., 2021).

One of the main implications of this framework is the separation of macroeconomic stabilization and welfare-based resilience. The good aggregate news (increased GDP, low inflation rates, or stable exchange rates) can be accompanied by a decrease in real incomes, worsening of the labor market, and food insecurity. These results can be characterized not as stability driven by productivity but as stability driven by absorption and adjustment (Alessi et al., 2019; Reuveni, 2024).

Figure 1: Conceptual Framework of Economic Resilience under Compound Shocks



Source: Author's illustration, adapted from the economic resilience frameworks proposed by Bujones et al., 2013.

Figure 1 is the conceptual issue of economic resilience in the case of compound shocks. There are five intersecting shock domains, namely, the economic, political, social, security, and environmental, which put pressure on the core of the system, which is constituted by households and livelihoods. Shock transmission occurs through institutions, resources, and adaptive facilitators that enable short-term stabilization but tend to reinforce structural frailty. In line with empirical evidence, the framework emphasizes the illusory stabilization phenomenon, in which macroeconomic stability is maintained without improvements in welfare. The model provides a consistent theoretical framework for explaining Afghanistan's economic trajectory in 2025 and the discrepancy between its macroeconomic performance and welfare-based resilience.

3. DATA AND METHODOLOGY

3.1. Data

To improve clarity and readability, the main abbreviations used in the analysis are summarized below.

Table 1: List of Abbreviations

Abbreviation	Full Form
GDP	Gross Domestic Product
GDP per capita	Gross Domestic Product per Capita
$	United States Dollar
USD	United States Dollar
AFN	Afghan Afghani (Official Currency of Afghanistan)
DAB	Da Afghanistan Bank(Central Bank of Afghanistan)
IOM	International Organization for Migration
SIDA	Swedish International Development Cooperation Agency
IPC Phase 3+	Integrated Food Security Phase Classification indicating crisis or worse levels of acute food insecuri
UNHCR	United Nations High Commissioner for Refugees
OCHA	Office for the Coordination of Humanitarian Affairs
UNOCHA	United Nations Office for the Coordination of Humanitarian Affairs
WFP	World Food Programme
FAO	Food and Agriculture Organization of the United Nations
IPC	Integrated Food Security Phase Classification
AML/CTF	Anti-Money Laundering / Counter-Terrorism Financing
PFM	Public Financial Management
ToT	Terms of Trade
NEER	Nominal Effective Exchange Rate
FDI	Foreign Direct Investment
ECO	Economic Cooperation Organization
HNRP	Humanitarian Needs and Response Plan
SIGAR	Special Inspector General for Afghanistan Reconstruction
NSIA	National Statistics and Information Authority
WHO-EMRO	World Health Organization, Regional Office for the Eastern Mediterranean

This paper draws on macroeconomic, labor-market, and migration-related data to examine overall conditions and household welfare dynamics in Afghanistan. Table 2 provides a general summary of indicators and the primary data sources used in the analysis.

Table 2: Summary of Datasets and Sources Used in the Study

Category	Core Indicators	Main Sources
Macroeconomic Conditions	GDP growth, inflation, exchange rate, and fiscal revenue	World Bank; NSIA
Labor Market	Daily wages, labor purchasing power	WFP; World Bank
Migration Pressure	Return migration flows	IOM; UNHCR
Household Welfare	Income changes, debt stress	UNOCHA; WoAA
Food Security	IPC classification, food access	WFP; FAO
Climate Shocks	Drought and disaster impacts	FAO; FEWS NET
External Sector	Trade flows and balance	World Bank; Reuters
Financial & Aid Environment	Liquidity conditions, humanitarian funding	World Bank; OCHA; SIGAR

The present study uses secondary data sources, which are widely available and publicly accessible, to examine Afghanistan's economic conditions during the numerous crises. The data combine macroeconomic variables (GDP growth, inflation, exchange rate movements, fiscal revenues, and external balances), migration data, labor market proxies, household welfare indicators, trade flows, and humanitarian financing data. The primary sources are publications and databases of the World Bank, the International Organization for Migration (IOM), United Nations agencies (UNHCR, OCHA, WFP, FAO), and other international surveillance sites.

Since structural data is limited in fragile and conflict-based environments due to the specifics of such settings, especially when they are financially isolated and their institutions disrupted, the analysis will be based on high-frequency, tentative, and harmonized data. Information is cross validated with as many sources as possible to improve reliability. The empirical focus spans 2022-2025, including the adjustment period post-2021; around 2025, the greatest convergence of the most significant shocks occurred in demographic, climatic, financial, and trade-related terms. It presents a sensitive evaluation of short-term stabilization processes alongside changes in the welfare performance of subjects under long-term stress.

3.2. Methodology

The analytical-descriptive research design is well-suited to conflict-impacted, data-limited economies, where structural discontinuities, measurement errors, and non-stationary, repetitive shocks render conventional econometric identification procedures infeasible. The analysis does not estimate causal parameters; instead, the conceptualization of economic resilience is that of a transmission process linking observed macroeconomic stabilization to micro-level welfare.

The empirical evaluation is methodologically based on 2025 as the year of core analysis, as an element of post-adjustment in Afghanistan after that political transition that was made in 2021, and the build-up of compound and persistent shocks, such as forced return migration, climate stress, financial isolation, dwindling external assistance, and trade destabilization. The year 2025 is chosen as a focal observation year, with the study able to determine whether the macroeconomic stabilization one might be witnessing in 2025 is resilience or just an absorption process due to dire structural and welfare conditions.

The concept of resilience is analysed through a triangulated, layered approach that reflects the multi-level structure of the economy. Aggregate indicators for macroeconomic stabilization include real GDP growth, inflation dynamics, exchange rate movements, and welfare transmission, which is determined by labor market conditions, household income variation, indebtedness, and food access indicators. These dimensions are examined together to determine the congruence or the difference between the aggregate performance and household-level realities in the 2025 crisis setting.

The primary analytical criterion of the study is the presence or absence of effective welfare transmission under macro-level stability. A scenario where aggregate metrics show positive signs, yet real incomes, labor market trends, increasing household debt, or limited access to food are indicative of adjustment-based or non-transmitting resilience. In line with the recent resilience literature, the discussed outcomes can be interpreted as the outcomes of absorptive and coping responses rather than adaptive or transformative resilience. The approach of clearly situating the analysis within the compounded shock in 2025 provides a context-sensitive, theory-based evaluation of the Afghanistan macroeconomic adjustment and its decoupling from welfare outcomes.

4. RESULTS AND DISCUSSION

4.1. Macroeconomic Stability and Fragility (2025): A Macroeconomic Overview

4.1.1. Macroeconomic Stabilization without Welfare Gains

The data shows that Afghanistan has recorded a second consecutive year of economic growth. It is estimated that gross domestic product (GDP) will increase by 4.3 percent in 2025, up from 2.5 percent in 2024. This growth has been driven by activity in the services and industrial sectors, with strong demand after the return of over 2 million migrants from Iran and Pakistan. Moreover, the mining and building industries remained in favor of aggregate output. Conversely, the agricultural sector remained partly resilient despite severe drought conditions, owing to strong production of irrigated wheat (Group, 2025; Office, 2025; WFP, 2025c).

Table 3 demonstrates that consumption-based adjustment is more prevalent in Afghanistan's post-2021 recovery than in productive or investment-based growth. Following the 2022 contraction, GDP growth becomes positive in 2023 as domestic and government consumption increase, primarily driven by demographic absorption. Still, investment remains low, and exports are insufficient to offset high import levels. Low inflation indicates demand compression and stability that is upheld administratively, rather than an improvement in the structure of supply. Existing external and productive constraints remain unresolved, as current account deficits persist and sectoral dependence on services persists.

Table 3: Macroeconomic Adjustment, Demand Composition, and External Imbalances in Afghanistan (2022–2027)

Recent history and projections	2022	2023	2024	2025e	2026f	2027f
Real GDP growth, at constant market prices	-6.2	2.3	2.5	4.3	3.8	3.5
Private consumption	0.6	6.4	4.9	7.0	5.0	4.0
Government consumption	-1.2	0.7	9.1	6.5	7.8	3.4
Gross fixed capital investment	29.2	-5.7	3.0	2.5	2.6	9.1
Exports, goods and services	18.6	-12.1	-3.0	2.5	3.0	4.0
Imports, goods, and services	36.7	0.7	8.0	9.0	7.0	6.0
Real GDP growth, at constant factor prices	-6.4	1.8	2.5	4.3	3.8	3.6
Agriculture	-6.6	2.2	6.0	-0.5	3.2	3.2
Industry	-5.7	1.8	2.1	4.5	3.0	2.5
Services	-6.5	1.5	-0.3	8.5	4.5	4.2
Inflation (consumer price index)	10.6	-7.7	-4.3	2.0	3.0	4.0
Current account balance (% of GDP)	-18.8	-17.6	-24.6	-31.9	-34.8	-36.1

Net foreign direct investment inflow (% of GDP)	0.0	0.3	0.0	0.0	0.0	0.0
Fiscal balance (% of GDP)	-1.0	-1.2	-0.4	0.0	0.1	0.1
Revenues (% of GDP)	40.6	33.9	30.7	29.1	29.0	28.7
Debt (% of GDP)	13.9	13.6	12.8	12.1	10.4	8.4
Primary balance (% of GDP)	-1.0	-1.2	-0.4	0.0	0.1	0.1
GHG emissions growth (mtCO2e)	-0.3	1.5	2.0	2.8	3.0	3.1

Source: (World Bank, 2025c)

According to Figure 2, the Afghan economy is sharply shrinking after the political and financial shock of 2021, and then recovering poorly and unevenly. The trend after 2023 is primarily service-intensive and demand-based, driven by demographic absorption from migrant reentry rather than productivity growth or structural change. Agriculture and industry remain shaky due to climatic pressures, low investment, and institutional constraints. Altogether, the trend indicates adjustment-based stabilization anchored in absorptive coping rather than in a sustainable or inclusive recovery.

Figure 3 illustrates the continued structural imbalance in Afghanistan, where import levels have been high, export levels have been low, and investment levels have been low. Although trade flows have at times been improving, the widening gap between imports and exports further highlights that the economy has a very weak productive base and is susceptible to external shocks. The long-term stagnation of investment leads to financial seclusion, liquidity constraints, and high levels of uncertainty, hindering capital accumulation and long-term growth. These trends, in combination, highlight that Afghanistan's macroeconomic stability is more dependent on external inflows and trade adjustments than on resilience based on endogenous investment.

Figure 2: Real DGP Growth and Sectoral Contributions in Afghanistan (2019-2027)

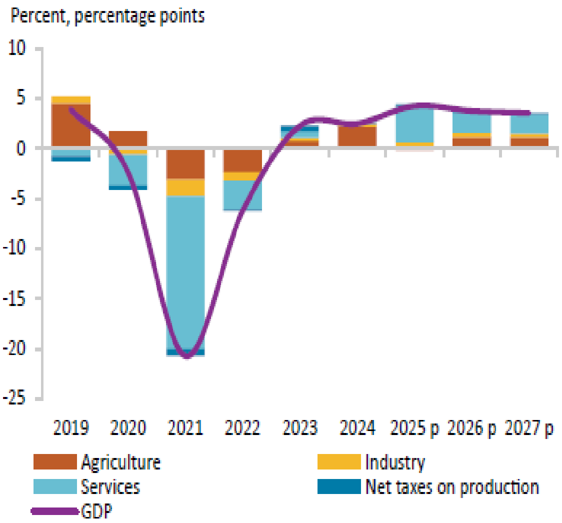
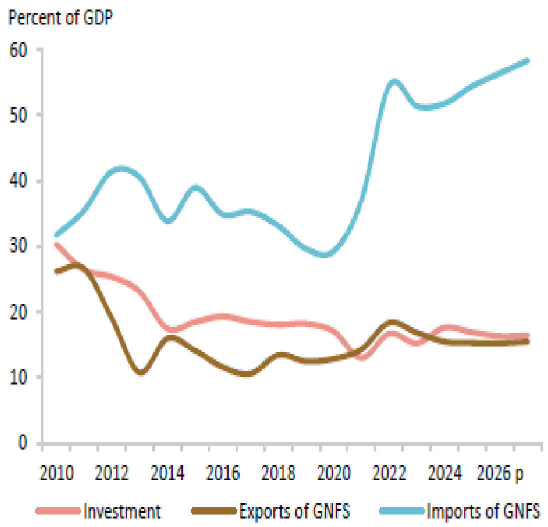


Figure 3: Exports, Imports and Investment as a share of GDP in Afghanistan (2010-2026)



Source: World Bank, 2025c.

Table 4: Key Macroeconomic and Demographic Indicators of Afghanistan (2024–2025)

Indicator	2024 (Actual)	2025 (Projected)	Interpretation
GDP Growth Rate	2.5% to 2.7%	4.3%	Demand-driven growth due to returnees and services sector expansion
Population Growth Rate	2.8%	8.6%	Demographic shock driven by forced population returns
GDP per Capita Growth	0.5%	- 4.0%	Indicates deterioration in living standards
Average Inflation Rate	-3.8% to - 4.7%	2.0%	Low inflation reflecting subdued aggregate demand and imports
Domestic revenue (% of GDP)	12% to 16.6%	17.1%	Improvement in fiscal revenue collection

Source: Group, 2025a; Group, 2025b; Office, 2025.

Table 4 summarizes Afghanistan's macroeconomic and demographic trends for 2024-2025, indicating economic stability amid shocks in one of the most fragile economies. Despite real GDP growth rising to 4.3 percent in 2025, the growth was mainly demand-led, attributable to the absorption of large-scale return migration and short-term growth in service provision, rather than to productivity or investment-led growth. At the same time, the population growth (8.6 percent) was impressive. It caused a severe demographic shock, weakening aggregate benefits and leading to a sharp decline in GDP per capita (-4 percent), as average living standards began to decrease.

The fact that inflation is low (approximately 2 percent) indicates that aggregate demand is depressed and that the country still depends on imports, with price stability maintained by the administration rather than a high level of domestic supply. The fact that domestic revenue collection (17.1 percent of GDP) is improving indicates that there is fiscal administration, but the budgetary stabilization has not been reflected in household welfare or labour market performance.

4.1.2. Inflation Dynamics and Engineered Price Stability

The average inflation in Afghanistan was still around 2 percent in 2025, among the lowest rates in the region. This stability was facilitated by relatively stable food prices and appreciation of the Afghan currency (AFN). Nominal effective exchange rate (NEER) grew by around 3.8 percent annually, which implies a nominal appreciation of the currency (WFP, 2025a; Group, 2025).

However, macroeconomic stability was maintained, while local and seasonal inflationary pressures were experienced. In August 2025, the headline inflation rate stood at 3.1 percent and the non-food items rate at 4.8 percent, driven by rising housing and related costs and high demand from large numbers of people receiving returns. This trend shows that, despite the strong dependence on imports and the stability of exchange rates in Afghanistan, the prices of tradable goods have been contained, while demographic shocks have exerted direct upward pressure on prices in the non-tradable services sector. In line with this, aggregate price stability is not just a short-term control of the macroeconomic situation but also indicates that Afghanistan is deeply dependent on imports and is more vulnerable to external and demographic shocks (WFP, 2025b; Group, 2025).

Figure 4: Headline and Core Inflation Dynamics in Afghanistan (2023–2025)

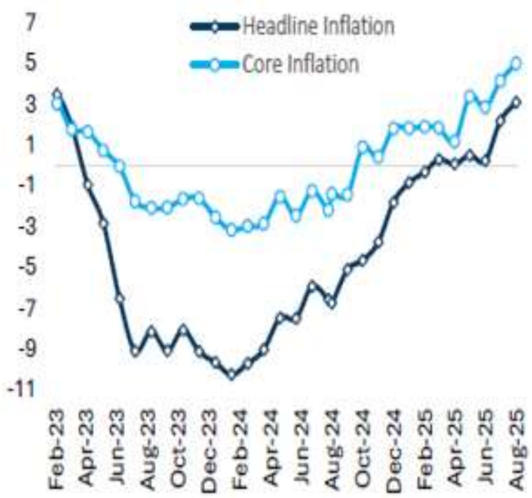
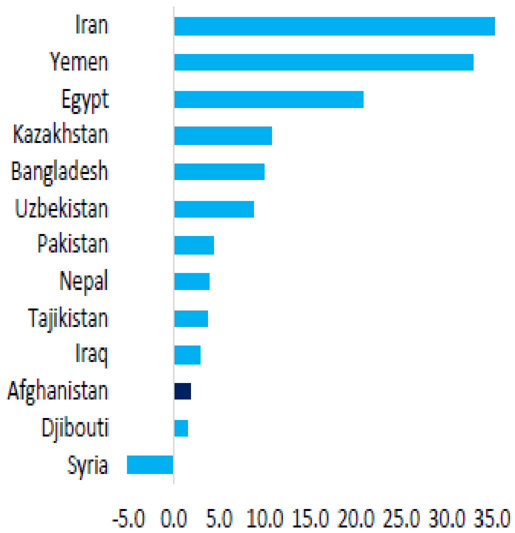


Figure 5: Inflation in Afghanistan Compared with Selected Peer Economies, 2025



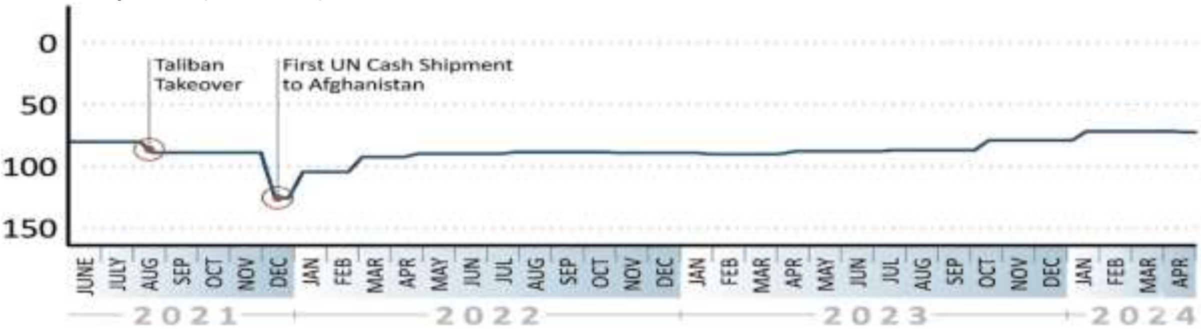
Source: National Statistics and Information Authority (NSIA) and World Bank Macro-Poverty Outlook (October 2025).

Figure 4 shows a disinflationary cycle during 2023-2024, in which headline inflation turns negative, with extreme demand compression, import contraction, and exchange-rate stabilization following liquidity injections. Core inflation also fell more slowly and was always substantially higher than headline inflation, suggesting that consumer prices were modulated by fluctuations in food and other trading items rather than widespread cost pressures. The following headline and core inflation contracting to low and favorable levels by mid-2025 is an indication of a slight pick-up in domestic market demand, linked primarily to return migration and services-sector operations. Nevertheless, the low rates of both indicators indicate that they are stabilized by economic compression rather than by increases in productivity or income.

Figure 5 places the 2025 inflation forecast for Afghanistan in a regional context. Compared to the high inflation rates recorded in the Iranian, Yemeni, and Egyptian peer economies, Afghanistan has one of the lowest inflation rates. This deviation highlights the unusual character of the adjustment process in Afghanistan: low inflation is indicative of restrained demand, liquidity constraints, and a high reliance on imports rather than competent macroeconomic management of overheating.

Although price stability might seem good news in the aggregate, it conceals significant welfare strains, as low inflation is accompanied by falling real incomes and a reduction in labor purchasing power.

Figure 6: Evolution of Afghanistan's Exchange Rate Dynamics Following the 2021 Political Transition and Initial UN Cash Injections (2021–2024)



Source: SIGAR, 2024.

In Figure 6, the exchange rate dynamics in Afghanistan since 2021, including the political transition and the beginning of UN cash assistance, are shown. The sharp decline immediately after the Islamic Emirate of Afghanistan assumed leadership speaks volumes about an extreme liquidity crunch, isolation, and a loss of trust. The subsequent stabilization and gradual recuperation of the AFN go hand in hand with the initiation of routine UN cash assistance. This trend indicates that external liquidity provision and administrative interventions were primary in ensuring exchange rate stability, rather than in restoring domestic financial services or export capacity.

4.1.3. Fiscal Conditions and Chronic Dependence

There has been an improvement in fiscal performance on the revenue side. Increased enforcement and improved compliance practices are expected to raise domestic tax revenues to 17.1 percent of GDP in 2025. The shrinking of external financial support, however, has reduced the overall fiscal envelope. This has increased Afghanistan's dependence on trade-based tax schemes and donor aid. In the meantime, the banking sector is relatively weak due to high non-performing loan rates, severely constrained credit operations, and ongoing liquidity stress (Group, 2025; The World Bank, 2021).

Table 5: Comparative Fiscal Revenue Performance (2023–2025)

Indicator	FY2023 (Actual)	FY2024 (Estimate)	FY2025 (Projected)
Total Revenue (AFN billion, with USD equivalent in parentheses)	211.7 (3.02)	241.3(3.45)	268.5(4.07)
Revenue as % of GDP	13.5%	16.6%	17.1%
Domestic Tax Revenue Growth (YoY %)	12.4%	28.5%	15.2%
Customs and Trade-Related Taxes (%)	52.0%	50.0%	48.0%
Non-Tax Revenue (AFN billion, with USD equivalent in parentheses) (AFN Billion)	63.8(0.91)	83.7(1.20)	90.1(1.37)

Source: World Bank, 2025c; CEICdata.com, 2024.

Table 5 demonstrates that fiscal revenues in Afghanistan will continue to grow through FY2023-2025, with total revenue expanding from AFN 211.7 billion to an estimated AFN 268.5 billion, and the revenue-to-GDP ratio rising by 13.5 to 17.1 percent. Such enhancement is a sign of increased tax enforcement and a tightening of customs administration, not economic growth. The growth in domestic tax revenue stalled after the FY2024 high, suggesting the increase is increasingly limited under an enforcement-based model. Simultaneously, the proportion of taxes on customs and trade dropped slightly, an indicator of negligible diversification under a still trade-related fiscal framework.

4.2. Demographic Shocks and Labor Market Strains: Micro-Level Stagflation

4.2.1. Labor Markets and Household Welfare

In Afghanistan, there was the massive repatriation of over 2.6 million Afghan migrants from Iran and Pakistan in 2025. This inflow of the population under the mass of forced deportation policies put tremendous pressure on local labor markets, border areas, and main cities (SIDA, 2025; IOM, 2025; OCHA, 2025b).

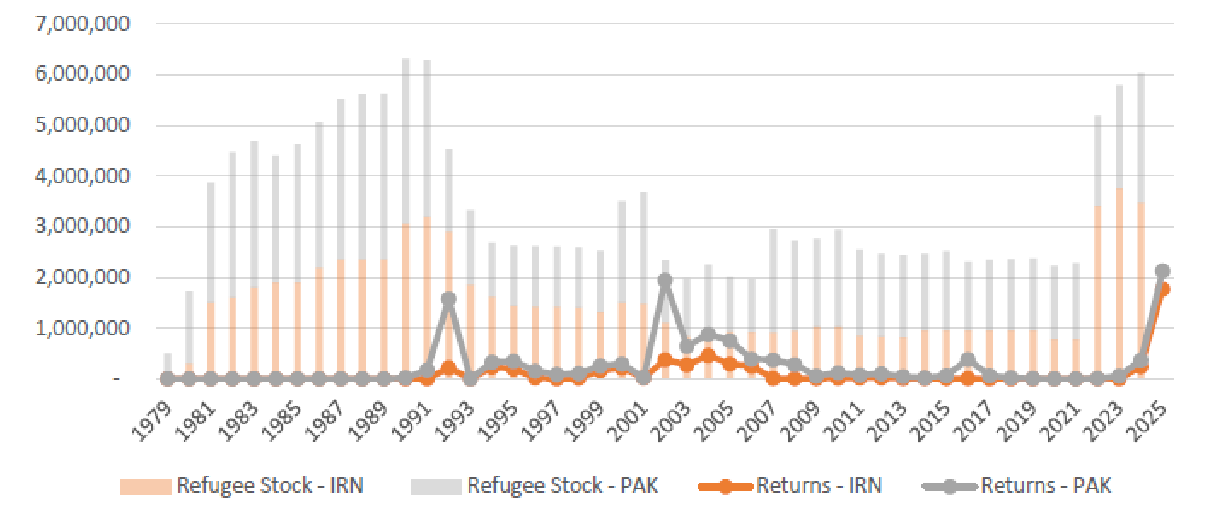
Table 6: Total Returns to Afghanistan in 2025 by Country of Origin

Country of Origin	Data Date	Number of Returnees	Share of Total Returns (%)
Iran (Islamic Rep. of)	29 Nov 2025	1,800,100	66.9%
Pakistan	29 Nov 2025	850,300	31.6%
Various	29 Nov 2025	41,100	1.5%

Source: UNHCR, 2025.

As shown in Table 6, in 2025, more than 2 million migrants returned to Afghanistan, and the policy driver for the increase in return migration was largely political, as host countries began to implement stricter immigration and deportation policies instead of voluntary return programs. The involuntary nature of return migration caused by the policy increased its disruptive economic effects. Compared to gradual or voluntary returns, forced expulsions occurred quickly and in large numbers, leaving little time to absorb labor-market and reintegration planning and to provide fiscal accommodation. Therefore, return migration acted as a negative demographic shock, increasing both labor supply and basic consumption demands within a severely constrained productive economy.

Figure 7: Afghan Refugee Stocks and Return Flows from Iran and Pakistan (1979–2025)



Source: World Bank, 2025b.

Figure 7 puts the 2025 return migration shock into a long-run historical perspective and emphasizes its unique magnitude, suddenness, and policy-induced character. Although refugee numbers in Iran and Pakistan have fluctuated over the decades, the sudden increase in returns during the 2023-2025 period constitutes a structural break, whereas the preceding changes were more gradual. In contrast to the previous return waves associated with reintegration with aid, the 2025 wave was driven by financial isolation, reduced assistance, and low labour demand. Unwilled returns, therefore, were a sudden external population shock, the expansion of labor supply and basic needs with no increase in productive capacity or public provision of service.

This population bloc also put additional pressure on the very fabric of the state machinery. For example, in 2025, 422 health facilities were shut down due to budget shortages and increased demand, resulting in the loss of access to basic health care services for some 3,000,000 individuals. Furthermore, as the number of Afghans facing food insecurity is estimated at 17.4 million, drastic cuts in humanitarian aid have left the crisis response vulnerable to collapse (WFP, 2025; UN News, 2025).

4.2.2. Labor Market Stress and Terms of Trade (ToT)

The Afghan economy cannot absorb new entrants into the labor market. It is estimated that 400,000 to 500,000 Afghans join the workforce each year. Youth unemployment (ages 15-29) was estimated to constitute one quarter of the population (25%), a situation further worsened by the mass return shock in 2025 (World Bank, 2025; OCHA, 2025a).

The terms of trade (ToT) of daily wage laborers were the clear indicators of the labor market pressures. The nominal terms of trade for daily wage workers decreased by 6.6 per cent in November 2025 and by 15 per cent compared to the same month last year. This measure indicates a substantial erosion in the buying power of the daily wage labor households (WFP, 2025c).

The following micro-level stagflationary dynamic can be singled out. The return shock in the population grew at an alarming rate, and this had an inverse effect on the daily wage rate. Meanwhile, the prices of basic commodities, e.g., wheat flour, and non-food spending (especially housing expenses) rose. The concurrent fall in wages and increase in prices seriously undermined the buying power of poor and returnee households. It led to a significant collapse in the real terms of trade that poor workers received on a daily wage basis. This way, macroeconomic stability, as reflected in aggregate inflation (2.0 percent), conceals a critical income and food access crisis at the microeconomic level (ReliefWeb, 2025; WFP, 2025c).

Table 7: Key Household Welfare and Labor Market Stress Indicators (2025)

Indicator	Value (2025)	Change Relative to 2024	Analytical Interpretation
Number of Returnees	More than 2.6 million people	Sharp increase	Intensified pressure on the labor market and public service provision
Average Reduction in Household Income	−13%	Significant decline	Declining purchasing power and rising vulnerability
Average Increase in Household Debt	+30%	Considerable increase	Growing reliance on coping and survival strategies
Deterioration in Daily Wage Labor Conditions	−15%	Severe decline	Food access crisis and deepening livelihood insecurity
Number of Closed Health Centers	422 centers	167 to 415	Reduced access to healthcare services for approximately 3 million individuals

Source: (WHO-EMRO, 2025; UN News, 2025; WFP, 2025d; OCHA, 2025b; UNHCR, 2025)

Table 7 indicates that although the macroeconomic situation has stabilized, household welfare and labour market conditions in Afghanistan remain devastating in 2025. The fact that more than 2.6 million migrants returned to work created a sudden spike in labor market pressure, a 13 percent decrease in household income, and a 30 percent increase in debt. The fact that the purchasing power of labor reduced by 15 percent per day is evidence that welfare strain was primarily caused by a reduction in income, rather than price volatility.

4.3. Climate Stress, Food Security, and the Disruption of Welfare Transmission

In 2025, Afghanistan faced compounded climate shocks that intensified structural vulnerability without triggering generalized price instability. Extreme droughts in the north and west provinces have weakened rainfed agriculture and livelihoods in rural areas, and an earthquake in eastern Afghanistan resulted in severe human and economic damage, further burdening humanitarian and reconstruction capacity (UNU-INWEH, 2025; Kabul Now, 2025). Market supply stabilized under the influence of these shocks, as record irrigated wheat production and some food imports related to stable food prices helped avoid a sharp rise in food prices (FAO, 2025; World Bank Group, 2025).

Nevertheless, food inflation remained low, masking a severe food access crisis. Over 17.4 million Afghans were under acute food insecurity (IPC Phase 3+), and emergency needs are expected to increase in the 2026 lean season (WFP, 2025b; UN News, 2025). This deviation is a breakdown of income and transmission, not a supply-side breakage: the loss of income due to climate change, coupled with labor-market saturation and declining real wages, severely reduced households' purchasing power. Consequently, income compression was the primary cause of food insecurity, compelling households, particularly in rural regions, to cut non-food spending on health and education, and resulting in unfavourable long-term effects on human capital and resilience (FEWS NET, 2025; Kochhar and Knippenberg, 2023).

4.4. External Constraints, Trade Reorientation, and the Persistence of Structural Fragility

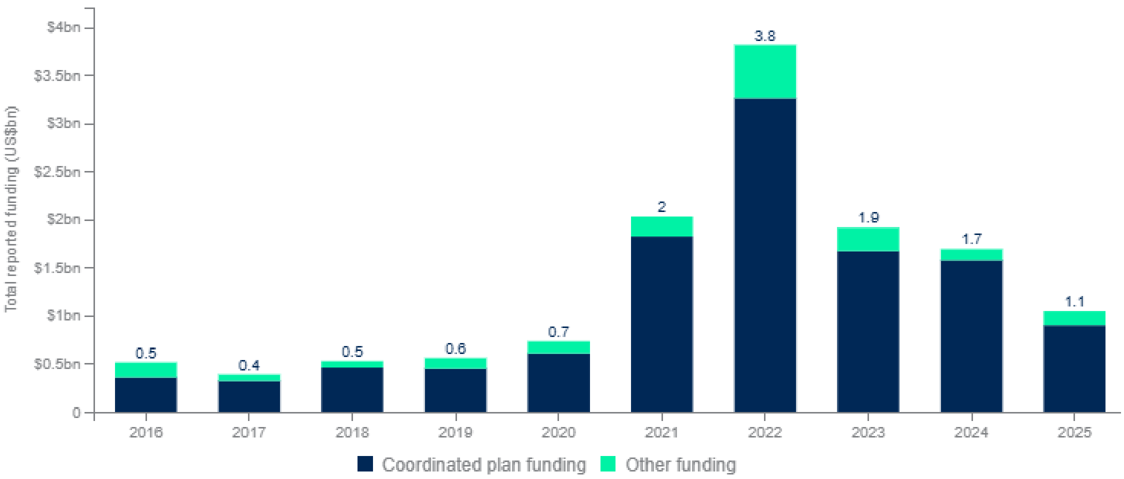
In 2025, the external economic environment of Afghanistan was characterized by increased geopolitical constraints, economic isolation, and a decline in external assistance. Growing tensions with Pakistan prompted a shock turnaround in trade towards Iran and Central Asia, with trade volumes with Iran exceeding those with Pakistan, backed by new transit plans and trade facilitation offices (Kabul Now, 2025a; Reuters, 2025). Although this change showed the short-term geopolitical flexibility, the external sector in Afghanistan was structurally weak, with a limited export base (focused on primary commodities and agriculture) and continuous trade deficits, which meant that the economy was highly vulnerable to commodity price fluctuations and external shocks (World Bank Group, 2025; World Bank, 2025b).

These potentialities were enhanced by primary financial isolation and an acute decline in foreign assistance. The banking sector was still affected by chronic liquidity shortages, poor credit intermediation, and low access to foreign reserves, which intensified the economic activity towards the use of informal financial intermediaries and hardened the obstacles to reintegrating into the global financial market (World Bank Group, 2025; SIGAR, 2024; World Bank, 2021). Simultaneously, the loss of humanitarian and development aid widened the financial gap, exacerbating fiscal strain and undermining the ability to provide services, especially in the health and social security sectors (UNOCHA, 2025).

The development of international humanitarian funding to Afghanistan from 2016 to 2025 is depicted in Figure 8, which separates coordinated plan funding from other funding streams. The data indicate strong growth in total humanitarian financing after the 2021 political transition, peaking in 2022 and then entering a steady decline until 2025. The reduction in funding is coupled with growing humanitarian demands driven by high rates of return migration, climate shocks, and the economy's vulnerability, highlighting the widening gap between resources and the scale of the crisis. In the context of financial resilience, the figure indicates that Afghanistan's adjustment mechanisms are increasingly susceptible to limitations on external funding.

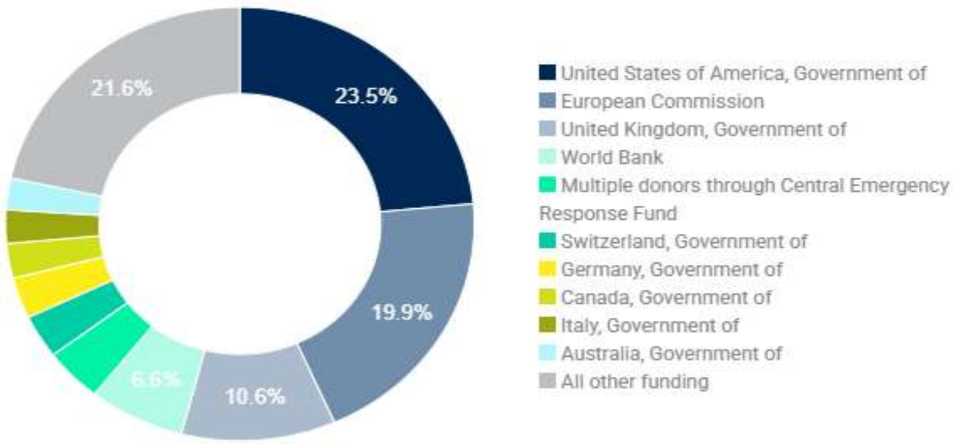
Figure 9 shows how humanitarian aid to Afghanistan will be correlated with major funders in 2025, revealing that there are still a few bilateral and multilateral donors. A large portion of the total funding is held by the United States, the European Commission, and the United Kingdom, compared with the complementary roles of multilateral institutions and pooled mechanisms. The dominance of donor funds is an indicator of Afghanistan's continued reliance on foreign aid and puts humanitarian action at increased risk of financing through geopolitical and donor burnout. This type of funding structure strengthens absorption capacity in the short term but, in the long term, limits adaptive and transformational responses to compound crises in terms of resilience.

Figure 8: Trends in International Humanitarian Funding to Afghanistan (2016–2025)



Source: OCHA, 2025a

Figure 2: Composition of Humanitarian Funding to Afghanistan by Major Donors (2025)



Source: OCHA, 2025a

Table 8 provides clear empirical evidence that, in 2025, Afghanistan appears to have been in a macroeconomic stabilization yet was also characterized by an extremely high level of humanitarian crises. The country has been ranked among the most severe crisis environments in the world, with an INFORM Severity Index of 4.5/5, and 22.9 million of the population require humanitarian help. The response capacity is structurally limited: only 29 percent of the total $2.42 billion budget needed for 2025 has been funded, indicating a significant funding gap.

Table 8: Key Humanitarian Indicators for Afghanistan (HNRP 2025)

Indicator	Value (2025)	Description / Source
INFORM Severity Index	4.5 / 5	Composite index measuring humanitarian crisis severity
People in Need of Humanitarian Aid	22.9 million	Estimated population requiring assistance (HNRP 2025)
People Targeted in Response Plan	16.8 million	Population prioritized for assistance (HNRP 2025)
Required Funding	USD 2.42 billion	Total financial requirement to meet 2025 targets
Funding Secured	29%	Share of required funding secured as of 2025

Source: IOM, 2025.

4.5. Engineered Macroeconomic Stability under Structural Constraints

With international isolation continuing, Afghanistan has since 2023 stabilized its macroeconomic position by enhancing fiscal, trade, and monetary management. The increase in domestic revenue to approximately 17.1 percent of GDP and the maintenance of short-term budgetary discipline were also promoted by improved taxation, the administration of customs, and improvements in the management of the country's finances (World Bank Group, 2025; World Bank, 2025a). At the same time, trade reorientation with Iran, Central Asia, and India reduced reliance on Pakistan, as bilateral trade with Iran exceeded USD 1.6 billion in 2025, in response to changes in geopolitical restrictions (World Bank Group, 2025; World Bank, 2025a).

Financial isolation kept inflation almost negligible at 2 percent, thanks to a controlled floating exchange rate system and active liquidity management by Da Afghanistan Bank (World Bank Group, 2025; World Bank, 2025a). Simultaneously, the preference for irrigated agricultural production enabled record wheat production, helping partly eliminate the threat of food shortages in the face of frequent droughts (World Bank Group, 2025; World Bank, 2025a).

Table 9: Afghanistan Fiscal Revenue Structure (FY2023–FY2025)

Revenue Category	FY 2023 (AFN billion, with USD equivalent in parentheses)	FY 2024 (AFN billion, with USD equivalent in parentheses)	FY 2025 Projection (% of GDP)	Source
Total Domestic Revenue	211.7 (2.999)	241.3 (3.432)	17.1%	World Bank (2025a)
Customs Duties & Fees	42.9 (0.608)	63.8 (0.908)	4.8% (Est.)	World Bank (2025c)
Inland/Tax Revenue	72.4 (1.025)	93 (1.323)	6.5% (Est.)	World Bank 2025e)

Note: FY2025 figures are projections expressed as a share of GDP because finalized nominal fiscal data are unavailable. This methodological approach aligns with the World Bank's Macro-Poverty Outlook reporting convention.

Table 9 presents the format and development of Afghanistan's fiscal revenues during FY2023-FY2025, both in terms of nominal performance and forecasted macroeconomic significance. The data show that total domestic revenue has increased significantly, rising from AFN 211.7 billion (USD 2.999 billion) in FY2023 to AFN 241.3 billion (USD 3.432 billion) in FY2024, indicating a high degree of revenue mobilization despite a limited economic environment. This enhancement is mainly motivated by strong growth in customs duties and taxes, which rose about 49 percent annually, underscoring the paramount role of border taxation and other trade-related income sources with limited external funding and sanctions. The growth in inland tax revenue is also significant, which implies a gradual improvement in internal tax collection and compliance. For FY2025, revenues are reported as a percentage of GDP, in line with the World Bank's reporting conventions, since nominal data are unavailable, and total domestic revenue is expected to be 17.1 percent of GDP. In general, the table shows a trend toward revenue-based fiscal stabilization, but it is still not substantially based on broad domestic tax capacity; instead, it relies on trade taxation.

4.6. Micro-Level Resilience and Household Fragility under Compound Crises

Evidence at the micro-level from Afghanistan in 2025 shows a deep decline in household financial strength, highlighting a significant breakdown in the relationship between macroeconomic stabilization and welfare outcomes. According to the results of the Whole of Afghanistan Assessment (WoAA), average per capita household income dropped by about 13 percent over the past year, and increasing living costs drove households to active borrowing, increasing the average per capita debt by about 30 percent to almost AFN 5,000 (71$) (UNOCHA, 2025b). This trend indicates a domestic liquidity trap, fueled by a high reliance on volatile sources of income, especially daily casual employment.

The stress in the labor market was directly converted into diminishing purchasing power. In November 2025, the nominal terms of trade for casual labor decreased by about 15 percent compared to the prior year, meaning real access to food was about 3.3 kilograms of wheat per day of labor. These processes support the development of micro-level real stagflation, in which falling real incomes are accompanied by low aggregate inflation, indicating a shortcoming in income transmission rather than price instability (WFP, 2025d; UNOCHA, 2025b).

With the lack of formal social protection and the decreasing humanitarian aid, households have had to resort to harmful coping mechanisms to meet basic needs. A 25 percent decline in UN cash payments or food aid was linked to a significant increase in the sale of distress assets, the use of predatory informal borrowing, and, in extreme situations, the sale of young girls and forced marriage as liquidity-generating measures (SIGAR, 2024). Such reactions not only relieve temporary consumption restraints but also permanently undermine long-term healing by robbing productive resources and human capital. Women's lack of access to education and employment also heightened the fragility of households, as approximately 80 percent of women were excluded from the economy and lost more than USD 1 billion (OCHA, 2025a; SIGAR, 2024).

Simultaneously, there appears to be a resilience paradox on the communal level. There are small yet significant improvements in adaptive capacity in assisted households in targeted humanitarian interventions. Based on the Resilience Capacity Index (RCI) of FAO and the E-RIMA model, it is estimated that by 2025, an average of 10 percent of resilience capacity will have increased among beneficiary households in nearly two-thirds, through increased access to basic services, asset accumulation, social networks, and livelihood diversification (FAO, 2025). Community-based organizations, especially cash-for-work programs, played a vital role in maintaining social cohesion and distributing resources in the absence of efficient formal institutions. However, such gains are fragile and strongly dependent on the sustainability of external funding, which confirms the description of Afghanistan's micro-level resilience as externally dependent and naturally unsustainable (OCHA, 2025d).

Table 10: Household Financial Fragility under Income Shocks: Debt Dynamics and Liquidity Traps in Afghanistan

Household Financial Status	2024 (Average)	2025 (Average)	Percentage Change
Per Capita Debt Level (AFN/USD)	3846 ($54)	5000 ($71)	+30
Debt-to-Income Ratio (Estimated)	**1.5**	**2**	+33

Source: UNOCHA, 2025b.

Table 10 shows that household financial resilience in Afghanistan has eroded sharply between 2024 and 2025, suggesting the emergence of a debt-based liquidity trap during income shocks. The household debt per capita rose by about 30 percent. Meanwhile, the debt-to-income ratio, which was previously estimated at 1.5, has increased to 2, indicating greater household borrowing to even out consumption amid falling and volatile incomes. This trend is an indicator of not a short-term adjustment but systemic financial vulnerability, in which income squeeze, labour market strains, and declining support subject households to an unaffordable accumulation of debt.

4.7. Discussion

The results of the research are highly aligned with the recent literature on economic resilience in the case of compound and persistent shocks, especially in vulnerable and conflict-ridden environments. Recent studies also argue that resilience should be viewed as a multidimensional process encompassing shock absorption, institutional mediation, and welfare transmission, rather than as macroeconomic stabilization (Ngono et al., 2025; Lazorec et al., 2023; Trippl et al., 2023). This conceptual difference can be clearly illustrated by the experience of Afghanistan in 2025.

The expected GDP growth driven by demographic pressure supports the growing evidence that indicators of aggregate growth may be deceptive in weak economies. Just as in the recent discoveries by Gomes et al. (2023) and Reuveni (2024), the growth in Afghanistan was not based on productivity gains or structural change but on a short-term demand boom driven by population inflows. The concurrent decline in GDP per capita shows that growth did not translate into better welfare and highlights the limitations of GDP-based explanations of resilience.

Macroeconomic price stability is also an indication of what recent scholarship describes as externally scaffolded or engineered resilience. Research emphasizes that external buffers can help temporarily stabilize inflation and exchange rates, especially in economies that rely on aid and those that are financially geographically isolated, but they are highly susceptible to external liquidity shocks (Ranger et al., 2021; Alessi et al., 2019). In Afghanistan's case, the role of UN-managed foreign currency inflows was central to sustaining low inflation and currency appreciation, reinforcing concerns about the fragility of stabilization mechanisms disconnected from domestic financial intermediation.

The micro-level deterioration of the labor market and the decline in purchasing power coincide with recent findings on the asymmetric welfare effects of compound shocks. It is shown that the shock, combined with the ineffectiveness of labor absorption capacity, disproportionately impacts labor-intensive households, resulting in crises of deteriorating real wages and food access in the absence of price spikes (Middelanis et al., 2023; Kuhla et al., 2021; Hallegatte et al., 2010). The fact that the terms of trade for casual laborers drastically declined in Afghanistan supports the idea that macro stability did not translate into household resilience.

Lastly, the costly reorientation of trade in Afghanistan to alternative corridors is indicative of broader analysis of global value chains and trade resilience. Although diversification can reduce exposure to politically constrained routes, logistical and institutional limitations can increase trade costs and create external imbalances (Pietrobelli et al., 2021; Miroudot, 2020). This trend aligns with previous results indicating that adaptation under constraint frequently balances flows at the expense of efficiency and competitiveness (Kitsos et al., 2016).

In general, the presented evidence confirms that the adaptation of Afghanistan to compound shocks was based mainly on the mechanisms of absorption and compression, but not adaptive or transformative resilience, which is the case in the entire literature on fragile states and limited policy spaces (Lagutin et al., 2020; Hu et al., 2021).

5. CONCLUSION AND RECOMMENDATIONS

The paper shows that Afghanistan's economic trend in 2025 presents a resilience paradox: it has stabilized its macroeconomic situation without improving welfare, labor-market conditions, or household resilience. Though aggregate indicators such as favorable GDP growth rates, low inflation, and stable exchange rates are indicative of a level of macroeconomic control, they signal adjustment to the impacts of demographic absorption, consumption compression, and externally assisted liquidity-based adjustment rather than a productivity- or inclusion-based economic recovery. As a result, GDP per capita declined, labor markets worsened, and households' purchasing power and food availability were significantly reduced. The analysis reveals that stability practices in Afghanistan are mostly independent of domestic productive and financial systems. Externally introduced liquidity is the key to monetary stability, and fiscal gains are mainly due to enforcement-based revenue collection and trade taxation, rather than economic growth in general. At the micro level, labor market saturation following the mass return of forcibly displaced migrants to the country of origin led to declining real wages, rising household indebtedness, and the adoption of harmful coping mechanisms. These dynamics affirm a failure of welfare transmission, in which macroeconomic stability fails to translate into better livelihoods or sustained human capital. Theoretically, the results advance the economic resilience literature by empirically distinguishing between stabilization resilience and welfare resilience in the context of compound and persistent shocks. The case of Afghanistan demonstrates an absorption-based resilience that maintains the existence of core macroeconomic activities while simultaneously strengthening structural vulnerability and welfare losses. This contravenes traditional understandings of stability as resilience and points to the risks of analysis depending on GDP growth or price stability as signs of recovery in weak and war-torn economies.

This distinction has direct policy implications. To enhance real fortitude in Afghanistan, the transition of externally reliant stabilization to a facility that restores welfare transmission and productive power is essential. Priority areas are employment creation through labor-intensive jobs, climate-resilient farmer investments, and increased cash-based social protection to stabilize incomes and food availability. Although external liquidity assistance is essential in the short run, it must be supported by credible financial governance reforms that would facilitate a gradual return to the international monetary system. The economic resilience of Afghanistan, however, will remain a mirage without such structural and welfare-oriented adaptation, supported by external scaffolding and population absorption, but highly susceptible to future shocks.

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THE IMPACT OF THE RULE OF LAW AND GENDER EQUALITY ON ECONOMIC GROWTH: A PANEL DATA ANALYSIS MEDIATED BY UNEMPLOYMENT AND POPULATION DYNAMICS

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ABSTRACT
Purpose- This study empirically investigates the impacts of structural factors including the rule of law, social capital, unemployment, and population growth rate on sustainable economic growth, utilizing a balanced panel dataset encompassing 34 developing and middle-income countries over the 2002–2022 period. By integrating institutional, social, and demographic dimensions, the research aims to elucidate how these elements shape long-term growth trajectories in heterogeneous emerging economies, addressing gaps in the literature on their interactive effects.
Methodology- Economic growth is proxied by the per capita gross domestic product (GDP) growth rate. Independent variables include the rule of law index, Women, Business and the Law Index score (as a measure of social capital), unemployment rate, and population growth rate. To address panel data challenges such as cross-sectional dependence, heteroskedasticity, and autocorrelation, the analysis employs a robust panel least squares method with panel-corrected standard errors (PCSE) under fixed effects specifications. Preliminary tests, including Pesaran's CIPS unit root and cross-sectional dependence tests, ensure model validity.
Findings- The results reveal that improvements in the rule of law and social capital indicators exert positive and statistically significant effects on growth, while unemployment and population growth exhibit negative influences. Specifically, a one-unit enhancement in the rule of law index boosts growth by 0.14%, and a similar rise in the social capital score contributes 0.13%. In contrast, a 1% increase in unemployment reduces growth by 13.7%, and population growth by 0.9%. The model's explanatory power ($R^2 = 0.478$) and absence of autocorrelation (Durbin-Watson = 2.066) affirm estimation reliability, with the Hausman test endorsing the fixed effects approach.
Conclusion- The findings underscore the imperative for institutional reforms and gender equality policies, alongside labor market interventions and demographic management, to foster sustainable growth. Prioritizing active employment programs, education investments, and controlled migration strategies can promote inclusive development. Future research may explore sectoral heterogeneity and climate interactions via dynamic models, such as GMM, to refine policy insights.

Keywords: Rule of law, unemployment, population growth, economic growth, panel data analysis.
JEL Codes: O11, J11, K40

1. INTRODUCTION

The dissemination of economic prosperity to broad segments of society and the establishment of equitable income distribution represent fundamental objectives of modern socio-economic development. In achieving these goals, law and economics assume a central role as two fundamental disciplines that interact reciprocally and complement one another. A historical examination reveals that, from ancient regulations such as the Code of Hammurabi to the complex international agreements of today, the legal framework has consistently been intertwined with economic elements (Çevik, 2007). Law structures life as a comprehensive body of rules, while economics seeks to fulfill the foundational layers of Maslow's hierarchy of needs (such as hunger and thirst) for individuals and society. This intersection delineates the societal roles of law, which defines rights and obligations, and economics, which examines assets and necessities (Türkbağ, 2003). Processes of production, exchange, and consumption fall within the domain of economics, whereas the cycles of rights and debts arising in commercial relations pertain to law. This interaction is grounded in statutes and regulations that govern the behaviors of market actors (Savatier, 1980; Savaş, 1993).

Beyond this institutional legal-economic framework, population dynamics constitute a critical factor shaping macroeconomic growth. Economists have historically viewed population growth from contrasting perspectives: as an optimistic force that fosters economic expansion by enlarging the labor force and accelerating technological progress (Kremer, 1993), and as a pessimistic factor that intensifies resource scarcity while constraining per capita income growth (Malthus, 1798). Thirlwall

(1994) draws attention to the complex nature of this relationship, while the demographic transition model (Cleland, 2013; Lee, 2003) anticipates changes in population structure through declines in mortality and fertility rates, leading to aging populations. These shifts in population composition directly influence poverty levels, exerting a determining impact on areas such as socio-economic growth, environmental sustainability, and social stability (Günsoy & Tekeli, 2015; UNFPA, 2014; Gu et al., 2021). In this context, the analysis of population dynamics, particularly at the macro level, is essential for understanding their implications for economic growth and informs the design of effective regional development strategies and efficient resource allocation (Güneş, 2005).

Economic growth, defined as the continuous increase in the production of goods and services, serves as the primary mechanism for enhancing societal welfare; however, the unemployment rate remains one of the most significant barriers to its equitable dissemination. Okun's Law demonstrates a strong negative correlation between economic growth and the unemployment rate, while empirical studies (Konya, 2006) confirm that growth generates new employment opportunities, supporting a long-term causal relationship. Within this cycle, the role of female employment is strategic. Although global industrialization has increased women's participation in the labor force, in societies such as Turkey, patriarchal mindsets and societal roles continue to keep these rates low (Ecevit, 2010; Ak, 2021). Nevertheless, increasing female employment fosters sustainable economic growth by generating macroeconomic and social benefits, including greater economic independence for women, advancement in gender equality, poverty reduction, and potential improvements in household savings rates that may contribute to mitigating current account deficits (BETAM, 2010).

In recent years, enhancing female employment in Turkey has been recognized as one of the core elements of sustainable economic growth and inclusive development. According to data from the Turkish Statistical Institute (TUIK), in 2024, the employment rate for women aged 15 and over stood in the range of 31.3%-32.5%, while the labor force participation rate reached approximately 35%-36.8%; the corresponding rates for men were around 65%-67% (TUIK, 2025a; TUIK, 2025b). The OECD's 2025 Economic Surveys: Türkiye report emphasizes that removing the primary barriers to women's labor market participation particularly unpaid care and domestic work burdens as well as societal normscan significantly enhance medium-term growth potential and foster a more inclusive economic structure (OECD, 2025). Similarly, the International Monetary Fund's 2024 study indicates that closing gender-based labor market gaps in Türkiye would strengthen medium-term growth, reduce informal employment rates, and contribute to a more equitable income distribution (IMF, 2024). In light of these developments, raising female employment is of strategic importance not only for women's economic independence and poverty reduction but also for improving household savings rates and exerting positive effects on the current account balance, thereby supporting sustainable growth.

In conclusion, the capacity to manage the pressures arising from population dynamics, together with the optimization of the relationship between economic growth and unemployment, is directly linked to the institutional assurances provided by the rule of law. Robust legal regulations, particularly those promoting female employment, exert a positive influence on the economic growth unemployment cycle and highlight the necessity of simultaneously implementing judicial reforms and demographic investments within policy frameworks. This study aims to examine in depth the interactions among the legal framework, population dynamics, and female employment in relation to economic growth and stability.

2. LITERATURE REVIEW

In this section, the empirical literature from the 2002-2022 period, which examines the relationships between sustainable economic growth (KGDP), the rule of law (RUL), population growth rate (POP), social capital (WBL, based on the Women, Business and the Law Index), and unemployment (UNEMP), is systematically addressed. The literature emphasizes the individual and interactive effects of these variables through methods such as panel data analyses and meta-regression, highlighting the integrated role of institutional quality (rule of law) and structural factors in influencing growth, while producing heterogeneous results. Determining the true effects thus emerges as a priority.

The empirical literature yields heterogeneous findings on the relationship between population growth rate and economic growth, investigated through panel data analyses and causality tests. In developing countries, findings commonly indicate that population growth negatively affects economic growth; for instance, studies by Thirlwall (1972) and Headey and Hodge (2009) demonstrate that a 1% increase in population reduces per capita GDP by 0.7-1%, attributing this to resource pressures and dependency ratios. In contrast, positive relationships predominate in Asia-focused panels; Bloom et al. (2003) found that population growth (specifically, increases in the working-age population) supported GDP growth by up to 2% during the 1965-1990 period, interpreted as evidence of the demographic dividend.

Causality analyses illuminate the direction of this relationship. Islam and Farid (2014) identified bidirectional causality in a panel of 111 countries, emphasizing that population growth influences economic growth, and economic growth, in turn, affects population dynamics. Similarly, in testing the Malthusian hypothesis, Crafts and Mills (2009) found a long-term neutral relationship in 19th-century data, indicating that population growth neither causes nor results from per capita GDP. Studies specific to developing countries address the relationship conditionally; for example, Azam and Khan (2016) confirmed the negative effect of population growth in an African panel but highlighted its moderation by education levels. In the case of

Singapore, low population growth (balanced by immigration) has been observed to support high economic growth (Lee and Lee, 2022).

Post-pandemic studies extend the relationship to climate and migration contexts; for instance, high population growth is noted to increase growth costs under climate pressures (Stern et al., 2022).

In the Turkish literature, the relationship is examined using panel data methods, with a predominance of Turkey-focused studies. Tiryaki and Ekinci (2023) found, through ARDL bounds testing for 1968-2019, that population exerts a positive long-term effect on growth, with life expectancy playing a positive moderating role. Dikmen (2022) detected no causality between growth and population via Granger causality tests for 2000-2021; Coşkun Yılmaz (2023) confirmed population's positive effect on growth using Johansen cointegration for 1980-2021. Kaur (2023) identified positive causality from population to growth in an Indian panel; Lianos et al. (2023) reported, in a PMG estimator for 19 countries, that population decline positively affects GDP. Mihajlović and Miladinov (2024) emphasized, via PMG in eight developing economies, the negative impact of old-age dependency ratios on GDP; Demir and Özkaya (2024) analyzed, using mean group dynamic OLS in 25 high-income countries, the negative effect of the 65+ population on growth.

Lorizio and Gurrieri (2013), in their study on the Italian case, underscore that an economy's growth depends not only on economic factors but also on institutions and citizens' trust in those institutions. Differences between public policies and institutions are regarded as one of the most critical elements in explaining wide variations in per capita growth rates and levels across countries. Among the institutions influencing economic growth, the legal and judicial system stands out as the most determinant. In modern economies, understanding how laws and regulations shape economic behavior is of critical importance. Telli (2014) notes that the UN Millennium Development Goals evolved to incorporate principles of the rule of law and democratic society alongside economic concerns, establishing a link between sustainable human development and the rule of law. UN documents affirm that sustainable development cannot be achieved independently of the rule of law and human rights; the post-2015 Development Agenda shifted from an economy-focused approach to a rights- and law-centered framework. This reflects the full international consensus on the three-way positive proportional relationship among sustainable development, human rights, and the rule of law.

This situation reflects the full international consensus on the three-way positive proportional relationship among sustainable development, human rights, and the rule of law. Recent empirical studies further substantiate this consensus; for example, Uddin et al. (2023) confirm that institutional quality and the rule of law not only promote economic growth but also minimize macroeconomic instability factors such as unemployment (UNEMP). Furthermore, improvements in women's legal rights as a manifestation of social capital (reflected in the Women, Business and the Law [WBL] index) have been shown to accelerate structural transformations in labor markets, thereby contributing directly to sustainable economic growth (KGDP) (World Bank, 2024).

3. DATA AND METHODOLOGY

The dataset utilized in this study has been compiled from the World Bank's open-access database (World Development Indicators - WDI and related indicators). The data forms a balanced panel structure covering the period from 2002 to 2022, collected at an annual frequency for the following 34 countries: Australia, Austria, Belgium, Canada, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Iceland, Ireland, Israel, Italy, Japan, Latvia, Lithuania, Luxembourg, Malta, Netherlands, New Zealand, Norway, Portugal, Singapore, Slovak Republic, Slovenia, Korea (Rep.), Spain, Sweden, Switzerland, United Kingdom, United States. These countries have been selected with a primary focus on developing and middle-income economies, thereby ensuring a heterogeneous sample diversity. Economic growth (KGDP) is employed as the dependent variable; the independent variables are defined as unemployment (UNEMP), population growth rate (POP), social capital indicator (WBL), and rule of law (RUL). These variables represent the economic, social, and institutional dimensions of sustainable growth, aligning with standard metrics in the literature.

The following table summarizes the definitions, measurement units, and sources of the variables:

Table 1: Variables Used and Their Sources

Variable	Description	Source
KGDP	Per capita gross domestic product (constant 2015 US dollars)	World Bank
UNEMP	Total unemployment rate (as a percentage of total labor force) (ILO estimate)	World Bank
POP	Population growth rate (annual %)	World Bank
WBL	Women, Business and the Law Index Score (1-100 scale)	World Bank
RUL	Rule of Law: Percentile Rank	World Bank

The descriptive statistics presented in Table 2 below summarize the variables KGDP (per capita GDP growth rate), RUL (rule of law index), WBL (Women, Business and the Law Index score), UNEMP (unemployment rate), and POP (population growth rate). These statistics are based on a balanced panel dataset covering the period 2002–2022 (680 observations, 34 countries), reflecting the central tendency, distribution, and degree of variation in the variables.

Table 2: Descriptive Statistics

Variable	Number of Observations	Mean	Std. Dev.	Min	Max
KGDP	680	0.0163	0.0367	-0.1583	0.2106
RUL	680	0.0048	1.9043	-9.4097	9.0909
WBL	680	0.7390	2.0677	-9.375	17.5
UNEMP	680	-0.0134	0.1686	-0.4645	0.9097
POP	680	0.0151	0.5150	-3.8584	7.4790

The mean value of the KGDP (Per Capita GDP Growth Rate, Constant 2015 US Dollars) variable (0.0163) indicates a growth rate of 1.63% over the period, reflecting the moderate performance of developing economies. The standard deviation (0.0367) maintains volatility at a moderate level; the minimum (-0.1583) and maximum (0.2106) values highlight economic shocks (e.g., the 2008 crisis or the pandemic) and recovery phases. This distribution provides sufficient variation for testing the sustainable growth hypothesis and is suitable for elucidating cyclical dynamics in panel models.

The mean value of the RUL (Rule of Law Index, Percentile Rank) variable (0.0048) indicates a slight improvement trend in the rule of law; however, the high standard deviation (1.9043) reflects inter-country heterogeneity (institutional reforms versus declines). The minimum (-9.4097) and maximum (9.0909) values represent periods of political instability and reform successes, supporting the long-term institutional effects emphasized in studies such as Kaufmann, Kraay, and Mastruzzi (2009).

The mean value of the WBL (Women, Business and the Law Index Score, 1-100 Scale) variable (0.7390) implies progress in gender equality indicators; the standard deviation (2.0677) highlights variations in the pace of reforms. The range from minimum (-9.375) to maximum (17.5) encompasses instances of legal regression and advancement; according to World Bank analyses (Amin et al., 2019), this provides critical variation for modeling the indirect effects that enhance women's employment and growth potential.

The negative mean value of the UNEMP (Total Unemployment Rate, ILO Estimate) variable (-0.0134) reflects a slight downward trend in unemployment over the period, while the standard deviation (0.1686) emphasizes cyclical fluctuations (recessionary increases). The minimum (-0.4645) and maximum (0.9097) values symbolize employment recoveries and losses; in the context of Okun's Law (Ball et al., 2013), this relationship is suitable for testing the inverse growth-employment linkage.

The mean value of the POP (Annual Population Growth Rate) variable (0.0151) indicates a population increase rate of 1.51%; the high standard deviation (0.5150) reflects demographic heterogeneity (differences in migration and fertility). The range from minimum (-3.8584) to maximum (7.4790) covers population contractions and surges; according to the demographic dividend hypothesis (Bloom et al., 2008), this variable will help illuminate the contributions of the working-age population to growth.

The correlation matrix presented in Table 3 symmetrically summarizes the linear relationships among the KGDP (per capita GDP growth rate), RUL (rule of law index change), WBL (Women, Business and the Law Index score change), UNEMP (unemployment rate change), and POP (urbanization rate change) variables.

Table 3: Correlation Matrix

	KGDP	RUL	WBL	UNEMP	POP
KGDP	1.000				
RUL	0.156	1.000			
WBL	0.052	0.085	1.000		
UNEMP	-0.606	-0.071	0.067	1.000	
POP	0.041	-0.000	0.024	-0.245	1.000

The strong negative correlation between KGDP and UNEMP (-0.606) distinctly confirms the classic inverse relationship between economic growth and unemployment. A 1% increase in the growth rate exhibits a tendency to reduce unemployment changes by approximately 0.6%; this finding reflects the cyclical dynamics of the panel dataset while emphasizing the critical role of labor markets in growth. Similar negative correlations in the literature indicate that labor force flexibility supports macroeconomic stability (Ball et al., 2013).

On the other hand, the weak positive correlation between KGDP and RUL (0.156) suggests that improvements in the rule of law mildly support economic growth and imply its indirect effects in promoting investments and contract reliability through institutional quality. This weak relationship signals that the rule of law functions as a long-term factor; studies such as Kaufmann, Kraay, and Mastruzzi (2009) note that such connections strengthen over time in developing economies. Similarly, the very weak relationships between KGDP and WBL and POP (0.052 and -0.123, respectively) demonstrate the minimal positive link between the social capital indicator (DSCO) and growth, reflecting the indirect contributions of gender equality reforms (WBL Index) (e.g., through women's employment) (Amin et al., 2019). POP's mildly negative correlation highlights the short-term resource pressures from population growth; however, it carries potential for a demographic dividend in the long term (Bloom et al., 2008).

4. FINDINGS AND DISCUSSIONS

In this study, the dependent variable is defined as the Gross Domestic Product growth rate (KGDP); the independent variables are the unemployment rate change (UNEMP), population change (POP), social capital indicator (WBL), and rule of law index change (RUL). It is expected that WBL and RUL will have a positive directional effect on the dependent variable; the others (UNEMP and POP) are anticipated to have a negative directional effect. The estimated econometric model is as follows:

$$DLGDP_{it} = \beta_0 + \beta_1 EDLUNEMP_{it} + \beta_2 DPOP_{it} + \beta_3 DWBL_{it} + \beta_4 DRUL_{it} + \varepsilon_{it} \quad (1)$$

This research utilizes a panel dataset constructed from data for 34 developing countries over the period 2002–2022, employing panel data methods in the analysis process. Prior to proceeding to model estimations, the basic assumptions affecting the validity of panel data analysis have been evaluated through various preliminary tests. First, to detect possible contemporaneous correlations among panel units, the cross-sectional dependence test (CD Test) developed by Pesaran (2004) has been applied. To examine the stationarity levels of the variables, the Pesaran CIPS test (2007), one of the second-generation unit root tests that accounts for dependencies between panel units, has been preferred. The advantage of this test is its ability to yield consistent results even in the presence of cross-sectional dependence in the panel.

Table 4: Pesaran CIPS Panel Unit Root Test Results

	Level		**First Difference**	
	Constant	With Trend	Constant	With Trend
KGDP	-1.245	-1.591	-3.019***	-3.229***
RUL	-1.893	-2.940***	-3.707***	-3.879***
WBL	-2.861***	-3.185***	-4.087***	-3.967***
UNEMP	-1.972	-2.135	-3.050***	-3.048***
POP	0.305	0.076	-3.159***	-3.338***

Note: Significance levels: *** p < 0.01, ** p < 0.05, * p < 0.10.

The Pesaran (2007) CIPS panel unit root test, as a second-generation method accounting for cross-sectional dependence, has been used to evaluate the stationarity levels of the variables in the panel dataset. The null hypothesis (H_0) of the test indicates the presence of a unit root (non-stationarity) in the variables, while negative statistic values and significance levels (*** p < 0.01) reject stationarity and support the alternative hypothesis (H_1: Stationarity). Table 4 presents the level and first-difference models for KGDP (per capita GDP growth rate), RUL (rule of law index), WBL (Women, Business and the Law Index score), UNEMP (unemployment rate), and POP (population growth rate), under constant and trend specifications.

In the level analyses, the stationarity of the variables is generally not rejected. For KGDP, the statistics are -1.245 (constant model) and -1.591 (trend model), which fall beyond the significance threshold; similarly, UNEMP (-1.972 and -2.135) and POP (0.305 and 0.076) support the stationarity hypothesis, meaning they can be considered I(0) at the level. For RUL and WBL, partial stationarity is observed, with RUL stationary in the trend model (-2.940***) and WBL in both models (-2.861*** and -3.185***). These results imply that most variables at the level exhibit integrated processes (I(1)) and that the panel's cyclical dynamics (e.g., economic shocks) delay stationarity.

In the first differences, all variables strongly reject the stationarity hypothesis, producing consistent results across constant and trend models. The statistics for KGDP (-3.019*** and -3.229***), RUL (-3.707*** and -3.879***), WBL (-4.087*** and -3.967***), UNEMP (-3.050*** and -3.048***), and POP (-3.159*** and -3.338***) fall below the critical values and are significant at p < 0.01. This confirms that the variables become I(0) stationary in the first differences, validating the stationarity assumption achieved through the logarithmic differencing (Δ log) transformations applied in the study.

Overall, the findings strengthen the reliability of the panel data model; the I(1) integration at the level, transitioning to stationarity in the first differences, eliminates risks in regression estimations. In the literature (e.g., Kaufmann, Kraay and Mastruzzi, 2009), similar results in panel structures support the integration of institutional and demographic variables (RUL, POP) into growth dynamics (KGDP).

Table 5: Panel Least Squares Estimation Results

Variable	**Coefficient (Std. Error)**	**t-Statistic**	**p-Value**
RUL	0.0020*** (0.0006)	3.444	0.001
WBL	0.0016** (0.0005)	2.918	0.004

UNEMP	-0.138*** (0.0067)	-20.434	0.000
POP	-0.008*** (0.0022)	-3.760	0.000
Constant	0.013*** (0.0012)	11.504	0.000
Number of Observations	680	-	-
R^2	0.399	-	-
Adjusted R^2	0.396	-	-
F-Statistic	112.10 ($p < 0.001$)	-	-
Durbin-Watson	1.811	-	-

Note: Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

The Panel Least Squares model estimates RUL (rule of law), WBL (Women, Business and the Law Index), UNEMP (unemployment rate), and POP (population growth rate) as independent variables for the dependent variable KGDP (GDP growth rate). The model is based on a balanced panel dataset of 680 observations (34 countries, 2003–2022 period) and indicates strong explanatory power through overall fit statistics. The R^2 value of 0.399 shows that the model explains 39.9% of the variation; the adjusted R^2 (0.396) confirms consistent fit after accounting for the number of parameters. The F-statistic (112.10, $p < 0.001$) highly affirms the overall significance of the model, while the Durbin-Watson value (1.811) indicates low autocorrelation risk (close to 2).

The independent variable coefficients produce significant results parallel to the hypotheses. The RUL coefficient (0.0020***, t = 3.444, p = 0.001) implies that a 1-unit improvement in the rule of law increases GDP growth by 0.20%; this supports the indirect effects of institutional quality in promoting investments (Kaufmann, Kraay, and Mastruzzi, 2009). The WBL coefficient (0.0016**, t = 2.918, p = 0.004) measures a 1-unit increase in the gender equality score as contributing 0.16% to growth, emphasizing the indirect role of women's employment (Amin et al., 2019). The UNEMP coefficient (-0.138***, t = -20.434, p = 0.000) confirms, in line with Okun's Law , that a 1% increase in unemployment reduces the growth rate by 13.8%; this reflects the cyclical sensitivity of labor markets (Ball et al., 2013). The POP coefficient (-0.008***, t = -3.760, p = 0.000) shows that a 1% increase in population growth reduces the growth rate by 0.8%; this highlights short-term demographic pressures (resource allocation) and implies the conditional nature of the demographic dividend hypothesis (Bloom et al., 2008). The constant term (0.013***, t = 11.504, p = 0.000) reflects an uncontrolled growth trend of 1.3%.

The findings indicate that the model is economically consistent and that sustainable growth can be reinforced with institutional factors (RUL, WBL), while unemployment (UNEMP) and population dynamics (POP) require management.

The Hausman test (1978) results have been applied to evaluate the choice between fixed effects and random effects models. The test statistic is calculated as 14.7125, with a corresponding p-value of 0.0053. This value rejects the null hypothesis (consistency of the random effects model) at the 5% significance level and supports the preference for the fixed effects model. This finding implies that individual heterogeneity in the panel dataset (country-specific differences) may affect model estimations and that the fixed effects approach controls for this effect more effectively.

Table 6: PSCE Standard Errors Test Results

Variable	Coefficient (Std. Error)	t-Statistic	p-Value
RUL	0.0014** (0.0006)	2.381	0.018
WBL	0.0013** (0.0005)	2.507	0.012
UNEMP	-0.137*** (0.0068)	-20.050	0.000
POP	-0.009*** (0.0024)	-3.845	0.000
Constant	0.014*** (0.0011)	12.125	0.000
Number of Observations	680	-	-
R^2	0.478	-	-
Adjusted R^2	0.448	-	-
F-Statistic	15.911 ($p < 0.001$)	-	-
Durbin-Watson	2.066	-	-

Note: Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

The RUL coefficient (0.0014**, t = 2.381, p = 0.018) implies that a 1-unit improvement in the rule of law increases GDP growth by 0.14%; this reflects the indirect effects of institutional quality in supporting investments and contract reliability (Kaufmann, Kraay, and Mastruzzi, 2009). The WBL coefficient (0.0013**, t = 2.507, p = 0.012) measures a 1-unit increase in the gender equality score as contributing 0.13% to growth, emphasizing the role of women's employment in inclusive growth (Amin et al., 2019). The UNEMP coefficient (-0.137***, t = -20.050, p = 0.000) confirms, in line with Okun's Law, that a 1% increase in unemployment reduces the growth rate by 13.7%; this highlights the cyclical sensitivity of labor markets (Ball et al., 2013). The POP coefficient (-0.009***, t = -3.845, p = 0.000) shows that a 1% increase in population growth reduces the growth rate by 0.9%; this implies short-term demographic pressures (resource allocation and infrastructure burden) and supports the conditional nature of the demographic dividend hypothesis (Bloom et al., 2008). The constant term (0.014***, t = 12.125, p

= 0.000) reflects an uncontrolled growth trend of 1.4%. Additionally, the overall fit statistics indicate that the model explains 47.8% of the variation ($R^2 = 0.478$) and provides consistent fit after parameter adjustment (adjusted $R^2 = 0.448$); the F-statistic (15.911, $p < 0.001$) confirms overall significance, and the Durbin-Watson value (2.066) verifies low autocorrelation risk.

The findings demonstrate that the PCSE correction reduces standard errors, enhancing the robustness of the estimations and confirming the model's economic consistency. It is emphasized that sustainable growth can be reinforced with institutional factors (RUL, WBL), while unemployment (UNEMP) and population dynamics (POP) require proactive management.

5. CONCLUSION AND IMPLICATIONS

The dataset utilized in this study has been compiled from the World Bank's open-access database (World Development Indicators - WDI and related indicators). The data forms a balanced panel structure covering the period from 2002 to 2022, collected at an annual frequency for the following 34 countries: Australia, Austria, Belgium, Canada, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Iceland, Ireland, Israel, Italy, Japan, Latvia, Lithuania, Luxembourg, Malta, Netherlands, New Zealand, Norway, Portugal, Singapore, Slovak Republic, Slovenia, Korea (Rep.), Spain, Sweden, Switzerland, United Kingdom, United States. These countries have been selected with a primary focus on developing economies, thereby ensuring a heterogeneous sample diversity.

All variables have been standardized and transformed into logarithmic differenced (Δ log) form to achieve stationarity; this process strengthens model estimations by accounting for time-series properties. However, variables with limited scales, such as the rule of law (RUL) and social capital indicator (WBL) (in percentile rank and 1-100 index forms, respectively), along with the population growth rate (POP, annual %), have not been subjected to logarithmic transformation; this approach aligns with the literature, which standardizes the direct use of bounded indicators in linear regression models. Economic growth (KGDP) is employed as the dependent variable; the independent variables are defined as unemployment (UNEMP), population growth rate (POP), social capital indicator (WBL), and rule of law (RUL). These variables represent the economic, social, and institutional dimensions of sustainable growth, aligning with standard metrics in the literature.

The findings reveal that sustainable growth is also contingent upon institutional and social elements. From a policy perspective, reforms aimed at strengthening the rule of law (contractual reliability and judicial independence) and gender equality-focused policies (legal regulations to improve the WBL Index) can enhance growth potential. To manage unemployment and population pressures, active employment programs, skills development initiatives, and controlled migration policies should be prioritized; for instance, education investments to maximize the demographic dividend could reverse the negative effects of population growth by 0.5–1 percentage points (Bloom et al., 2008).

Future research could extend this model through dynamic panels (e.g., GMM) that incorporate sectoral employment distribution, the moderating role of female and youth labor forces, or the interaction between population growth and climate change. Analyses of the micro-level effects of informal employment or heterogeneity across geographic subgroups (e.g., Europe vs. Asia) would offer policymakers more nuanced insights. In conclusion, this study once again demonstrates that addressing structural factors within an integrated framework is the key to sustainable development in developing economies.

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THE EFFECT OF MILITARY SPENDING EXEMPTIONS FROM FISCAL RULES ON PUBLIC DEBT IN THE EUROPEAN UNION

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ABSTRACT

Purpose- The research fills a serious policy gap by quantitative empirically determining the macro-fiscal effect of the exemption of military spending by the Stability and Growth Pact (SGP) rules of the European Union on the sustainability of public debt. The study is driven by the political argument of the year 2022 on whether defense expenditure or fiscal prudence should be given priority.
Methodology- The study is done using a balanced panel data of 27 EU member countries between the years 2000 and 2023. This methodology is quite stringent with the start of the diagnostic tests, the Pesaran CD test of cross-sectional dependence, and the Westerlund Cointegration Test, which proved the existence of a long-run equilibrium relationship between the variables. The primary model is a Fixed-Effects (FE) estimator to adjust to unobserved heterogeneity that the final results would be based on Driscoll-Kraay (1998) robust standard errors to address the documented cross-sectional dependence and serial correlation. The fundamental component of the model is an interaction term (Military Expenditure times Exemption Dummy) that aims at capturing the impact of the institutional change.
Findings- The empirical findings are very convincing in terms of their support to the hypothesis of the study. The interaction term is positive and quite significant ($p < 0.01$), which indicates that the process of exempting military expenditure on the SGP rules causes its effect on the accumulation of public debt to be significant. Although the baseline FE model proved to be fragile in certain control variables (e.g., GDP growth), the strong Driscoll-Kraay estimates prove that the impact of the institutional change is statistically dependable. Moreover, the control variables are also analyzed, which proves that both the government spending and the role of inflation as a debt-reducing factor have a very strong positive impact.
Conclusions: The paper comes to the conclusion that the policy option of bending the rules to spend on defense is not a fiscally neutral option, but has a quantifiable price in the form of sustaining debts. The results send a very strong signal to the SGP, with its credibility under attack, and it urges policymakers in the EU to focus on other methods of financing transparency, including common EU defense funds, rather than exemptions in an ad-hoc fashion. This study adds a well-timed, methodologically sound study to the current argument about the security necessity versus the fiscal stability of the Eurozone in the long term.

Keywords: Military expenditure exemptions, panel data analysis, EY fiscal rules, debt sustainability, public debt dynamics
JEL Codes: H56, H63, E62

1. INTRODUCTION

The Stability and Growth Pact (SGP) is the cornerstone of the fiscal architecture of the European Union, which is based on institutional and economic integration. Strict restrictions on public debt and budget deficits are imposed by the SGP, which was created to guarantee budgetary discipline among member states. This framework has been a source of stability as well as a hot topic of discussion (Blanchard et al., 2021). But after the conflict in Ukraine in 2022, the geopolitical landscape drastically changed, posing the EU's biggest security challenge in decades. To meet NATO's 2% of GDP target and strengthen collective defence capabilities, there is a broad and urgent consensus that significant increases in military spending are necessary (Tian, 2023).

The EU's strict fiscal regulations and the need to boost military spending have collided, resulting in a fundamental policy conundrum that is commonly summed up as "Guns vs. Debt Ceilings." On the one hand, there is a serious security risk associated with not increasing defence spending. However, funding this increase through conventional borrowing might force many member states—especially those with high levels of debt—to violate the SGP, which could lead to market pressure and financial instability (Darvas, 2022). A ground-breaking policy debate has arisen in response to this tension: should military spending be given a special status, thereby exempting it from the SGP's debt and deficit calculations? Critics caution that such an exemption could set a risky precedent, damage the credibility of the entire fiscal framework, and open a "Pandora's box" of demands for similar treatment for other policy areas like social investment or climate change. Proponents contend that this is a necessary measure in extraordinary times.

The work aims to address a significant gap in the current literature by conducting the first serious empirical study of the impact of the statutory exemption for military spending on public debt in the European Union. Based on an extensive panel dataset that includes member states, we build on the traditional frame of analysis by considering the exemption as such, i.e., as a salient institutional change, to be a part of the explanatory variables. By using a fixed-effects specification with Driscoll-Kraay heteroscedasticity- and autocorrelation-robust standard errors to address the cross-country dependence problem, the analysis not only measures the baseline effect of defence expenditure on debt accumulation, but, more to the point, breaks down the effect of this relationship in an environment where fiscal constraints are being purposefully loosened to meet security demands. It is hoped that the expected outcomes can provide policy entrepreneurs with evidence-based suggestions in their machinations on the dangerous trade-offs between fiscal discipline and national security in the enrichment of the scholarly debate over Europe's nascent economic security architecture.

Within the framework of the inflexible institutional design dictated by the Maastricht requirement and the Stability and Growth Pact (SGP), the spiral of geopolitical tension has sparked a critical discussion about the legality and the wisdom of excluding the increasing military expenditures of the current fiscal paradigm. Despite the political connotations of this discussion being absolutely clear, the econometric analysis of the consequences of such a waiver is conspicuously lacking in the economic literature.

The mainstream literature (which, in most instances, has been limited to measuring the classical relationship between defence spending and the state debt) has so far failed to question the macro-fiscal implications of such a policy change. However, little serious attention has been paid to the long-term impact of such an exemption on the sustainability of debt, especially in nations where the level of indebtedness is high, or the possible spill-over effects that such an exemption has on fiscal credibility, inter-sectoral government spending, and the cost of debt in the capital market. This research gap, therefore, necessitates a shift away from the simplistic question: Does military spending affect public debt? to a more complex and sophisticated question: How does this effect vary when institutional rules governing it are changed?

This study is structured into six main sections. Section 1 introduces the research topic and outlines the study's objectives. Section 2 reviews the relevant literature on military expenditure and public debt. Section 3 describes the methodology, including the research design, data sources, and econometric techniques employed. Section 4 presents the empirical results derived from the statistical analysis. Section 5 discusses the findings, highlights the key challenges, and addresses the limitations of the study. Finally, Section 6 concludes the paper and offers policy implications and recommendations.

2. LITERATURE REVIEW

What remains in the extant literature on the nexus between military expenditure and civil debt is massed in their general aims, but differs on the issues of geographical focus, methodology, and empirical findings. In developed economies, the relationship between defence and debt has been studied mostly by providing scholarship on the relationship between defence and debt in European Union member states and the participants in the OECD. As an example, Bardakas et al. (2022) assessed the role of imports of defence equipment in the public debt of Greece and found that it did not make a significant difference, which contradicts the existing discourse that defence spending was the source of the debt crisis in the country. Equally, using a dynamic GMM framework in a cross-country study that considered the EU countries, Paleologou (2013) has established that military expenditure is a strong contributor to general government debt, thus justifying the perception of defence spending as a fiscal burden. The study by Nikolaidou (2016) indicated that short-term effects of military spending and arms imports increased Greek government debt (19702011), whereas investment turned out to create alleviation effects, and thus, it can be considered that the military-debt relationship is cyclical. Alexander (2013) extended the study to include OECD and NATO states with the Arellano Bond model and found the defence burden to be a statistically significant determinant of public debt and critiqued the literature that did not take into consideration the fiscal pressures associated with defence. In addition, Kollias et al. (2004) affirmed that internal and external debt (19602001) in Greece was negatively influenced by the high defence expenditure and by the political cycles. The same is confirmed by studies concerning smaller states in NATO, including the example published by Dudzevičiūtė et al. (2021), who show that the relationships are mixed and mostly inconclusive, which means that defence spending alone is not sufficient to explain the form of debt development in developed economies.

The correlation between military spending and debt seems to be more variable in developing and emerging nations. Azam and Feng (2017) illustrated the security-borrowing conundrum faced by developing nations by showing that military spending increases external debt in ten Asian nations, but that this effect is mitigated by economic growth and foreign reserves. Similarly, Esener and Ipek (2015) used Pooled OLS and dynamic panel estimations to find that increases in defence spending significantly raise external debt across 36 developing nations. According to Georgantopoulos's (2011) findings, there is no causal relationship between military spending and external debt in Tunisia, Algeria, or Morocco, but there is a strong unidirectional causal relationship between defence spending and external debt in Egypt, suggesting that the effects differ significantly between nations. In South America, Dunne et al. (2004) reported that military burden affected external debt only in Chile, not in Argentina or Brazil, implying that broader macroeconomic conditions may override defence-related effects. Additionally, Dunne (2003) confirmed that military burden positively impacts external debt in small industrialising economies, particularly when dynamic adjustments are considered. In addition, Khan et al. (2021) examined 35 major arms-importing countries using annual panel data (1995–2016), dividing the sample by income level (upper-middle and lower-middle) and by region (MENA, South and East Asia, Latin America, Europe and Central Asia, Sub-Saharan Africa). Using pooled mean group estimators, the study found that military expenditure generally increases external debt, although it decreases external debt in Europe and Central Asia. The interaction term between military expenditure and the growth rate was positive and significant in all sub-samples except upper-middle-income countries, MENA, and Latin America. Their findings suggest that military expenditure tends to increase the external debt burden, particularly in countries with weak debt management systems, highlighting the need for economic policies that limit defence spending and strengthen debt sustainability.

It is evident from this review that, despite their diversity, the previous studies share a key feature: they examine the relationship between military expenditure and debt within a relatively institution-free context. According to the researcher's knowledge, no study has analysed this relationship within a changing framework of fiscal rules—such as the current debate in the European Union regarding the possibility of exempting military expenditure from the constraints of the Stability and Growth Pact (SGP). Therefore, the research gap lies in moving beyond merely measuring the direct impact of military spending to analysing how this impact changes when the institutional rules governing fiscal policy are adjusted. This is precisely the contribution that the present study seeks to make.

The knowledge of this nexus is further improved and deepened by recent research. Bardakas et al. (2023) also researched Greece and applied a 3SLS model and a non-linear quadratic form to the military debt in terms of imports of military equipment instead of expenditures. They come up with the conclusion that the impact of the defense equipment purchased since the 1980s has little effect on the public debt in Greece, and these purchases are more of an investment and not a consumption activity. Abbasov (2024) estimated the world military expenditure (41 countries) and fiscal deficits (41 countries) based on SIPRI, IMF, and the World Bank data and found that the fiscal deficit is above 2 percent and growing at a pace of 0.1 to 0.3 percent of the debt-to-GDP ratio due to an increase in military spending by a state of 1 percent of the GDP. Harutyunyan (2023) tested Armenia (19942020) through the Johansen cointegration and Granger causality tests and revealed that there were long-term interdependencies between military expenditure and external debt, with military spending triggering debt increase after two years. Makun (2025) employed a linear and nonlinear bounds testing of the ARDL model to investigate Fiji (1992-2021) and discovered that the increment or contraction of military expenditure has asymmetrical impacts on domestic and international debt, with the former having a stronger effect on debts than the latter. Using an SVAR model, Olejnik and Kuna (2025) examined 21 EU-NATO member states (1995-2023) and found that military spending was initially financed by debt but eventually increased revenues and reduced other expenditures, which indicated the fiscal multipliers and policy consequences. Sadiq et al. (2023) considered Pakistan (1972-2021) with ARDL, and the results indicate that a 1 percent rise in defense spending results in a 6.81 percent rise in the external debt. Ondráčková et al. (2024) compared the Czech Republic and Lithuania (1999-2022) and discovered that military spending does not affect indebtedness in the Czech Republic but does affect it in Lithuania. Durucan and Yeşil (2022) used system GMM on 25 countries (2000-2019) and reported that defense expenditure has a significant impact on government debt, budget deficit, and current account deficit. Haydory et al. (2022) applied SVAR models to the United States (1947-2021) and established that both the dynamics of defense and non-defense spending are highly determined by the debt-to-GDP shocks. El-Naser et al. (2025) consider the countries of the European Union after 2000-2022, using the GMM method, and discover that military spending is one of the main determinants that add to the intensity of a public debt, in particular during the emergence of compound shocks, like the one due to the COVID-19 pandemic and the Ukraine war, and that there are definite indications of the persistence of the debt through lagged effects. Focusing on Nigeria during 1970-2020, with the ARDL method, Okwoche and Nikolaidou (2022) demonstrate that armed conflict and military expenditure create a positive and statistically significant influence on external debt and total government debt, whereas they do not have a significant effect on domestic debt, which implies that a country funds defense expenditures through external debt. The use of descriptive and multivariate statistics in Dudzevičiūtė et al. (2021) among small EU countries, which are members of NATO in 2005-2019, shows that the correlation between military spending and the dynamics of the public debt is not consistent: in some countries, it is negative and in others, it is positive, which can be interpreted as the fact that the dynamics of the military expenditure cannot fully explain the dynamics of the general level of public debt. In the case of fragile African states, i.e., over 2000-2023, Aschalew and Alemu (2025) use System-GMM and dynamic sophisticated models to find a nonlinear relationship, i.e., where military spending above a critical threshold becomes a large contributor to external debt accruals, which constitute what they termed as a fiscal security trap. Lastly, a panel of 20 developing countries over 1970-2019 allows Ghulam and Saunby (2023) to conclude that intermediate amounts of military spending can decrease the probability of sovereign default, but extreme spending results in high debt risk, especially in external form.

As can be seen in this review, the previous literature has mostly investigated the issue of military spending and debt in the context of institution-free settings, regardless of the methodological and regional variety. The relationship has not been studied in detail in relation to the effect of a shift in fiscal rules, including exemptions of military spending under the EU Stability and Growth Pact, on this relationship. Consequently, the research gaps are the ability to go beyond estimating the direct effects of military expenditures and examining the influence of institutional structures on the military spending-debt nexus, which the current study addresses.

3. DATA AND METHODOLOGY

This study examines the effect of Military Spending Exemptions on Public Debt in the EU. The analysis utilizes panel data and encompasses data from 27 EU member states: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, and Sweden, covering the period from 2000 to 2023.

Table 1 delineates the variables included in our model, along with their acronyms, units, and data sources utilized to elucidate the correlation between Military expenditure and public debt.

Table 1: Variables Utilized in the Model

Name of Variables	Abbreviation	Unit	Source
Dependent variables			
Public debt	Debt	%GDP	Eurostat 2000-2023
Independent variables			
Military expenditure	Milit	%GDP	World Bank 2000-2023
Gross domestic product per capita	gdp	%growth	World Bank 2000-2023
Inflation rate	Inf	%Average Consumer Price	World Bank 2000-2023
Government expenditure	Ge	%GDP	IMF 2000-2023
Primary balance	Pb	%Annual	AMECO 2000-2023
Post-2022 dummy variable	Exemption_dummy	0/1	The author's calculation
Interaction term (milit+dummy)	ME_x_Dummy	Derived variable	The author's calculation

At the first stage, we run the panel unit root tests before the main estimations, and we have done a set of panel unit root tests to establish the stationarity characteristics of the variables, which is a necessary step to prevent spurious regression. We used a multi-faceted testing strategy to ascertain the strength of our results. In the first instance, we used two first-generation tests, the Im, Pesaran, and Shin (IPS) test (2003), which allows heterogeneity in the autoregressive parameter within the panel, and the ADF-Fisher Chi-square test, which is a combination of the p-values of the individual Augmented Dickey-Fuller tests in the panel of interest (Maddala and Wu 1999). We, however, noted that due to the great possibility of cross-sectional dependence in our sample of EU countries, we also adopted a second-generation unit root test, the Cross-Sectionally Augmented Dickey-Fuller (CADF) test formulated by Pesaran (2007). This improved test is strong for the existence of cross-sectional dependence by adding the cross-sectional averages of the lagged levels and first differences of a solitary series to the ordinary ADF regression. In all the chosen tests, the null hypothesis is that the variable has a unit root (is non-stationary), and the optimal lag length was calculated with the help of the Bayesian-Schwarz Information Criterion (BIC).

After the unit root analysis, we have conducted a formal test on the presence of cross-sectional dependence (CSD) across the panels. With the degree of economic and financial integration among the member states of the EU being high, one country is likely to spill over to other countries in case a shock is experienced in one country. To examine this, we have used the Pesaran (2004) CD test, which is resistant to non-stationarity and heterogeneity. The null hypothesis of the test is the cross-sectional independence. The outcome of this test is important in that the presence of CSD would invalidate the assumptions of this standard panel regression and would require the use of estimation methods that would give robust standard errors, like Driscoll and Kraay's (1998) technique.

To assess the effect of the military spending exemption on the public debt, this paper uses a panel data method. The basic model is defined as a Fixed-Effects (FE) model, and it is shown in Equation. FE estimator is selected to adjust for any unobserved, time-invariant country-specific traits (e.g., institutional quality or historical situation) that could be correlated with both the regressors and the dependent variable, thus reducing the risk of omitted variable bias.

Nevertheless, due to the presence of a high probability of cross-sectional dependence in the panel as postulated by the Pesaran (2004) CD test, the standard errors of the traditional FE model could be subject to bias and inaccuracy. To solve this serious problem, the model is also estimated through the Driscoll and Kraay (1998) standard errors methodology. The result of this method is the generation of strong standard errors that have been adjusted for the existence of extremely broad types of cross-sectional dependence, heteroskedasticity, and serial correlation. Thus, the FE model can be used in obtaining the first estimates; the model that includes Driscoll-Kraay standard errors is deemed to be the most important and the strongest specification to perform the hypothesis test and make conclusions.

$$Debt_{it} = \beta_0 + \beta_1 \ln\_milit_{it} + \beta_2 GDP_{it} + \beta_3 inf_{it} + \beta_4 ge_{it} + \beta_5 pb_{it} + \beta_6 \text{Exemption\_dummy}_{it} + \beta_4 \text{ME\_x\_Dummy}_{it} + \varepsilon_{it} \quad (1)$$

Where Debt is the public debt, ln is the logarithm of the Military expenditure, ln. Increased military expenditure, particularly on the acquisition of arms, is more likely to result in more borrowing and accumulated debt, especially in the developing world. This adverse effect is possible since military spending tends to build a budget deficit that is financed through borrowing, thereby increasing the growth of public debt (Brzoska 1983; Looney 1989).

Moreover, the regression analysis includes the growth of GDP per capita as an indicator to determine the economic growth against the public debt. Imran (2016) also argues that the larger the economic growth, the higher the domestic revenue and the less the borrowed money will be necessary. Inflation rate (Inf) is included to measure its contribution to the dynamics of debt. Imran (2016) confirms that the rise in inflation reduces the value of debts by reversing the interest rates. Moreover, government spending or government expenditures (GE) may also increase faster in comparison with government revenues, necessitating borrowing and, accordingly, increasing the national debt, as elaborated by Uguru (2016). The primary balance (PB) is also incorporated into fiscal discipline, which makes a high or positive primary balance decrease the necessity to borrow funds and, accordingly, the level of public debt, and a negative primary balance increases debt (Hakkio and Rush, 1991).

To reflect the changes that may occur after 2022, I developed a post-2022 dummy variable (Exemption_dummy), which has a 1 = 2022 years and 0 = non-2022 years. Also, a term of interaction (ME_x_Dummy) was calculated, which was the product of the logarithm of ME with the dummy, and then the analysis could be performed to identify whether the impact of military expenditure on public debt varies in the post-2022 period.

Table 2 below presents the essential descriptors of the variables utilized across all EU27 countries from a statistical standpoint.

Table 2: Descriptive Statistics EU27 Countries

Variable	Obs	Mean	Std. dev.	Min	Max	Skewness	Kurtosis
Debt	648	60.09	35.49	3.8	207	1.0326	4.3454
ln_milit	647	0.2743	0.4534	-1.49	1.35	-0.9406	4.4127
Gdp	648	2.42	3.80	-14.8	24.5	-0.4274	6.9246
Inf	648	3.05	3.74	-1.7	45.7	4.4170	38.3469
Ge	621	0.2141	0.0191	0.1720	0.3315	1.0056	5.9846
Pb	648	-0.4867	3.30	-29.3	9.6	-1.3265	11.8346
Exemption_dummy	648	0.0833	0.2765	0	1	4.5873	22.0434
ME_x_Dummy	647	0.0360	0.1852	-1.49	1.34	5.9440	45.4316

As shown in Table 2, the descriptive statistics showed that the dataset employed in the model is a strong panel structure out of 648 observations. The average public debt as a percentage of GDP is 60.09, with a very large standard deviation of 35.49, which indicates that there is a great variation in the level of debt among the EU countries, with the lowest level of 3.8 to the highest level of 207. The average military spending (military spending after log transformation, ln military) is 0.2743, which means that the average military spending (military spending before the logarithm) is more than 1/4 of GDP. Macroeconomically, the average economic growth (GDP) is 2.42, and the average inflation (Inf) is 3.05, with some high outliers of up to 45.7, thus the necessity to use of strong means to bring about heteroskedasticity. In terms of government spending, the mean of Ge was 0.2141 (i.e., approximately 21.41 per cent of GDP), the standard deviation of which was very low (0.0191), which means that slight variations in government spending occurred among countries. The primary balance (Pb) has an average of -0.4867, indicating that, on average, governments have been operating with a primary deficit (i.e., spending more than they collect before paying interest), and the value of -29.3 to 9.6 indicates that there is a wide span of fiscal discipline across the states. The mean of the dummy variable (Exemption_dummy) is 0.0833, which is an indicator that the structural change period (2022 and above) is estimated to contribute about 8.33% towards the total period of the study. In the meantime, the interaction term (ME x Dummy) is 0.0360, which proves the fact that these variables record the overall impact of military expenditure in the given structural change.

4. FINDINGS AND DISCUSSIONS

Table 3 of the correlation indicated that the interaction term (ME_x_Dummy) is positively and significantly related to the public debt (Debt), both with the correlation coefficients of 0.0798 and 0.1678, respectively, and that the military expenditure (ln_milit) is positively and significantly related to the public debt(Debt), with the correlation coefficients of 0.0798 and 0.1678, respectively. This is in line with the hypothesis that the new post 2022 military spending environment is linked to high levels of debt. The correlations that the economic theory requires can also be affirmed by the matrix since the correlation of the public debt is strong and negative towards economic growth (GDP, the coefficient is -0.2620) and inflation (Inf, the coefficient is -0.2173), but it is positive towards general government expenditure (Ge, the coefficient is 0.1571). Concerning the relationships between the independent variables, the correlation between the interaction dimension (ME x Dummy) and its elements (ln milk and Exemption dummy) is within reasonable bounds (0.3060 and 0.6521), which proves that multicollinearity is not critical and that the model is suitable to be used in the advanced econometric analysis.

Table 3: Correlation Matrix EU27

	Debt	ln_milit	Gdp	Inf	ge	Pd	Exemption _dummy	ME_x_ Dummy
Debt	1.0000							
ln_milit	0.1678***	1.0000						
Gdp	-0.2620***	-0.1227***	1.0000					
Inf	-0.2173***	0.2274***	0.1310***	1.0000				
Ge	0.1571***	-0.1388***	-0.1306***	0.1609***	1.0000			
Pb	-0.1116***	-0.229***	0.3321***	-0.0221	-0.0963***	1.0000		
Exemption_dummy	0.0554	0.1093***	-0.0106	0.4693***	0.5019***	-0.0462	1.0000	
ME_x_Dummy	0.0798***	0.3060***	-0.0603	0.3642***	0.2958***	-0.0348	0.6521***	1.0000

Significance levels are indicated by *, **, and *** for 1%, 5%, and 10%, respectively.

Table 4 indicates that the panel unit root tests (IPS, ADF-Fisher, and CADF) results indicate that the variables employed in the study have mixed orders of integration. The results suggest that the economic growth (GDP) and inflation (Inf) are stationary at the level and therefore are of order zero (I (0)). However, in contrast, public debt (Debt), military expenditure (lnmilit), government expenditure (Ge), and the primary balance (Pb) do not have the level stationarity and are then statistically stationary on first differencing, which proves that they are of order one integrated (I (1)).

Table 4: Panel Unit Root Tests

Variables	IPS test	ADF fisher	CADF test
Debt	1.5442	56.56	-1.351
ln_milit	0.8091	71.66	-2.596***
Gdp	-11.695***	297.13	-5.796***
Inf	-5.253***	123.05	-5.488***
Ge	4.0195	34.54	-4.780***
Pb	-5.5753***	128.04	-0.745
Tests in first logarithmic differences 23.11			
Debt	-9.5979***	180.3***	-3.044***
ln_milit	-10.4309***	233.9***	-8.201***
Gdp	15.9033***	716.4***	-13.395***
Inf	-13.5526***	429.3***	-12.422***
Ge	-9.8390***	319.6***	-7.233***
Pb	-13.1928***	373.05***	-9.002***

***, **, * Indicate the rejection of the null hypothesis of a unit root at the 90%, 95%, and 99% significance levels, respectively, along with the critical values: −2.45 (1%), −2.25 (5%), −2.14 (10%)

The null hypothesis that there is no cross-sectional dependence is categorically rejected for every variable in the model, according to the Pesaran Cross-Sectional Dependence Test (Pesaran CD Test) results in Table 5, where the p-value for every variable is 0.000. This suggests that the 27 EU nations have a strong and statistically significant cross-sectional dependence, which means that shocks or changes in one nation have an impact on the others. Given the strong institutional and economic ties within the European Union, this kind of cross-sectional dependence is to be expected.

Table 5: Pesaran CD Test

Variables	CD-test	P-value	corr	abs (corr)
Debt	40.12	0.000	0.447	0.618
ln_milit	35.79	0.000	0.399	.0464
Gdp	59.12	0.000	0.659	0.689
Inf	68.22	0.000	0.760	0.760
Ge	70.28	0.000	0.784	0.801
Pb	39.85	0.000	0.444	0.453
Exemption_dummy	91.64	0.000	1.000	1.000
ME_x_Dummy	43.40	0.000	0.472	0.981

Note: The Pesaran (2004) CD test checks for cross-sectional dependence. Significant p-values indicate the presence of cross-sectional correlation among the units in the panel.

The baseline fixed-effects model (Column 1) indicates statistically significant relationships for the majority of variables, according to the estimation results in Table 6; however, these results may be skewed because cross-sectional dependence was not included. As a result, the more solid and trustworthy specification used in the study is the Driscoll–Kraay model (Column 2). The main conclusion of the analysis is revealed by the corrected results: the interaction term (ME_x_Dummy) shows a positive and highly significant coefficient (12.318, $p < 0.01$), confirming that during the exemption period, the relationship between military spending and public debt has fundamentally changed and become more positive. The statistical significance of other variables, such as GDP growth (GDP), vanishes, indicating that the effects of government expenditure (Ge) and inflation (Inf) on public debt were weak. The within R-squared of 0.1926 indicates that the model explains about 19.3% of the variation in public debt. Overall, the study's main hypothesis is supported by the strong results, which show that exempting military spending from fiscal regulations has, in fact, increased its impact on the accumulation of public debt in the countries included in the sample.

Table 6: Fixed Effects Estimates with Driscoll–Kraay Standard Errors

	Fixed effect		Driscoll kraay	
Dependent variable: Debt				
Variables	**Coef.**	**St. Err**	**Coef.**	**St. Err**
ln_milit	-9.5833	3.5748 ***	-9.5833***	5.4027
Gdp	-0.4647	0.1850***	-0.4647*	0.4641
Inf	-1.3364	0.2305***	-1.3364***	0.5541
Ge	268.8	44.34***	268.8***	122.13
Pb	-0.3152	0.2285*	-0.3152*	0.4976
Exemption_dummy	2.7597	3.4664*	2.7597*	6.8229
ME_x_Dummy	12.318	4.5063***	12.318***	3.7995
_cons	9.7864	9.4451*	9.7864*	25.54
Obs		620		620
R-squared		0.0442		0.1926
Prob		0.0000		0.0001
F statistic		19.97		7.59

Standard errors in parentheses. *, **, *** denote significance at 10%, 5%, and 1%, respectively.

5. CONCLUSION AND IMPLICATIONS

The purpose of this study was to examine a crucial and pertinent question at the nexus of security and fiscal policy: what is the impact on public debt of exempting military spending from EU fiscal regulations? The study offers a precise and reliable response by examining panel data for 27 EU member states from 2000 to 2023. Based on a Fixed-Effects model corrected with Driscoll-Kraay standard errors to ensure robustness against cross-sectional dependence; the main finding is that these exemptions have a real and negative effect. The analysis shows that although there is a complicated relationship between military spending and public debt, exempting it from fiscal regulations fundamentally changes this dynamic and greatly increases its beneficial impact on debt accumulation. Every percentage point increase in military spending during the exemption period contributed more to the public debt than it did before, as confirmed by the highly significant coefficient of the interaction term. This result implies that the "guns vs. debt ceilings" conundrum is a quantifiable fiscal reality rather than merely a theoretical trade-off.

The analysis's policy implications are substantial and have a big impact on EU policymakers. The results draw attention to the dangers of relaxing fiscal regulations by exempting particular spending categories. This could damage the Stability and

Growth Pact's credibility and pave the way for similar exemptions in other high-priority areas, endangering the coherence of the EU's fiscal framework. They also highlight the need for more sustainable and transparent financing options, like creating a European Defence Fund, issuing joint EU security-related debt, or permitting short-term, well-defined deviations during emergencies rather than long-term exemptions. The findings also highlight how crucial it is to increase military spending efficiency through cooperative procurement, coordinated research initiatives, and cutting member state redundancies in order to reduce the financial burden without sacrificing security objectives. Lastly, the study emphasizes how important it is to update the current fiscal framework in order to make it more adaptable and resilient to overlapping crises. Overall, evidence indicates that exempting military spending from fiscal regulations has definite negative effects on public debt dynamics, necessitating a more balanced strategy based on collaboration, efficiency, and comprehensive fiscal governance reform, even though bolstering European defence is crucial.

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DETERMINANTS OF CAPITAL STRUCTURE POLICY IN CONVENTIONAL AND ISLAMIC BANKS: EVIDENCE FROM INDONESIA

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ABSTRACT

Purpose- This study examines the determinants of capital structure in Indonesian banks by analyzing the effects of profitability, bank size, growth, and asset tangibility, while comparing capital structure policy between conventional and Islamic banking systems.
Methodology- This research utilizes panel data regression using a sample of 28 conventional banks and 9 Islamic banks observed over a four-year period (for the year 2021-2024), resulting in 148 bank-year observations. Separate regression models are estimated for conventional and Islamic banks to capture differences in capital structure determinants.
Findings- The results show that profitability negatively affects capital structure in conventional banks, supporting the Pecking Order Theory, while it has a positive effect in Islamic banks, consistent with the Trade-Off Theory. Bank size negatively influences capital structure in conventional banks but positively affects it in Islamic banks. Growth is insignificant for conventional banks but positively associated with capital structure in Islamic banks. Asset tangibility increases financial leverage of conventional banks, but it has no significant effect on Islamic banks' capital structure.
Conclusion- The study concludes that capital structure decisions differ fundamentally between conventional and Islamic banks in Indonesia. Conventional banks' policy is better explained by the Pecking Order Theory, whereas Islamic banks follow a Trade Off Theory. These findings indicate the importance of adopting institution-specific capital policies in dual banking systems.

Keywords: Capital structure, banking sector, profitability of banks, bank size, Islamic and conventional banks.
JEL Codes: G32, F65, L25.

1. INTRODUCTION

Research on capital structure has emerged as a significant topic in corporate finance literature, initiated by Modigliani and Miller (1963). Capital structure represents the proportion of capital from debt and from equity capital that commonly measured using debt to equity ratio. The optimal capital structure will result in reduced capital costs, increased net economic returns, and enhanced company value (Groth & Anderson, 1997). Moreover, Boateng (2004) states that the firms will choose the appropriate capital structures by balancing the tax advantages and benefits of debt financing with the costs of financial distress. While Alipour et al (2015), point out that capital structure emphasizes the combination of debt and equity in finance companies needs which ultimate purpose is to increase shareholder wealth and to reduce bankruptcy cost.

The optimal capital structure policy is generally explained by Static Trade-Off Theory (Miller, 1977) and Pecking Order Theory (Myers and Majluf, 1984). The trade-off theory states that managers attempt to balance the benefits of interest tax shields against the bankruptcy cost (Myers 2001). While Pecking order theory concludes that the manager prefers to generate internal funds than external funds respectively. Moreover, this theory explains that the firm financing policy will maintain retained earnings as the first source of funds followed by debt and equity. Based, both theories numerous studies have been explored profitability, firm size, growth opportunity, tangibility, and earnings volatility as determinant factors of capital structure in some countries around the world and various industries such as non-financial institutions, conventional banks, and Islamic banks. However, those previous studies still provided the controversy empirical evidence regarding the determinants of capital structure.

Haron (2014) concluded that the determinant factors of capital structure depend on the model and measurement of capital structure. Moreover, he found that different models and different capital structure measurements give different results including signs. The inconclusive results were also found by some previous studies in different countries and different industries. For manufacturing firms in Pakistan, Sheikh and Wang (2011) highlighted that profitability and tangibility are negatively influence the debt ratio, whereas firm size is positively linked to the debt ratio. Sheikh and Wang (2011) also showed that growth opportunities were not related to the debt ratio. While Eriotis, et al. (2007) found that the size of a firm is positively correlated with its capital structure, whereas firm growth exhibits a negative correlation with the capital structure of Greek listed corporations. Omran and Pointon (2009) found that size and growth exhibit a positive association with the capital structure of companies operating in heavy industry and service sectors. Meanwhile, Viviani (2008) found that there is no association between growth and capital structure of the French wine companies. In contrast, Viviani (2008) highlighted that asset tangibility has a positive impact on the capital structure of French wine companies. Zhang and Kanazaki (2007) found the negative correlation between profitability and capital structure of Japanese non-financial companies. Sheikh and Wang (2013) found that profitability negatively related to the capital structure of non-financial listed firms in Pakistan. Mohammadi and Derakhshan (2015) found the firm size, asset structure, sales growth, assets growth, volatility and variability of profit negatively impact to the capital structure of Iran manufacturing listed firms. Chadha and Sharma (2015) obtained that firm size, growth, and profitability are negative and significantly correlated with the capital structure of Indian manufacturing companies. While tangibility is positively correlated with financial leverage.

In the context of the financial institution, Ahmeti et al. (2023) revealed that the positive impact of profitability on bank capital structure policy. While Ali et al. (2011) found that bank size positively influences capital structure of Pakistan banks, Boateng (2004) also found that size has a positive bearing on the capital structure of joint ventures in Ghana. However, a contradictory sign was found in North American banks (Juca et al., 2012). Meanwhile, Van Dinh and Huyen (2024) found that ROA and bank growth positively impact on Vietnam commercial banks. Moreover, some literatures have been comparing the capital structure determinant of conventional and Islamic banks. Empirical results have shown that Islamic banks are less likely to use debt financing and have a different sensitivity to profitability and growth compared with conventional banks (Sheikh & Qureshi, 2017; Khan et al., 2021; Rehan et al., 2024). However, results are inconclusive and highly country-dependent (Haron, 2014; Ahmeti et al., 2023). Sheikh and Qureshi (2017) mentioned that profitability has a negative and significant effect on the capital structure of Islamic banks. In contrast, Rehan et al. (2024) found ROE and tangibility positively influence Pakistan shariah banks. Moreover, Amidu (2007) reveals a positive relationship between profitability, bank size and long-term debts of banks. Sheikh and Qureshi (2017) also found that bank size has a positive and significant effect on the capital structure of Islamic banks. While Sheikh and Qureshi (2017), found that growth negatively affects the capital structure of conventional banks. In contrast, they highlighted the Islamic banks' growth positively affected the capital structure. Eldomiaty (2008) found a positive and significant relationship between growth and debt ratio. While Rehan et al. (2024), Amidu (2007) showed a negative and significant relationship between long-term debt and banks' growth.

Indonesia represents a very relevant case for exploring these matters. Indonesia represents one of the largest dual banking systems in the emerging markets, where conventional banks and Islamic banks operate in a single system with a unified regulatory structure that also takes into account specific operating norms for each banking system. Despite the rising popularity of Islamic banking in Indonesia, there are very few empirical analyses of the determinants of the capital structure of banks that take a comparative approach (Meutia et al., 2024; Van Dinh & Huyen, 2024). Therefore, there exists a gap for a thorough empirical study that considers the two banking systems simultaneously in a single country.

This study addresses the existing gap by analysing the effects of profitability, bank size, growth, and asset tangibility on the capital structure of Indonesian conventional and Islamic banks using panel data. It provides updated empirical evidence from an emerging economy with a dual-banking system and offers a direct comparison between the two banking models. By doing so, the study contributes to the ongoing debate on the applicability of capital structure theories across different banking frameworks. The findings are also expected to inform bank managers, regulators, and policymakers in formulating capital strategies that support financial stability and sustainable growth.

This paper divided into 5 sections. The literature review outlines the Pecking Order Theory and Static Trade-Off Theory and reviews relevant empirical studies, followed by the development of research hypotheses is presented in second section. The third section explains the data and research methodology. The empirical findings are then presented and discussed in fourth section. The final section concludes the research findings and discusses some implications.

2. LITERATURE REVIEW

2.1. Pecking Order Theory

According to pecking order theory, companies show a stronger preference for internal financing rather than external funding. Thus, retained earnings will be the first source of funds followed by debt and equity respectively (Myers and Majluf, 1984). Smart, et al. (2004) state that Pecking Order Theory assumes that: (1) companies prefer internal financing rather than external, (2) bonds, preferred stocks, and common shares, (3) establish a constant amount of dividend payments, and (4) constant dividend policy and fluctuations in profitability, as well as investment opportunities. Implicitly this theory postulates the profitable firms generate retained earnings, hence showing a negative correlation between profitability and leverage.

Some empirical evidence supported this postulate in the banking industry, where high profitability is associated with lower ratios of capital structure, especially in developing countries (Amidu, 2007; Shahid et al., 2016; Assfaw, 2020). Studies that include both conventional and Islamic banks also show that internal sources are major financing influencers, in line with POT postulates (Al-Hunnayan, 2020; Sheikh & Qureshi, 2017; Rehan et al., 2024). Therefore, POT provides a strong theoretical framework in treating profitability as a major factor in bank capital structure in Indonesia.

2.2. Statis Trade-Off Theory

Modigliani and Miller (1963) and Brigham and Houston (2011) concluded that under static trade-off theory, firms identify an optimal capital structure through a trade-off between tax benefits and potential bankruptcy costs. So, the optimal level of capital structure is attained when additional tax benefits no longer exceed bankruptcy-related costs. (Grigham & Gapenski, 1996). Scott (1977) argues the firms' bankruptcy cost is determined by the firms' asset structure. Moreover, he concluded that firms with a higher proportion of tangible assets will have smaller financial distress. In other words, the firms having higher tangible assets will be followed by more debt financing in their capital structure. Then, Berryman (1982) indicates that the optimal capital structure will be determined by firm size because of small-large firm bankruptcy difference. Some empirical banking studies find a positive association between bank size and leverage, supporting the trade-off perspective (Boateng, 2004; Al-Mutairi & Naser, 2015; Kebede, 2024). Growth opportunities are also theorized to increase external financing needs, thereby raising leverage, particularly in regulated banking environments (Datta & Agarwal, 2008; Mabandla & Marozva, 2025). However, the role of asset tangibility in banking is less clear, as banks primarily hold financial rather than physical assets, which may weaken collateral effects and lead to a negative or insignificant relationship with leverage (Eriotis et al., 2007; Omran & Pointon, 2009).

2.3. Profitability and Capital Structure

Pecking order theory explains that the firms more prefer to internal funds (retained earnings) than external funds (debt and equity). Moreover, retained earnings come from corporate profit. In other words, we can conclude that the firm capital structure is determined by its profitability. Moreover, under pecking order theory, profitability and capital structure are expected to be negatively related. The pecking order theory statement implies that companies with high rates of return tend to use smaller debt (Brigham & Houston, 2016). Empirical evidence from non-banking firms suggest that the more profitable firms have the lowest debt ratios in developed as well as emerging economies (Titman & Wessels, 1988; Eldomiaty, 2008; Alipour et al., 2015; Chadha & Sharma, 2015). The empirical evidence from banks in Ghana, Ethiopia, Pakistan, GCC countries, Saudi Arabia, and Western Balkan countries also confirm the negative relationship between the two variables in all cases (Amidu, 2007; Ali et al., 2011; Al-Hunnayan, 2020; Khan et al., 2021; Ahmeti et al., 2023). The relationship holds in the banking sector irrespective of the banking system being conventional or Islamic, suggesting the reliance of the most profitable banks on internal sources of finance in the form of equity rather than debt (Sheikh & Qureshi, 2017; Hoque & Liu, 2022; Rehan et al., 2024; Yilmaz & Alghazali, 2024).

H1: The profitability negatively effect on the bank's capital structure

2.4. Bank Size and Capital Structure

According to static trade-off theory, large companies can use more debt because of the risk of bankruptcy is lower. Based on the static trade-off theory, Berryman (1982) argued that the negative relationship between capital structure and firm size. Empirical findings from non-banking institutions have shown a positive association between firm size and leverage (Titman & Wessels, 1988; Song, 2005; Chadha & Sharma, 2015). Similarly, in the banking industry, larger banks are found to have larger amounts of leverage due to their increased credibility in the market (Boateng, 2004; Al-Mutairi & Naser, 2015; Khan et al., 2021; Mohammad, 2022; Kebede, 2024). In the banking industry, a similar positive association has been found in conventional as well as Islamic banks due to their size advantages in procuring funds from the market (Sheikh & Qureshi, 2017; Hoque & Liu, 2022).

H2: Bank size positively influences on the bank's capital structure

2.5. Growth and Capital Structure

According to theoretical perspective, growing firms often require substantial external financing to support asset expansion and investment activities, leading to higher leverage (Myers, 1977). Moreover, Anarfo (2015) argued that high growth potential corporate will have high debt ratios. Empirical studies on non-bank firms generally document a positive association between growth opportunities and capital structure (Datta & Agarwal, 2008; Eldomiaty, 2008; Mabandla & Marozva, 2025). Consistent evidence is also reported in the banking sector, where bank growth is positively related to leverage, particularly in emerging markets (Amidu, 2007; Abdullah et al., 2022; Van Dinh & Huyen, 2024). Evidence from Islamic and conventional banks further indicates that growth-oriented banks increase external funding to sustain expansion (Khan et al., 2021; Rehan et al., 2024; Yilmaz & Alghazali, 2024).

H3: Growth positively influences on bank capital structure.

2.6. Tangibility and Capital Structure

Based on the trade-off theory, Brigham and Houston (2016) state that the optimal capital structure is determined by taxes and the bankruptcy cost. Moreover, the lower bankruptcy cost firms will refer to debt in their capital structure. Scott (1977) argues the bankruptcy cost will be lower for the firms with higher intangible asset proportions. However, empirical findings from non-bank firms show mixed results, particularly in service-oriented and emerging market contexts where intangible assets dominate (Eriotis et al., 2007; Omran & Pointon, 2009). In the banking sector, higher asset tangibility may reduce leverage, as banks rely primarily on financial assets and regulatory capital rather than physical collateral (Haron, 2014; Meutia et al., 2024). Evidence from banks in emerging economies suggests a negative or insignificant relationship between tangibility and capital structure, reflecting the limited role of fixed assets in banking operations (Assfaw, 2020; Ahmeti et al., 2023).

H4: There is a negative influence of tangibility on capital structure in Indonesian banks.

3. DATA AND METHODOLOGY

3.1. Sample

The sample of this study consists of 28 conventional banks listed on the Indonesia Stock Exchange (IDX) and 9 Indonesian Islamic banks over the 2021-2024 periods (see appendix 1). The study employed purposive sampling to determine the research sample, with the detailed selection process summarized in Table 1.

Table 1: Sample Selection

No	Indicators	Total
1	Listed conventional Banks and Indonesian Islamic banks	57
2	Banks have no complete reports or complete data during 2021-2024	20
3	The number of banks as a final sample	37
4	Total observation for 4 years	148

3.2. Variables Measurement

The dependent variable in this study is the capital structure measured using the financial leverage ratio, i.e. total debt to total asset ratio. The independent variables in this study are: (1) Profitability is calculated using the Return on Assets (ROA) ratio, (2) The bank size is calculated by the natural log of total assets, (3) Bank growth opportunities are calculated by changes in total assets from year to year, and (4) Tangibility can be measured by comparing fixed assets with total assets.

4. FINDINGS AND DISCUSSIONS

Descriptive statistics reported in Table 2 reveal clear structural differences between conventional and Islamic banks. For conventional banks (Panel A), exhibit a relatively high and stable capital structure, as indicated by a high mean and low dispersion, suggesting a more uniform leverage pattern under established regulatory frameworks. Profitability is positive but modest, while bank size reflects the dominance of large institutions with moderate variation. Although average growth is positive, the wide range indicates that expansion strategies differ considerably across conventional banks. Tangibility remains low, confirming that these banks rely primarily on financial assets rather than fixed assets.

Table 2: Descriptive Statistics

Variables	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis
Panel A Conventional Banks (112 Observations)						
Capital Structure	0.4487	0.9166	0.7984	0.0927	-1.7435	6.4992
Profitability	-0.1806	0.0378	0.0044	0.0263	-4.1025	25.5632
Bank size	25.6065	42.3333	33.0609	3.9978	0.5014	2.7007
Bank growth	-0.9787	0.6581	0.0574	0.1722	-1.3803	15.5025
Tangibility	0.0019	0.0987	0.0285	0.0217	1.6837	5.8623
Panel B Islamic Banks (36 Observations)						
Capital Structure	0.0264	0.9323	0.3459	0.3061	0.9948	2.3946
Profitability	-0.0665	0.0383	0.0026	0.0205	-2.0492	7.4719
Bank size	28.1384	33.6438	30.5593	1.3986	0.7483	3.1681
Bank growth	-0.2766	0.4602	0.1061	0.1326	-0.4582	4.9507
Tangibility	0.0003	0.0561	0.0231	0.0145	0.3147	2.3850

Islamic banks (Panel B), on the other hand, report lower capital structure and more dispersed, reflecting diverse Shariah-compliant financing arrangements. Profitability is close to zero with noticeable fluctuations, pointing to less stable earnings. Islamic banks are generally smaller in size but show higher average growth, accompanied by substantial variation, indicating uneven development across institutions. Similar to conventional banks, tangibility is consistently low, suggesting that asset composition remains largely financial in nature regardless of bank type.

Moreover, multiple linear regression analysis was used to examine the influence of profitability, size, growth, and tangibility on the capital structure of the Indonesian banking sector. Because this research employs one dependent variable and a set of independent variables, the multiple regression model was identified as follows:

$$CS = \alpha + \beta 1ROA + \beta 2Size + \beta 3Growth + \beta 4Tang + \varepsilon \quad (1)$$

Table 3 reveals multiple regression results examining the effect of profitability (ROA), bank size (Size), Growth, and asset tangibility (Tang) on capital structure (CS) for conventional and Islamic banks. Overall, the models are statistically significant at the 1% level, as indicated by the F-statistics for both bank types. The explanatory power differs substantially between the two models, with Islamic banks exhibiting a higher adjusted R-squared (0.653) compared to conventional banks (0.198), suggesting that the selected firm-specific variables explain capital structure decisions more strongly in Islamic banks.

The results for the first hypothesis testing showed that profitability negatively influences the capital structure of conventional banks. This finding indicates that more profitable conventional banks tend to rely less on external financing, particularly debt. This finding strongly supports Pecking Order Theory, which posits that firms prefer internal financing over external capital when profitability increases (Myers, 1977; Myers & Majluf, 1984; Myers, 2001). Empirical banking studies across both developed and emerging markets consistently document a negative profitability–leverage relationship, suggesting that profitable banks rely more on retained earnings and internal capital buffers (Amidu, 2007; Assfaw, 2020; Ahmeti et al., 2023). This result is also consistent with evidence from Ethiopia, Ghana, and Western Balkan banking sectors, where profitability reduces leverage due to internal capital accumulation and regulatory capital incentives (Assfaw, 2020; Kebede, 2024; Ahmeti et al., 2023). However, profitability positively effects on capital structure of Islamic banks. This result suggests that more profitable Islamic banks tend to increase their capital structure levels, potentially reflecting greater capacity to attract external funding through profit-sharing instruments such as mudarabah and musharakah. This finding diverges from POT but aligns with the institutional and Sharia-compliant financing framework, where higher profitability enhances stakeholder confidence and supports capital expansion. This suggests that profitable Islamic banks expand their capital base rather than substituting external financing with internal funds. Prior empirical studies show that Islamic banks adjust capital upward as profitability improves, driven by the need to support asset-backed financing and maintain Shariah-compliant capital adequacy (Al-Hunnayan, 2020; Khan et al., 2021; Rehan et al., 2024). Similar evidence from Indonesia confirms that profitability positively influences Islamic bank capital structure due to equity-based financing instruments and profit-sharing investment accounts (Meutia et al., 2024).

Table 3: Multiple Regression Results

Variables	Conventional Banks			Islamic Banks		
	Coef	t-stat	p-value	Coef	t-stat	p-value
Constant	1.148	8.409	0.000***	-5.784	-5.467	0.000***
Profitability	-0.802	-5.084	0.000***	1.153	3.618	0.001***
Size	-0.012	-2.800	0.006***	0.198	5.823	0.000***
Growth	0.242	0.992	0.324	0.086	2.018	0.052*
Tangibility	0.822	2.407	0.018**	0.808	0.556	0.583
R-Squared		0.226			0.693	
Adjusted R-Squared		0.198			0.653	
F		7.851			17.527	
Sig		0,000***			0,000***	

Note: *** indicates 1% significance level, ** indicates 5% significance level, and * indicates 10% significance level

For the second hypothesis, this study found that there is a significant negative effect of conventional bank size on its capital structure. This finding implies that larger conventional banks rely less on leverage due to diversified funding sources, economies of scale, and greater access to internal capital. This result is consistent with earlier and recent empirical studies indicating that size reduces financial constraints and leverage dependence in banking institutions (Boateng, 2004; Omran & Pointon, 2009; Ahmeti et al., 2023). The result also aligns with classical financial management arguments that large firms face lower information asymmetry and can operate with lower debt ratios (Brigham & Houston, 2016).

Conversely, bank size shows a positive and highly significant effect on capital structure in Islamic banks. It is mean that larger Islamic banks tend to increase capital to support balance sheet expansion and comply with regulatory and Shariah governance requirements. This finding is consistent with empirical evidence from GCC, Saudi Arabia, Pakistan, and Indonesia, which shows that size is a key driver of Islamic banks' capital structure adjustments (Al-Hunnayan, 2020; Sheikh & Qureshi, 2017; Khan et al., 2021; Meutia et al., 2024). These results support static Trade-Off Theory whereby larger banks move toward an optimal capital structure by balancing regulatory costs and growth benefits.

The third hypothesis testing also shows growth does not significantly influence capital structure in conventional banks, indicating that growth opportunities are not a primary determinant of leverage decisions in this segment. This finding aligns with empirical studies suggesting that conventional banks often finance growth through retained earnings or balance sheet optimization rather than increasing leverage (Eriotis et al., 2007; Haron, 2014). However, growth exhibits a positive and weakly significant effect on capital structure in Islamic banks. This result is consistent with recent empirical evidence showing that growth opportunities increase capital needs in Islamic banks due to asset-backed financing requirements (Rehan et al., 2024; Mabandla & Marozva, 2025).

The last hypothesis testing results revealed that in conventional banks, tangibility positively influences capital structure, supporting static Trade Off Theory, which emphasizes the collateral value of tangible assets in reducing bankruptcy costs and increasing debt capacity (Modigliani & Miller, 1963; Titman & Wessels, 1988). Similar findings are reported in banking and corporate finance studies across emerging markets, where asset tangibility enhances borrowing capacity (Alipour et al., 2015; Chadha & Sharma, 2015). In Islamic banks, tangibility is statistically insignificant, reflecting the limited role of conventional collateral in Shariah-compliant financing structures, a result consistent with Islamic banking evidence from GCC and Southeast Asia (Al-Hunnayan, 2020; Hoque & Liu, 2022).

Furthermore, on overall, the findings indicate that capital structure decisions in conventional banks are predominantly explained by Pecking Order Theory, driven by profitability and internal financing preferences, while Islamic banks follow a static Trade-Off Theory–oriented framework, where profitability, size, and growth positively influence capital structure adjustments. These results are consistent with comparative banking studies across different regions and reinforce the view that capital structure theories must be applied with careful consideration of banking system characteristics and institutional environments (Sheikh & Qureshi, 2017; Hoque & Liu, 2022; Van Dinh & Huyen, 2024).

Table 4: Comparison of research findings' supporting theories

Variables	Theory Supporting	
	Conventional Banks	Islamic Banks
Profitability	Pecking Order Theory	Statis Trade-Off Theory
Size	Pecking Order Theory	Statis Trade-Off Theory
Growth	None	Statis Trade-Off Theory
Tangibility	Statis Trade-Off Theory	None

Beyond that, this study compares the theoretical frameworks that support the research findings for conventional and Islamic banks. Table 4 shows for conventional banks, profitability and firm size are predominantly explained by the Pecking Order Theory. It is suggesting a preference for internal financing over external sources, while asset tangibility aligns with the Static Trade-Off Theory due to its role as collateral. In contrast, the findings for Islamic banks are more consistently supported by the Static Trade-Off Theory, particularly for profitability, size, and growth, reflecting a stronger emphasis on balancing financing benefits and costs within Sharia-compliant constraints. Notably, no supporting theory is identified for growth in conventional banks and for tangibility in Islamic banks, indicating potential differences in financing behaviour across the two banking systems.

5. CONCLUSION AND IMPLICATIONS

This study investigates the influence factors of Indonesian banks' capital structure using the balanced panel data of 28 conventional banks and 9 Islamic banks over a four-year period, yielding 148 observations. The findings reveal systematic differences in capital structure behaviour across banking systems, underscoring the importance of institutional and financing frameworks in shaping banks' capital decisions. The results show that profitability negatively affects capital structure in conventional banks, indicating a preference for internal financing and providing the strong empirical support for Pecking Order Theory (POT). In contrast, profitability positively influences capital structure in Islamic banks, suggesting that higher earnings facilitate capital expansion through equity-like and profit-sharing instruments, consistent with static Trade-Off Theory (TOT). Bank size negatively impacts on capital structure in conventional banks but a positive effect in Islamic banks, reflecting differences in funding diversification and regulatory capital needs. Growth opportunities are insignificant for conventional banks but positively associated with capital structure in Islamic banks, while asset tangibility increases capital structure only in conventional banks, consistent with collateral-based financing.

From a theoretical perspective, the study demonstrates that capital structure theories are not universally applicable across banking systems. Conventional banks' capital structure policy aligns more closely with POT, whereas Islamic banks follow a TOT-oriented framework shaped by Shariah compliance and regulatory constraints. Practically, the findings suggest that bank managers should adopt capital strategies tailored to their banking model, and regulators should avoid a uniform capital policy for conventional and Islamic banks. Overall, the study highlights the need for institution-specific approaches to capital regulation and financial management in dual banking systems such as Indonesia.

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Appendix 1: The list of bank samples and number of observations

No	Name of Bank	Classification	Number of Observation
1	MNC Internasional Tbk	Conventional	4 (2021-2024)
2	Capital Indonesia Tbk	Conventional	4 (2021-2024)
3	Central Asia Tbk	Conventional	4 (2021-2024)
4	Bukopin Tbk	Conventional	4 (2021-2024)
5	Bank Negara Indonesia Tbk	Conventional	4 (2021-2024)
6	Bank Nusantara Parahyangan Tbk	Conventional	4 (2021-2024)
7	Bank Rakyat Indonesia Tbk	Conventional	4 (2021-2024)
8	Bank Pembangunan Daerah Banten Tbk	Conventional	4 (2021-2024)
9	QNB Indonesia Tbk	Conventional	4 (2021-2024)
10	Bank Mandiri Tbk	Conventional	4 (2021-2024)
11	CIMB Niaga Tbk	Conventional	4 (2021-2024)
12	Maybank Indonesia Tbk	Conventional	4 (2021-2024)
13	Bank Agroniaga Tbk	Conventional	4 (2021-2024)
14	Bank Sinar Mas Tbk	Conventional	4 (2021-2024)
15	Bank Tabungan Negara Tbk	Conventional	4 (2021-2024)
16	Bank Mutiara Tbk	Conventional	4 (2021-2024)
17	Bank Danamon Indonesia Tbk	Conventional	4 (2021-2024)
18	Bank Permata Tbk	Conventional	4 (2021-2024)
19	Bank India Indonesia Tbk	Conventional	4 (2021-2024)
20	Bank Tabungan Pensiunan Nasional Tbk	Islamic	4 (2021-2024)
21	Bank Victoria International Tbk	Conventional	4 (2021-2024)
22	Bank Windu Kentjana International Tbk	Conventional	4 (2021-2024)
23	Bank OCBC NISP Tbk	Conventional	4 (2021-2024)
24	Bank Woori Saudara Indonesia	Conventional	4 (2021-2024)
25	Bank Mega Tbk	Conventional	4 (2021-2024)
26	Bank National NOBU Tbk	Conventional	4 (2021-2024)
27	Bank PAN Indonesia Tbk	Conventional	4 (2021-2024)
28	Bank Bumi Arta Tbk	Conventional	4 (2021-2024)
29	Bank Artha Graha International Tbk	Conventional	4 (2021-2024)
30	Bank Bukopin Syariah (KB Syariah)	Islamic	4 (2021-2024)
31	Bank Central Asia Syariah	Islamic	4 (2021-2024)
32	Bank Jabar Banten Syariah	Islamic	4 (2021-2024)
33	Bank Syariah Indonesia	Islamic	4 (2021-2024)
34	Bank Panin Dubai Syariah	Islamic	4 (2021-2024)
35	Bank Victory Syariah	Islamic	4 (2021-2024)
36	Bank MEGA Syariah	Islamic	4 (2021-2024)
37	Bank Muamalat Syariah	Islamic	4 (2021-2024)

Appendix 2: Raw Data of Bank Samples

No	Name of Bank	Year	CS	ROA	BS	GROW	TANG
1	MNC Internasional Tbk	2024	0,8246	0,0036	30,6694	0,1501	0,0480
2	MNC Internasional Tbk	2023	0,8023	0,0043	30,5295	0,0762	0,0552
3	MNC Internasional Tbk	2022	0,8391	0,0031	30,4561	0,2031	0,0019
4	MNC Internasional Tbk	2021	0,8312	0,0009	30,2712	0,2027	0,0022
5	Capital Indonesia Tbk	2024	0,7068	0,0048	30,7486	0,1730	0,0339
6	Capital Indonesia Tbk	2023	0,8240	0,0053	30,5890	-0,0664	0,0340
7	Capital Indonesia Tbk	2022	0,8406	0,0016	30,6577	-0,0760	0,0333
8	Capital Indonesia Tbk	2021	0,9049	0,0016	30,7368	0,1040	0,0322
9	Central Asia Tbk	2024	0,8186	0,0378	34,9099	0,0293	0,0267
10	Central Asia Tbk	2023	0,8278	0,0346	34,8810	0,0710	0,0270
11	Central Asia Tbk	2022	0,8318	0,0310	34,8124	0,0703	0,0274
12	Central Asia Tbk	2021	0,8349	0,0256	34,7444	0,1420	0,0263
13	Bukopin Tbk	2024	0,9042	-0,0762	32,0508	-0,0146	0,0400
14	Bukopin Tbk	2023	0,8326	-0,0718	32,0655	-0,0632	0,0384
15	Bukopin Tbk	2022	0,8754	-0,0559	32,1308	0,0087	0,0377
16	Bukopin Tbk	2021	0,8520	-0,0258	32,1221	0,1161	0,0392

17	Bank Negara Indonesia Tbk	2024	0,8520	0,0192	34,6608	0,0397	0,0269
18	Bank Negara Indonesia Tbk	2023	0,8576	0,0194	34,6219	0,0552	0,0256
19	Bank Negara Indonesia Tbk	2022	0,8639	0,0179	34,5682	0,0674	0,0258
20	Bank Negara Indonesia Tbk	2021	0,8689	0,0114	34,5030	0,1487	0,0279
21	Bank Nusantara Parahyangan Tbk	2024	0,9084	0,0087	33,5708	0,0160	0,0110
22	Bank Nusantara Parahyangan Tbk	2023	0,9166	0,0095	33,5550	-0,9787	0,0976
23	Bank Nusantara Parahyangan Tbk	2022	0,6376	0,0122	37,4039	-0,1949	0,0039
24	Bank Nusantara Parahyangan Tbk	2021	0,7029	0,0068	37,6207	-0,0746	0,0033
25	Bank Rakyat Indonesia Tbk	2024	0,8378	0,0304	42,1362	0,0142	0,0313
26	Bank Rakyat Indonesia Tbk	2023	0,8389	0,0308	42,1220	0,0533	0,0304
27	Bank Rakyat Indonesia Tbk	2022	0,8374	0,0276	42,0701	0,1118	0,0296
28	Bank Rakyat Indonesia Tbk	2021	0,8261	0,0183	41,9642	0,0423	0,0286
29	Bank Pembangunan Daerah Banten Tbk	2024	0,7744	0,0052	36,5605	0,1103	0,0037
30	Bank Pembangunan Daerah Banten Tbk	2023	0,7546	0,0039	36,4558	-0,0585	0,0048
31	Bank Pembangunan Daerah Banten Tbk	2022	0,7727	-0,0423	36,5161	-0,1838	0,0051
32	Bank Pembangunan Daerah Banten Tbk	2021	0,7863	-0,0231	36,7191	0,6581	0,0069
33	QNB Indonesia Tbk	2024	0,6305	0,0043	37,0923	0,0935	0,0158
34	QNB Indonesia Tbk	2023	0,6008	0,0059	37,0029	-0,2969	0,0181
35	QNB Indonesia Tbk	2022	0,7216	-0,0240	37,3552	-0,0556	0,0165
36	QNB Indonesia Tbk	2021	0,7725	-0,0892	37,4124	-0,0326	0,0181
37	Bank Mandiri Tbk	2024	0,7665	0,0252	42,3333	0,1164	0,0260
38	Bank Mandiri Tbk	2023	0,7637	0,0276	42,2232	0,0912	0,0267
39	Bank Mandiri Tbk	2022	0,7749	0,0226	42,1359	0,1547	0,0176
40	Bank Mandiri Tbk	2021	0,7688	0,0177	41,9921	0,1191	0,0178
41	CIMB Niaga Tbk	2024	0,8523	0,0192	33,5177	0,0773	0,0261
42	CIMB Niaga Tbk	2023	0,8524	0,0196	33,4433	0,0900	0,0294
43	CIMB Niaga Tbk	2022	0,8524	0,0166	33,3571	-0,0130	0,0331
44	CIMB Niaga Tbk	2021	0,8604	0,0136	33,3701	0,1062	0,0304
45	Maybank Indonesia Tbk	2024	0,8417	0,0061	32,9151	0,1477	0,0290
46	Maybank Indonesia Tbk	2023	0,8207	0,0106	32,7774	0,0683	0,0316
47	Maybank Indonesia Tbk	2022	0,8163	0,0095	32,7113	-0,0468	0,0331
48	Maybank Indonesia Tbk	2021	0,8288	0,0101	32,7592	-0,0259	0,0321
49	Bank Agroniaga Tbk	2024	0,7370	0,0039	30,2058	0,0553	0,0271
50	Bank Agroniaga Tbk	2023	0,7251	0,0020	30,1520	-0,1049	0,0310
51	Bank Agroniaga Tbk	2022	0,7562	0,0008	30,2628	-0,1760	0,0328
52	Bank Agroniaga Tbk	2021	0,8543	-0,1806	30,4564	-0,3980	0,0169
53	Bank Sinar Mas Tbk	2024	0,7209	0,0067	31,6496	0,0568	0,0280
54	Bank Sinar Mas Tbk	2023	0,7179	0,0014	31,5944	0,1116	0,0305
55	Bank Sinar Mas Tbk	2022	0,7085	0,0047	31,4886	-0,1010	0,0319
56	Bank Sinar Mas Tbk	2021	0,7366	0,0024	31,5951	0,1807	0,0293
57	Bank Tabungan Negara Tbk	2024	0,8684	0,0064	40,6907	0,0703	0,0195
58	Bank Tabungan Negara Tbk	2023	0,8688	0,0080	40,6227	0,0910	0,0185
59	Bank Tabungan Negara Tbk	2022	0,8737	0,0076	40,5356	0,0814	0,0158
60	Bank Tabungan Negara Tbk	2021	0,8812	0,0064	40,4573	0,0295	0,0154
61	Bank Mutiara Tbk	2024	0,9058	0,0001	38,2341	0,0261	0,0109
62	Bank Mutiara Tbk	2023	0,9042	0,0007	38,2083	0,1671	0,0056
63	Bank Mutiara Tbk	2022	0,8892	0,0026	38,0538	0,5770	0,0064
64	Bank Mutiara Tbk	2021	0,8752	-0,0209	37,5983	0,3155	0,0090
65	Bank Danamon Indonesia Tbk	2024	0,7861	0,0136	40,0291	0,0950	0,0102
66	Bank Danamon Indonesia Tbk	2023	0,7742	0,0165	39,9383	0,1192	0,0098
67	Bank Danamon Indonesia Tbk	2022	0,7599	0,0173	39,8257	0,0287	0,0097
68	Bank Danamon Indonesia Tbk	2021	0,7649	0,0087	39,7973	-0,0431	0,0099
69	Bank Permata Tbk	2024	0,8356	0,0138	33,1881	0,0063	0,0137
70	Bank Permata Tbk	2023	0,8447	0,0100	33,1818	0,0091	0,0136
71	Bank Permata Tbk	2022	0,8525	0,0079	33,1727	0,0885	0,0129
72	Bank Permata Tbk	2021	0,8438	0,0053	33,0880	0,1854	0,0140
73	Bank India Indonesia Tbk	2024	0,4927	0,0116	29,5502	0,1120	0,0185
74	Bank India Indonesia Tbk	2023	0,4487	0,0080	29,4440	0,0113	0,0207

75	Bank India Indonesia Tbk	2022	0,4501	0,0027	29,4327	0,4241	0,0211
76	Bank India Indonesia Tbk	2021	0,5256	-0,0104	29,0792	0,1435	0,0306
77	Bank Tabungan Pensiunan Nasional Tbk	2024	0,1302	0,0488	30,7105	0,0146	0,0154
78	Bank Tabungan Pensiunan Nasional Tbk	2023	0,1277	0,0504	30,6961	0,0129	0,0176
79	Bank Tabungan Pensiunan Nasional Tbk	2022	0,1375	0,0841	30,6832	0,1412	0,0179
80	Bank Tabungan Pensiunan Nasional Tbk	2021	0,1371	0,0790	30,5512	0,1283	0,0203
81	Bank Victoria International Tbk	2024	0,8733	0,0038	31,0665	0,0480	0,0112
82	Bank Victoria International Tbk	2023	0,8709	0,0034	31,0196	0,1424	0,0143
83	Bank Victoria International Tbk	2022	0,8573	0,0087	30,8865	0,0395	0,0166
84	Bank Victoria International Tbk	2021	0,8298	-0,0048	30,8478	-0,0486	0,0240
85	Bank Windu Kentjana International Tbk	2024	0,7960	0,0088	31,1439	0,2044	0,0234
86	Bank Windu Kentjana International Tbk	2023	0,7652	0,0087	30,9579	0,1131	0,0302
87	Bank Windu Kentjana International Tbk	2022	0,7523	0,0054	30,8508	-0,0447	0,0299
88	Bank Windu Kentjana International Tbk	2021	0,7678	0,0030	30,8966	0,0380	0,0366
89	Bank OCBC NISP Tbk	2024	0,8552	0,0173	33,2694	0,1251	0,0143
90	Bank OCBC NISP Tbk	2023	0,8506	0,0164	33,1515	0,0472	0,0156
91	Bank OCBC NISP Tbk	2022	0,8566	0,0139	33,1054	0,1124	0,0158
92	Bank OCBC NISP Tbk	2021	0,8492	0,0118	32,9988	0,0393	0,0151
93	Bank Woori Saudara Indonesia	2024	0,7654	0,0088	31,7040	0,0713	0,0058
94	Bank Woori Saudara Indonesia	2023	0,8126	0,0127	31,6351	0,0645	0,0064
95	Bank Woori Saudara Indonesia	2022	0,8072	0,0167	31,5726	0,1757	0,0071
96	Bank Woori Saudara Indonesia	2021	0,7887	0,0144	31,4107	0,1510	0,0091
97	Bank Mega Tbk	2024	0,8430	0,0195	25,6279	0,0217	0,0453
98	Bank Mega Tbk	2023	0,8352	0,0266	25,6064	-0,0684	0,0467
99	Bank Mega Tbk	2022	0,8544	0,0286	25,6773	0,0668	0,0447
100	Bank Mega Tbk	2021	0,8559	0,0302	25,6127	0,1843	0,0423
101	Bank National NOBU Tbk	2024	0,8905	0,0099	31,1374	0,2518	0,0211
102	Bank National NOBU Tbk	2023	0,8747	0,0053	30,9128	0,2037	0,0264
103	Bank National NOBU Tbk	2022	0,9153	0,0047	30,7273	0,0662	0,0137
104	Bank National NOBU Tbk	2021	0,9149	0,0031	30,6632	0,5099	0,0143
105	Bank PAN Indonesia Tbk	2024	0,7702	0,0118	33,1280	0,0989	0,0406
106	Bank PAN Indonesia Tbk	2023	0,7599	0,0135	33,0337	0,0451	0,0451
107	Bank PAN Indonesia Tbk	2022	0,7613	0,0154	32,9896	0,0390	0,0479
108	Bank PAN Indonesia Tbk	2021	0,7626	0,0089	32,9514	-0,0624	0,0520
109	Bank Bumi Arta Tbk	2024	0,6104	0,0075	36,6400	0,0231	0,0955
110	Bank Bumi Arta Tbk	2023	0,6093	0,0056	36,6172	-0,0268	0,0987
111	Bank Bumi Arta Tbk	2022	0,6253	0,0047	36,6443	-0,0523	0,0974
112	Bank Bumi Arta Tbk	2021	0,7413	0,0049	36,6980	0,1349	0,0945
113	Bank Artha Graha International Tbk	2024	0,8560	0,0051	31,0364	0,1541	0,0705
114	Bank Artha Graha International Tbk	2023	0,8402	0,0056	30,8931	0,0262	0,0815
115	Bank Artha Graha International Tbk	2022	0,8426	0,0022	30,8673	-0,0264	0,0817
116	Bank Artha Graha International Tbk	2021	0,8487	-0,0064	30,8940	-0,1441	0,0806
117	Bank Bukopin Syariah (KB Syariah)	2024	0,2734	0,0013	29,7880	0,0915	0,0234
118	Bank Bukopin Syariah (KB Syariah)	2023	0,2326	-0,0665	29,7005	0,1294	0,0267
119	Bank Bukopin Syariah (KB Syariah)	2022	0,2437	-0,0098	29,5788	0,1275	0,0315
120	Bank Bukopin Syariah (KB Syariah)	2021	0,2016	-0,0373	29,4588	0,1909	0,0416
121	Bank Central Asia Syariah	2024	0,8089	0,0110	30,4429	0,1499	0,0139
122	Bank Central Asia Syariah	2023	0,7870	0,0106	30,3032	0,1422	0,0137
123	Bank Central Asia Syariah	2022	0,7687	0,0093	30,1703	0,1905	0,0124
124	Bank Central Asia Syariah	2021	0,7331	0,0082	29,9959	0,0949	0,0139
125	Bank Jabar Banten Syariah	2024	0,2572	0,0041	30,3137	0,0714	0,0317
126	Bank Jabar Banten Syariah	2023	0,2189	0,0043	30,2448	0,0967	0,0315
127	Bank Jabar Banten Syariah	2022	0,2202	0,0082	30,1524	0,2015	0,0350
128	Bank Jabar Banten Syariah	2021	0,1745	0,0021	29,9689	0,1660	0,0388
129	Bank Syariah Indonesia	2024	0,2586	0,0171	33,6438	0,1555	0,0189
130	Bank Syariah Indonesia	2023	0,2467	0,0161	33,4993	0,1567	0,0151
131	Bank Syariah Indonesia	2022	0,2409	0,0139	33,3537	0,1524	0,0176
132	Bank Syariah Indonesia	2021	0,2333	0,0114	33,2118	0,1073	0,0153

133	Bank Panin Dubai Syariah	2024	0,1359	0,0053	30,4522	-0,0305	0,0124
134	Bank Panin Dubai Syariah	2023	0,2312	0,0131	30,4832	0,1713	0,0118
135	Bank Panin Dubai Syariah	2022	0,1362	0,0169	30,3251	0,0254	0,0131
136	Bank Panin Dubai Syariah	2021	0,0504	-0,0567	30,3001	0,2764	0,0135
137	Bank Victory Syariah	2024	0,2648	0,0061	28,8293	0,0753	0,0010
138	Bank Victory Syariah	2023	0,2899	0,0032	28,7567	0,4602	0,0021
139	Bank Victory Syariah	2022	0,1211	0,0024	28,3781	0,2709	0,0003
140	Bank Victory Syariah	2021	0,0418	0,0027	28,1384	-0,2766	0,0006
141	Bank MEGA Syariah	2024	0,0264	0,0158	30,4033	0,0980	0,0264
142	Bank MEGA Syariah	2023	0,0307	0,0164	30,3098	-0,0936	0,0307
143	Bank MEGA Syariah	2022	0,0653	0,0145	30,4080	0,1445	0,0278
144	Bank MEGA Syariah	2021	0,0919	0,0383	30,2731	-0,1288	0,0283
145	Bank Muamalat Syariah	2024	0,9130	0,0003	31,7257	-0,1035	0,0561
146	Bank Muamalat Syariah	2023	0,9221	0,0002	31,8350	0,0911	0,0417
147	Bank Muamalat Syariah	2022	0,9152	0,0004	31,7478	0,0419	0,0441
148	Bank Muamalat Syariah	2021	0,9323	0,0002	31,7068	0,1495	0,0483

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IMPACT OF LIQUIDITY ON STOCK RETURNS: EVIDENCE FROM SELECTED INDIAN COMPANIES

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ABSTRACT

Purpose- The present study tries to judge the impact of liquidity on stock return in two select Indian companies listed in Bombay Stock Exchange (BSE) by making use of a restructured stock market dataset and financial data for the period from 1 January 2008 to 31March 2025.

Methodology-The study is solely based on secondary daily, monthly, and annual stock market data collected from BSE India. Actual returns calculated using the log difference of previous price and current price R_t= Ln (P_t-P_{t-1}), where P is the price, Ln is natural logarithm and t is the period and R_t is Actual Return. Amihud (2002) measure of illiquidity is applied to arrive at stock illiquidity, single index model (SIM) is used to compute market risk. Several econometric tools like unit root test such as ADF test, PP test, granger causality test, robustness test like multicollinearity, serial correlation (Breusis usedy test), heteroscedasticity test (Breusch-Pagan-Godfrey Test), normality of error terms (Jarque-Bera Test), Ramsey Reset test etc applied. Finally, generalized method of moment has been applied to judge the impact of illiquidity on stock return on select conglomerates.

Findings- The results suggest that the impact of illiquidity on stock returns is diverse in case of select conglomerate industries listed in Indian stock market. More precisely, we observe a reliable positive impact of illiquidity on stock returns in Reliance industry and insignificant negative impact of illiquidity on stock returns in Adani industry. However, we do not find any granger causal connection between fluctuation in liquidity and stock returns in both Indian conglomerate industries. Stock's systematic risk has an insignificant positive effect on stock returns in case of both industries indicating a direct, risk-reward relationship, although existence of insignificantly positive effects.

Conclusion- This research study on the nexus between illiquidity and stock return might be viewed as an effort towards understanding stock return, illiquidity, volatility dynamics in the emerging economy like India.

Keywords: Stock returns, illiquidity, market risk, reliance, Adani.
JEL Codes: G12, G10

1. INTRODUCTION

Investors' decisions are affected by liquidity, market competence or transactions costs. Stock market liquidity is an indispensable market trait whose existence makes certain the smooth operations of the market, while its nonexistence causes restlessness in the market. Researchers appear to agree upon the fact that liquidity is a significant factor in asset pricing. Simply, liquidity is the extent to which one asset can be traded promptly at minimum impact cost. In other words, liquidity relates to trading cost, and it decides how fast the assets can be traded at the normal market price with fractional influence on the stock price movement and is précised by the bid-ask spread known as illiquidity cost. Investors bring upon themselves a systematic liquidity risk, for which they want higher expected return to compensate for the hazard of holding stock whose illiquidity differs with market illiquidity. Additionally, the market microstructure theory (Stoll, 1978) presupposes that higher return volatility enhances illiquidity. Their substantiation on higher return volatility claims that investors holding an asset with high inventory costs increase the bid-ask spread and trading cost.

On the contrary, investors are enthusiastic to accept a lower return on an asset with a higher return in times of market illiquidity. Whilst the market turns down, an investor is prepared to accept a low-priced return on stocks with low illiquidity costs in states of reduced market return. Amihud et al. (2006) designate that market liquidity exposes the existence of keen buyers and sellers who concur to exchange a definite quantity of securities at the stated price without any delay in time. Conversely, illiquidity increases trading costs and unfavorably affects asset return and holding it up until revitalization of liquidity level breeds an extra premium for the investment in the asset. Amihud and Mendelson (1986) exemplify that investors holding stocks characterized by an outsized bid-ask spread accept high costs of positions liquidation, and subsequently they claim compensation for illiquidity.

Hence, one of the factors which investors judge while making investment decisions is the liquidity of a financial asset. Prudent investors need a high premium of risk for holding fewer liquid stocks. So, investors stipulate a higher rate of returns for less liquid stocks than more liquid stocks. Therefore, the risk-adjusted returns of liquid stocks are lower than those of less liquid stocks. Thus, the liquidity risk exhibits explanatory power on the cross-section of stock return (Vu, Chai, & Do, 2015). As higher expected returns are associated with less liquid assets, expected returns and illiquidity are positively related, or conversely, a negative relationship between liquidity and stock returns can be recommended. Ellington (2018) stated that lower liquidity levels cruelly hinder economic growth during catastrophe. Bigger liquidity leads to bigger financial risk-sharing, influencing investors' trading decisions and inspiring portfolio changes. Moreover, deficient market liquidity leads to reducing market competence, incompetent asset allocation, and hindering economic growth. Therefore, liquidity is one factor that investors believe very frequently in the stock market. The existence of market liquidity is significant for a trader as it decides the extent of his returns and in that way, it helps in formulating suitable trading strategies. Many studies (Amihud& Mendelson, 1986; Bradrania et al., 2015; Chang et al., 2010; Lam & Tam, 2011) have tinted the important association between market liquidity and stock returns.

Brief profile of selected conglomerates

Reliance Industries Limited (RIL) was established in 1958 by Dhirubhai Ambani as an unassuming trading firm for spices and polyester yarn. Over the decades, it evolved into an international powerhouse by pioneering the "backward integration" model, expanding from textiles into petrochemicals and refining to control its entire production chain. Now a days, its energy segment remains its financial strength of character, housing the world's largest refining complex in Jamnagar. Under the leadership of Mukesh Ambani, Reliance has pivoted toward a consumer-centric ecosystem, dominating India's digital landscape through Jio Platforms and its AI initiatives, while operating the country's largest retail network through Reliance Retail and a massive media portfolio via JioCinema.

Adani Enterprises Limited (AEL), founded by Gautam Adani in 1988, began as a commodity trading business that shifted focus to the nation's physical infrastructure following the development of Mundra Port in 1995. Functioning as an "in-house incubator," AEL systematically builds and scales capital-intensive ventures before demerging them into independent entities. As of 2026, the group is the primary architect of India's logistics and utilities, managing major gateways through Adani Ports, operating the newly opened Navi Mumbai International Airport, and leading the cement industry through Ambuja Cements. Its portfolio extends into critical "hard" infrastructure, including power transmission, data centers via AdaniConneX, and defense manufacturing.

These companies are termed conglomerates because they administer a vast network of diverse, often unrelated business entities under a single corporate umbrella to diversify risk and leverage internal capital. This structure is particularly evident in their shared pursuit of the Green Energy sector, where both have pledged over $70 billion to lead India's energy transition. While RIL focuses on the manufacturing of solar modules and batteries at its Giga Complex, Adani targets global leadership in renewable generation and the Green Hydrogen ecosystem. By operating across sectors as varied as 5G telecom, city gas distribution, and luxury fashion, these conglomerates make certain that their unwavering cash flows from traditional industries fund to the high-growth technologies of the future.

2. LITERATURE REVIEW

There is a volume of research which substantiates the notion that the liquidity of stock is a crucial aspect for pricing a financial asset. The research endeavor of Amihud and Mendelson (1986) is one of the ground-breaking research projects on the relationship between liquidity and stock returns. Using the bid-ask spread as a proxy for liquidity, this study demonstrates that investors need extra liquidity premium for holding illiquid stocks.

Amihud and Mendelson (1986) opined that investors having a short-term horizon have a propensity to invest more in liquid stocks, even though investors having a long-term horizon tend to invest more in less liquid stocks. Consequently, stock liquidity level is fundamental of motivations differences of investors, more specifically, investments horizon differences, and in equilibrium, the relationship between required return and stock liquidity is non-linear and concave.

Following the research findings, a great deal of studies carries on spotlighting on return–liquidity association from diverse perspectives. Following the move of Amihud and Mendelson (1986), Eleswarapu and Reinganum (1993) deal with this relationship using a restructured database. This finding suggests that the liquidity premium is a recurrent effect as it is consistently positive during the month of January. However, Brennan and Subrahmanyam (1996) found well-built substantiation which is consistent with the conception of a premium for illiquidity. These findings are unwavering over time and strong enough to controlling for Fama and French's (1993) risk factors.

Datar et al. (1998) employ the turnover ratio as a proxy for liquidity to examine the return–liquidity nexus. The result showed that liquidity had significant effect on analyzing returns on assets. The effect of the liquidity risk factor is well-built in comparison with the size risk factor on asset returns. This study inferred that the size effect could be an indication of liquidity impact. This might partially be owing to the reason that institutional investors have well-built command of large and liquid stocks, and this demand seems to pay no attention to the relative performance of small stocks.

Huberman and Halka (1999) found a momentous connection between liquidity instability of diverse stocks. The result presents the subsistence of common factors of liquidity across stocks and elucidates those factors by the existence of liquidity traders.

Jacoby et al. (2000) restructured CAPM model by reassessing excess returns over one-period of both stock and market by captivating liquidity costs and demonstrate that the measurement of systematic risk obviously connects the alteration of the spread of security.

Chordia et al. (2001) found an adverse unenthusiastic connection between volatility of liquidity and cross-sectional equity returns, in contrast of the perception on risk–return affiliation. These findings are solidified in presence of a variety of controls for the size, momentum, book-to-market ratio, dividend yield effects, price level.

Jun et al. (2003) observed an encouraging affirmative association between market-wide liquidity and stock returns applying statistics for promising equity markets. Pastor and Stambaugh (2003) appraise whether market-wide liquidity is priced and observed that returns of stocks with high sensitivity to market liquidity surpassed those with lesser sensitivity.

Acharya and Pedersen (2005) modify the liquidity-adjusted CAPM model by incorporating three additional risk factors associated with liquidity risk like proxy for commonality in liquidity of stock and market, return sensitivity to market liquidity and liquidity sensitivity to market return. The result indicates that investors have need of higher expected future asset returns to pay off the contemporary liquidity's shocks. The effect is corroborated by Chien and Lustig (2010) who assert that liquidity risks resulted by diverse business cycles should be satisfied by higher expected stock return. Liu (2006) made use of a new proxy for liquidity and the liquidity-augmented CAPM model. The study suggested that liquidity explicates cross-sectional stock return better than CAPM and the Fama–French three-factor models (1993).

Amidst controversies upon whether the prevailing asset-pricing models with well-known factors such as market premium, size, book-to-market, Nguyen et al. (2007) carry out both time-series and cross-section tests upon the three-moment CAPM and four factor model based on Fama–French and Pastor–Stambaugh factors as well as the mix of these two models. The result on empirical study displayed that all the factors do not include the characteristic liquidity premium. The characteristic liquidity should take part in its important role in elucidating stock returns jointly with further recognized risk factors.

Hearn (2010) observed in his study that liquidity is one of the significant determinants for asset evaluation in a bigger market, mostly in less competitive stock markets because these markets are distinguished to have a high cost of equity. Loukil et al. (2010) observed a positive consequence of both present and past illiquidity on expected stock returns wherein the return of small size stocks was highly affected by illiquidity over some time.

Lee (2011) found an optimistic and important effect of liquidity on the expected return while considering the International financial liquidity factor. Lam and Tam (2011) advocated that the liquidity augmented Fama–French model elucidates better stock returns in the Hong Kong stock market which corroborates the concept that illiquidity capitulates superior stock returns. Narayan and Zheng (2011) established that liquidity has an unconstructive consequence on Chinese expected stock returns, and the result is not vigorous due to asymmetric information and unwarranted government control. Lam and Tam (2011) found that liquidity is the most significant issue influencing stock returns even after controlling other determinants of stock returns.

Mazouz, Alrabadi, and Yin (2012) established that the less systematic risk responds to positive and negative shocks, while the high systematic risk does not respond to shocks. Donadelli and Prosperi (2012) affirmed that the international liquidity factors, i.e. VIX and open interest, have envisaged surplus returns. Shieh et al. (2012) observed that any alteration in liquidity levels of stock results in a gigantic impact on stock returns.

Papavassiliou (2013) showed substantiation on liquidity pricing in the Greek stock market and informed that the shocks occur as liquidity has noteworthy implications on portfolio diversification.

Batten and Vo (2014) concluded that liquidity did not have influence on asset return owing to the dearth of integration of emerging markets into the global market. Cao and Petrasek (2014) deal with the query of whether liquidity risk is priced in stock returns applying an event study framework and observed that abnormal stock returns for the duration of liquidity crises are strappingly and negatively associated with liquidity risk. Using Vietnamese firm level data, Batten and Vo (2014) too presented a positive affiliation between stock market and stock turnover as a measure of stock liquidity.

Chiang and Zheng (2015) emphasized that the excess stock returns of the G7 countries are optimistically connected with market illiquidity risk and found that market-level illiquidity considerably impacts large-cap stock excess return, and firm-level illiquidity sturdily affects small-cap stock excess return. Hung et al. (2015) found the analogous results of a constructive link between the illiquidity measures and stock returns in the Chinese stock markets.Vu et al. (2015) substantiated the LCAPM (Acharya & Pedersen, 2005) and established that liquidity affects anticipated stock returns. Bradrania et al. (2015) proved that liquidity persuades the expected returns since it significantly determines the association between expected returns and expected volatility.

Shih and Su (2016) demonstrated an encouraging association between liquidity and expected cross-sectional return for the duration of the market downturn in Taiwan. Arjoon et al. (2016) observed that the existence of institutional ownership establishes positive association between liquidity and stock returns.

Fong, Holden, and Trzcinka (2017) and Goyenko, Holden, and Trzcinka (2009) substantiated the Amihud (2002) illiquidity measures as the most excellent substitute for global research and Ahn, Jun, and Yang (2018) and Amihud (2002) affirmed that illiquidity measures are the most efficient price impact using high-frequency data in emerging Markets.

Harris and Amato (2019) presented conflicting confirmation against (Amihud, 2002) illiquidity measures for asset pricing. Kumar and Misra (2019) substantiated the economic implication of the LCAPM (Acharya&Pedersen, 2005) in the Indian stock market and reported the covariance of individual security return with combined liquidity as a authoritative effect on expected return even after controlling idiosyncratic risk. Altay and Çalgıcı (2019) found the identical experiential results supporting the LCAPM theory and the opposing confirmation on positive and significant covariance of individual security return with aggregate liquidity. Their conclusions may be owing to microstructure differences in Asian Economics and Emerging Markets.

Xu, Taylor, &Lu (2018) observed that illiquidity shocks are an indispensable conduit for transmitting shocks in the equity market There is a feedback connection between illiquidity shocks and volatility shocks (Zhang & Han, 2022). Wang, Cohen, and Glascock (2022) examined the asymmetric impact of frequency and measured shocks on return volatility across assets and markets.

Kao et al. (2020) studied the association between return and trading volume and between return volatility and trading volume by explaining the asymmetric relations of contemporaneity and lead-lags between these factors for the S&P 500 VIX Futures Index using the threshold model with the GJR-GARCH framework. The result suggests that with trading volume, which is above the threshold, it guides to higher returns, but at below the threshold limit, it led to lower returns.

Zhang Y, Ding S(2021) strived to examine the liquidity upshot on commodity prices and return movements based on daily stock data. The result suggests that daily price co-movements across different commodity futures are mostly determined by cross-sectional liquidity spillover rather than exclusively by macroeconomic factors. While daily liquidity shocks depressingly impact instant commodity returns, these influences smooth out over time, leaving monthly co-movements subjugated by global indices.

Seo-Yeon Lim & Sun-Yong Choi (2022) examined liquidity spillovers among industry sectors in the S&P 500 index to explain the interconnection dynamics in the US stock market using the spillover model as well as sectoral liquidity measure based on the Amihud liquidity measure. The result demonstrates that liquidity associations became sturdy during both crises-GFC period and COVID-19 pandemic period. The result also found that net liquidity spillovers between all sectors fluctuated remarkably during the GFC, whereas the industrial, consumer staples, and healthcare sectors had the biggest net liquidity spillovers during the COVID-19 crisis.

Cheng, Liu, Jiang, and Cao (2023) investigated the stock liquidity effects on accrual irregularity, and their findings pointed out that stock liquidity is pessimistically associated with the accrual irregularity and that there is a causal connection between the effect of stock liquidity and accrual irregularity.

Cuong Nguyen Thanh and Hai Phan Thanh (2024) investigate the effect of market liquidity on the stock returns of non-financial companies listed on the Vietnam Stock Market during the COVID-19 pandemic phase from January 30, 2020, to December 31, 2021, for 647 non-financial companies listed on the Vietnamese stock market using a fixed-effects panel data regression model. The result suggests a statistically significant and negative affiliation between market tightness and stock returns. Moreover, market depth exhibits a remarkable optimistic affiliation with stock returns. The result also demonstrates that stocks with lower liquidity tended to succumb high returns during the COVID-19 phase which gradually was heightened during periods of lockdown.

Prem Bahadur Budhathoki, Ganesh Bhattarai and Arjun Kumar Dahal (2024) evaluate the influence of liquidity, trading volume, market capitalization, book-to-market ratio, asset growth, size, profitability financial and asset risk on stock returns in Nepalese commercial banks for the study period from 2009-10 to 2019-20 using pooled ordinary least squares regression model. The research findings demonstrate that trading volume as a substitute of liquidity, optimistically influences stock returns in Nepalese commercial banks. On the contrary, asset growth and return on assets display an insufficiently constructive linkage with stock returns in Nepal. On the other hand, the result recommends an irrelevant contrary association between book-to-market and stock returns and also Market capitalization is found to have a very small effect on stock returns in Nepal.

Garg, Rakesh (2025) investigates the impact of stock market liquidity on firm value by utilizing secondary data from a sample of 150 firms listed on the National Stock Exchange (NSE) for the period 2015– 2025. The result exhibits a statistically noteworthy optimistic connection between stock market liquidity and firm value, indicating that firms with higher liquidity be likely to benefit from better-quality valuation in the capital market.

In contrast, research studies (Lischewski&Voronkova, 2012; Nguyen & Lo, 2013) have not observed any empirical substantiation supporting the effect of liquidity on expected stock returns. In frontier markets, Stereńczak et al. (2020) found that liquidity does not influence returns because they are less internationally integrated. Also, Garleanu (2009) suggested that liquidity does not have any effect upon stock returns because diverse traders utilize different trading strategies in view of their different trading objectives.

2.1. Research Gap

From the literature, it has been recognized that liquidity is a vital factor influencing stock returns, but the literature on liquidity–stock returns offer contradictory results. Asset-pricing theories advocate that liquidity is priced in asset-pricing models as investors claim higher returns to compensate for less liquid stocks. Based on asset-pricing theories, the matter of whether liquidity is priced is extensively investigated in developed countries which have established stock markets. From the above literature review, it has also been found that most of the studies on illiquidity and stock return made use of data taken from the US stock market. Furthermore, the greater part of studies of Illiquidity and liquidity risk linked with asset returns are in US market which has been normally documented as the prominent liquid market in the universe with a little impact of liquidity than those of other markets, particularly the promising markets. The result might be prejudiced because equity markets in diverse countries have diverse market structures. In common parlance, while the hypothetically explained scheme seems to be corroborated by experiential confirmation employing data from developed stock markets, most of the research endeavors employing emerging markets data endow with opposite results (Jun et al., 2003; Geert et al., 2005; Batten and Vo, 2014). In a nutshell, the increasing body of research studies on liquidity typically centered around the developed markets while research on emerging stock market liquidity is still very scanty.

Emerging markets are normally considered to have stumpy transparency, problems of corporate misgovernance, highly intense ownership, and ease of use of insufficient portfolio choices owing to dearth of diversity in securities as compared to developed markets. Moreover, as emerging markets are distinguished by the dearth of liquidity, it is imperative to endow with additional investigation into this subject matter in the perspective of emerging market like India. Consequently, investors are worried about the liquidity of securities. These factors mean that liquidity plays a more crucial role in emerging markets than in developed ones. Emerging market like India generates a center of attention to worldwide investors and affords a chance for maximizing the benefits of international portfolio diversification. There is not much research work done applying emerging market data and emerging market perspective. Facts suggest that negligible studies have been attempted in the literature on Emerging Markets (Altay &Çalgıcı, 2019; Donadelli&Prosperi, 2012; Hearn, 2010; Kumar & Misra, 2019). So, the dearth of research work on the effect of liquidity volatility on stock returns in emerging markets highlights the significance of this work. In view of the above research gap, other emerging markets like Indian stock market need to be examined in order to avoid the data-dredging problem. This paper deepens the literature considering the liquidity–stock returns nexus in the Indian context. Therefore, it is imperative to empirically investigate the proliferation of illiquidity shocks on return volatility across assets and markets in India as an Emerging Market.

2.2. Objective of the Study

The present study tries to judge the impact of liquidity on stock return in two select Indian companies listed in Bombay Stock Exchange (BSE) to bring more transparency in the relation between liquidity and stock return. The impetus behind probing the liquidity performance and stock return of Emerging Markets like India is to endow with improved insight to investors for making investment decisions effectively.

3. METHODOLOGY

The study used the daily historical return and volume data (Total Turnover) of 2 large-cap Stocks of Reliance and Adani Ltd listed in the Bombay Stock Exchange (BSE) and obtained data fromwww.bseindia.com. The study period covers from 1 January 2008 to 31March 2025. The reason for taking this period is that the study period observed the first two years as a coalition Government. The residual period covers a steadfast government followed by enormous structural reforms in India's economy, i.e. the introduction of GST, demonetization, etc. The last part of the study period covers the COVID-19 Pandemic.

This period had a vibrant impact on the liquidity of India's stock market and exposed both high liquidity and low liquidity scenarios.

Before applying the most suitable regression method for studying a relationship between a dependent (endogenous) variable and several independent (exogenous) variables, we first assume that the model is linear in parameters, the regressed (dependent variable) is considered in a linear function by a specific set of regressors (independent variables) with residual. Other assumptions such as absence of multicollinearity (variable inflation factor), absence of serial correlation (by Durbin Watson test and Breusch-Godfrey LM test), homoscedasticity or absence of heteroskedasticity (by Breusch-Pagan-Godfrey test**)**, normality of error terms (by Jarque-Bera test**)** and model specification (by Ramsey RESET Test**)** must be observed before applying appropriate regression to achieve Best Linear Unbiased Estimator (BLUE) properties.

3.1. Dependent Variable

MRT: The yearly stock returns represent a dependent variable. In the estimations, we take the natural logarithm of each price data point to reduce the observed skewness in the stock price data distribution. We use logarithm of stock return because most studies estimate that stock return follows a log normal distribution. The stock return data used in this research consists of the logarithmic first difference of closing stock prices, which is defined symbolically as follows:

To calculate the return, the following formula has been used:

$$R_t = lnP_t - lnP_{t-1} \tag{1}$$

R_t= daily stock return, P_t= closing price of the stock at time t, and P_{t-1} = previous day's closing price at time t-1while ln symbolizes the natural log.

3.2. Independent Variables

ILIQ: Petersen and Fialkowski (1994), and Brennan and Subrahmanyam (1996) denigrate that the quoted spread is a meager substitute for liquidity as smaller equity trades are frequently executed inside the quoted prices, while larger trades often face prices far less to those quoted. As such, many substitute proxies for liquidity have been used for additionally investigating the relationship between asset returns and liquidity, such as trading volume (Brennan et al., 1998), turnover ratio (Datar et al., 1998; Howard and Robert, 2005), zero return (Lesmond et al., 1999), price impact of trading (Breen et al., 2002), Amihud's illiquidity ratio (Amihud, 2002), the Pastor and Stambaugh (2003) liquidity measure and the Liu (2006) liquidity ratio. Nonetheless, most of these papers corroborate Amihud and Mendelson (1986).

Amihud (2002) proposes a measure of illiquidity, which is the daily ratio of absolute stock return to its currency volume, and argues that this can be interpreted as "the daily price response associated with one dollar of trading volume, thus serving as a rough measure of price impact." This measure only needs daily data on returns and volume to calculate and can be calculated for longer time periods than we have microstructure data for.

Let D_{iy}be the number of days with available data for stock *i*in year *y*, R_{iyd}be the stock return for stock *i*in day *d* of year *y*, and $VOLD_{ivyd}$be the daily volume [in units of currency(rupee)]. Amihud (2002)'s measure is calculated as:

$$ILR_y = 10^6 \frac{1}{D_{iy}} \sum_d \frac{|R_{iyd}|}{VOLD_{ivyd}} \tag{2}$$

This measure is multiplied by 10^6. This ratio has a daily impact on order flow on prices (Amihud, 2002). Investors are averse to illiquidity, and they require a premium of return for holding illiquid stocks.

Many researchers use the price impact or the price response to sign order flow as a measure of stock liquidity, using intra-day continuous data on transactions. These fine measures of illiquidity require for their calculation microstructure data on transactions and quotes that are unavailable in most markets around the world for long time periods of time. In contrast, liquidity measures based on transaction volume are more available. We expect a positive effect of the illiquidity ratio on stock returns.

SIZE: The size of firm is represented by the logarithm of market capitalisation (outstanding shares multiplied by the last transaction price of the month). Size is related to liquidity since a larger stock issue has smaller price impact for a given order flow. Thus, stock expected returns are negatively related to size (Banz, 1981; Reinganum, 1981; Fama and French, 1992).

MRISK(β **)**:The systematic risk of stock is included in the model as a measure of risk. we calculate portfolios returns and market returns (NSE return is taken as proxy market return), and we estimate the following market model for each portfolio:

$$R_{pt} = \alpha_{pt} + \beta_{pt} MR + \varepsilon_{pt} \tag{3}$$

where MR is the market return and β is the slope estimated by Sholes and Williams (1977). p is the index of portfolio (p = 1,2,….5), t is the index of day. We expect a positive association between systematic risk and stock return.

STRISK: The stock total risk is computed by the logarithm of the standard deviation of the daily returns on stock i in month t multiplied by 10^2. As proposed by Stoll (1978), liquidity is associated negatively with stock risk. Constantinides (1986) proposes that stock total risk affect positively the return required by investors. Indeed, this risk imposes higher trading costs on them due to the need to engage more frequently in portfolio rebalancing. We expect in this study a positive effect of total risk on stocks returns.

RET2_3: The cumulative returns over the second through the third month prior to the end of current year (Jegadeesh and Titman, 1993; Chordia et al., 2001; Chang et al., 2010)

RET4_6: The cumulative returns over the fourth through sixth month prior to the end of current year (Jegadeesh and Titman, 1993; Chordia et al., 2001; Chang et al., 2010)

RET7_12: The cumulative returns over seventh through 12th month prior to the end of current year (Jegadeesh and Titman, 1993; Chordia et al., 2001; Chang et al.,2010)

The 2 months, 3 months or 6 months cumulative return is a measure of the total gain or loss of a stock over 60 days, 90-day or 180-day period. It is an absolute, non-annualized figure that acts as a short-term momentum indicator, showing how the stock price has recently behaved. The lagged return variables serve as proxies for momentum effects. Jegadeesh and Titman (1993) advance that stock preserve their characteristics in short term. Lee and Swaminathan (2000) suggest that liquidity and stocks return depend on previous performance.

We have included in this analysis year dummy variables in order to eliminate effects of macroeconomics variables associated to following years.

YR 20-21. A dummy variable that takes on the value of 1 in 2020-21 and 0 in other years.

YR 21-22. A dummy variable that takes on the value of 1 in 2021-22 and 0 in other years.

3.3. Model Specification

We model portfolio return as a function of several exogenously related factors–such as Illiquidity, market risk, portfolio stock risk, size, relative changes in volume and return, cumulative returns over several prior months before end of relevant years.

The regression model is represented as follows:

MRT= f(ILR, MRISK, STRISK, SIZE, RCV, RCR, RET2_3, RET4_6, RET7_12)

The regression equation is depicted below:

$$MRT_t = \beta_0 + \beta_1\mathrm{ILR} + \beta_2\mathrm{MRISK} + \beta_3\mathrm{STRISK} + \beta_4\mathrm{SIZE} + \beta_5\mathrm{RCV} + \beta_6\mathrm{RCR} + \beta_7\mathrm{RET2\_3} + \beta_8\mathrm{RET4\_6} + \beta_9\mathrm{RET7\_12} + \varepsilon$$

Unit root test - When dealing with time series data, a number of econometric issues can influence the estimation of parameters using OLS. Regressing a time series variable on another time series variable using the Ordinary Least Squares (OLS) estimation can obtain a very high R^2, although there is no meaningful relationship between the variables. This situation reflects the problem of spurious regression between totally unrelated variables generated by a non-stationary process.

Therefore, prior to testing and implementing the Granger Causality test, econometric methodology needs to examine the stationarity; for each individual time series, most macro-economic data are non-stationary, i.e., they tend to exhibit a deterministic and/or stochastic trend. Therefore, it is recommended that a stationarity (unit root) test be carried out to test for the order of integration. A series is said to be stationary if the meaning and variance are time-invariant.

A non-stationary time series will have a time dependent meaning or make sure that the variables are stationary, because if they are not, the standard assumptions for asymptotic analysis in the Granger test will not be valid. Therefore, a stochastic process that is said to be stationary simply implies that the mean [(E(Y_t)] and the variance [Var (Y_t)] of Y remain constant over time for all t, and the covariance [covar (Y_t, Ys)] and hence the correlation between any two values of Y taken from different time periods depends on the difference apart in time between the two values for all t≠s.

Since standard regression analysis requires that data series be stationary, it is obviously important that we first test for this requirement to determine whether the series used in the regression process is a difference stationary or a trend stationary.

ADF Test - To test the stationary of variables, we use the Augmented Dickey Fuller (ADF) test which is mostly used to test unit root. Following equation checks the stationarity of time series data used in the study:

$$\Delta y_t = \beta_1 + \beta_1 t + \alpha\, y_{t-} + \gamma_1 \Sigma \Delta y_{t-1} + \varepsilon_t \quad (4)$$

where: ε_t is white nose error term in the model of unit root test, with a null hypothesis that variable has unit root.

The ADF regression test for the existence of unit root of y_t that represents all variables (in the natural logarithmic form) at time t. The test for a unit root is conducted on the coefficient of y_{t-1} in the regression. If the coefficient is significantly different from zero (less than zero) then the hypothesis that y contains a unit root is rejected. The null and alternative hypothesis for the existence of unit root in variable y_t is:

H_0; $\alpha = 0$ versus H_1: $\alpha < 0$. Rejection of the null hypothesis denotes stationary in the series.

If the ADF test-statistic (t-statistic) is less (in the absolute value) than the Mackinnon critical t-values, the null hypothesis of a unit root cannot be rejected for the time series and hence, one can conclude that the series is non-stationary at their levels. The unit root test tests for the existence of a unit root in two cases: with intercept only and with intercept and trend to take into the account the impact of the trend on the series.

PP Test - The PP tests are non-parametric unit root tests that are modified so that serial correlation does not affect their asymptotic distribution. PP tests reveal that all variables are integrated of order, one with and without linear trends, and with or without intercept terms.

Phillips–Perron test (named after Peter C. B. Phillips and Pierre Perron) is a unit root test. That is, it is used in time series analysis to test the null hypothesis that a time series is integrated of order 1. It builds on the Dickey–Fuller test of the null hypothesis δ = 0 in $\Delta y_t = \delta y_{t-1} + u_t$, here Δ is the first difference operator.

Like the augmented Dickey–Fuller test, the Phillips–Perron test addresses the issue that the process generating data for y_t might have a higher order of autocorrelation than is admitted in the test equation - making y_{t-1} endogenous and thus invalidating the Dickey–Fuller t-test. Whilst the augmented Dickey–Fuller test addresses this issue by introducing lags of Δy_t as regressors in the test equation, the Phillips–Perron test makes a non-parametric correction to the t-test statistic. The test is robust with respect to unspecified autocorrelation and heteroscedasticity in the disturbance process of the test equation.

Granger Causality Test - Causality is a kind of statistical feedback concept which is widely used in the building of forecasting models. Historically, Granger (1969) and Sim (1972) were the ones who formalized the application of causality in economics. Granger causality test is a technique for determining whether one time series is significant in forecasting another (Granger. 1969). The standard Granger causality test (Granger, 1986) seeks to determine whether past values of a variable help to predict changes in another variable.

The definition states that in the conditional distribution, lagged values of Y_t add no information to explanation of movements of X_t beyond that provided by lagged values of X_t itself (Greene, 2003). We should take note of the fact that the Granger causality technique measures the information given by one variable in explaining the latest value of another variable. In addition, it also says that variable Y is Granger caused by variable X if variable X assists in predicting the value of variable Y. If this is the case, it means that the lagged values of variable X are statistically significant in explaining variable Y. The null hypothesis (H_0) that we test in this case is that the X variable does not Granger cause variable Y and variable Y does not Granger cause variable X. In summary, one variable (X_t) is said to granger cause another variable (Y_t) if the lagged values of X_t can predict Y_t and vice-versa.

Multicolliearity- Before running the regression, investigation into the multicollinearity problem must be conducted using the pairwise correlation matrix. First, bivariate (pairwise) correlations among the independent variables were examined to find out the multicollinearity problem. The existence of correlation of about 0.90 or larger indicates that there is problem of multicollinearity. When independent variables are highly correlated in a multiple regression analysis, it is difficult to identify the unique contribution of each variable in predicting the dependent variable because the highly correlated variables are predicting the same variance in the dependent variable. Some statisticians say correlations above 0.70 indicate multicollinearity and others say that correlations above 0.90 indicate multicollinearity.

Multicollinearity is assessed by examining tolerance and the Variance Inflation Factor (VIF) which are two collinearity diagnostic factors that can help to identify multicollinearity. If a low tolerance value is accompanied by large standard errors and no significance, multicollinearity may be an issue. The variable's tolerance is indicated by $1-R^2$. A small tolerance value indicates that the variable under consideration is almost a perfect linear combination of the independent variables already in the equation and that it should not be added to the regression equation. The Variance Inflation Factor (VIF) measures the impact of collinearity among the variables in a regression model. The Variance Inflation Factor (VIF) is 1/Tolerance, it is always greater than or equal to 1. There is no formal VIF value for determining presence of multicollinearity. A commonly given rule of thumb is that multicollinearity exists when Tolerance is below 0.1 and values of VIF that exceed 10 are often regarded as indicating multicollinearity. When those R^2 and VIF values are high for any of the variables in regression model, multicollinearity is probably an issue.

Serial Correlation (Breusch-Godfrey Test) - In Ordinary Least Squares (OLS) regression, time series residuals are often found to be serially correlated with their own lagged values. Serial correlation means (a) OLS is no longer an efficient linear estimator, (b) standard errors are incorrect and generally overstated, and (c) OLS estimates are biased and inconsistent. This test is an alternative to Q-Statistic for testing for serial correlation. It is available for residuals from OLS, and the original regression may include autoregressive (AR) terms. Unlike the Durbin-Watson Test, the Breusch-Godfrey test may be used to test for serial correlation beyond the first order and is valid in the presence of lagged dependent variables. The null hypothesis of the Breusch-Godfrey test is that there is no serial correlation up to the specified number of lags. The Breusch-Godfrey test regresses the residuals on the original regressors and lagged residuals up to the specified lag order. The number of observations multiplied by R^2 is the Breusch-Godfrey test statistic. The statistic labelled'Obs*R-squared' is the LM test statistic for the null hypothesis of no serial correlation. The high probability values indicate the absence of serial correlation in the residuals.

Normality of Error Terms (Jarque-Bera Test) - The Jarque-Bera test, a type of Lagrange multiplier test, was developed to test normality of regression residuals. The Jarque-Bera statistics are computed from skewness and kurtosis and asymptotically follow the chi-squared distribution with two degrees of freedom. While testing for normality, it was found that Jarque-Bera statistics where p values for all variables are lower than 0.05 imply that variables under our consideration are normally distributed.

Ramsey Reset Test - The Ramsey Reset Test, popularly known as Regression Equation Specification Error Test, is a statistically analytical device applied in econometrics to confirm for functional form misspecification in a linear regression model, such as the existence of omitted variables or incorrect relationships. It works by adding powers of the predicted values from the original regression as new explanatory variables in a second regression; if these added terms are statistically significant, it suggests the original model's functional form is incorrect. The null hypothesis is that the model is correctly specified, and a rejection indicates misspecification.

4. ANALYSIS OF RESULTS

The diagrammatic presentation in Fig-1&2 shows the trend of illiquidity and stock return in both select conglomerates-Reliance and Adani Ltd which can be explained and corroborated analytically through subsequent econometric presentation in the study.

Figure 1: Graphical Presentation of the Trend of Illiquidity and Stock Returns of Adani Ltd

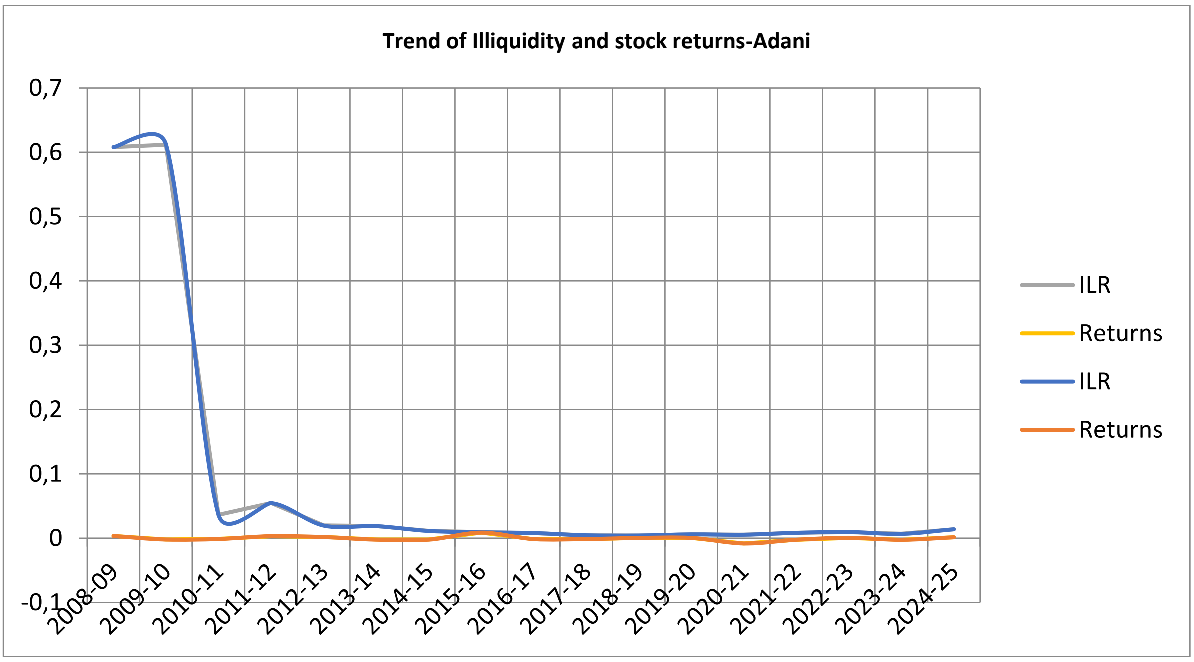
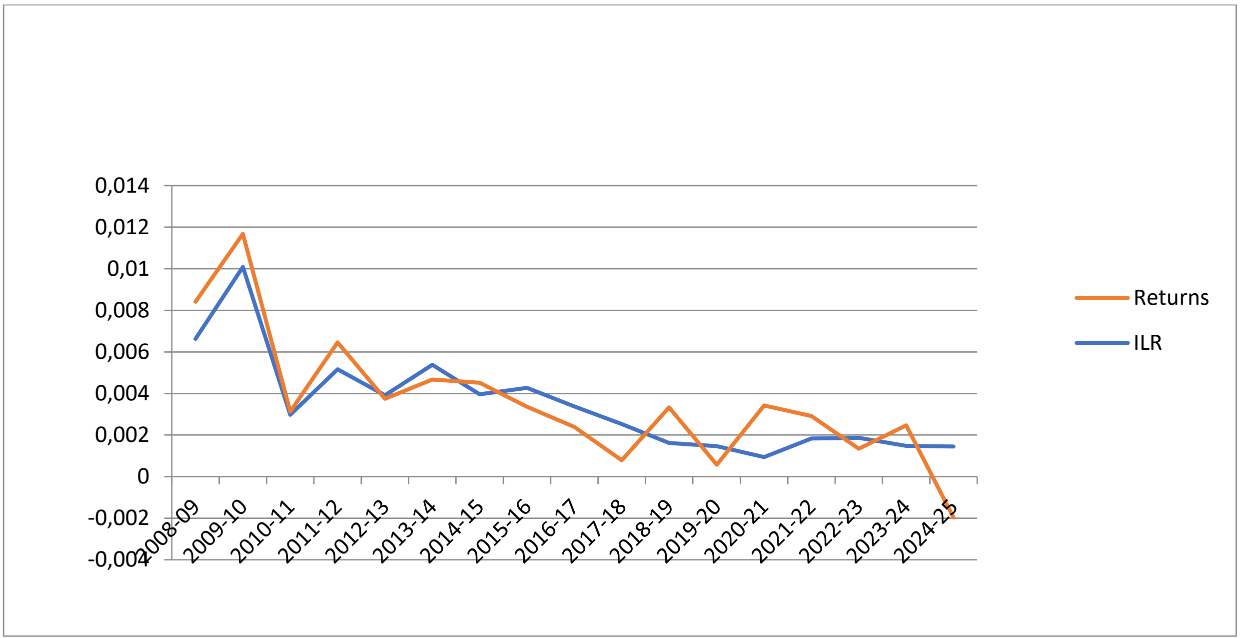


Figure 2: Graphical Presentation of the Trend of Illiquidity and Stock Returns of Reliance Ltd



Descriptive statistics in Table 1 reveal following results. The mean distribution of variable measuring illiquidity is 0.00346 and 0.084426 in case of Reliance Ltd and Adani Ltd respectively, and their respective standard deviations are moderately low (0.00236 and 0.198231 respectively) and significant, which demonstrates that liquidity level does not vary much from firm to other. The meaning of size (SIZE) is 15.5309 and 14.61915and the standard deviation of these variables is significant and positive.

Table 1: Descriptive Statistics

	RETURNS	ILR	MRISK	STRISK	SIZE	RCV	RCR	RET2_3	RET4_6	RET7_12
RELIANCE										
Mean	0.00013	0.00346	-0.02255	0.75930	15.5309	-0.15817	-3.69897	-0.01348	-0.01154	0.03662
Median	0.00015	0.00297	-0.00258	0.54772	15.4183	-0.12376	-3.21392	0.02338	0.00514	0.00579
Maximum	0.00248	0.01008	0.08943	1.66800	16.6810	-0.06493	-1.56691	0.11448	0.41851	0.72657
Minimum	-0.00341	0.00094	-0.35366	0.21196	14.9437	-0.38633	-6.10552	-0.13062	-0.88775	-0.86272
Std. Dev.	0.00151	0.00236	0.09449	0.4766	0.47318	0.07893	1.36283	0.08405	0.27622	0.30911
Skewness	-0.519384	1.35301	-2.62472	0.84071	0.79029	-1.43006	-0.45919	-0.14364	-1.62352	-0.82233
Kurtosis	2.85597	4.5668	10.208	2.2494	3.0704	4.9952	2.1043	1.5825	7.4109	6.46109
ADANI										
Mean	-0.000266	0.084426	-0.01618	1.253703	14.61915	-0.36568	-2.96969	0.025004	-0.08558	0.019413
Median	-0.001305	0.009584	-0.01161	1.154450	15.05494	-0.2013	-2.60226	0.018211	-0.13846	0.020503
Maximum	0.008602	0.611821	0.007476	2.460800	16.01802	-0.13818	-1.79031	0.898346	0.560729	2.028508
Minimum	-0.008230	0.004119	-0.05393	0.837476	11.25763	-2.18248	-5.70855	-0.55025	-0.64254	-0.86272
Std. Dev.	0.003535	0.198231	0.016440	0.376722	1.269329	0.495346	1.085152	0.329792	0.342458	0.642768
Skewness	0.352977	2.354247	-0.71786	2.055099	-1.4047	-3.16218	-1.33396	0.807364	0.572285	1.629502
Kurtosis	4.519092	6.579827	2.937246	7.308785	4.300148	12.05538	3.796043	4.203165	2.548811	6.835602

The variability of size exhibit that our sample is heterogeneous and it includes large and small firms. The standard deviation of measures of risk stock's own risk (STRISK), and market risk (MRISK) are positive significant and indicate that the variability of level of risk between firms of sample is high. The means of cumulated lagged returns (RET2_3), (RET7_12) are negative and significant and for (RET7_12), means of cumulated lagged returns is positive for both industries and their dispersions are high and significant.

Negative skewness of return series notices in case of Reliance but it shows positive in case of Adani. A left tail event is highly undesirable as it highlights the black swan event, i.e. a negative event, the occurrence of which is highly unpredictable. A negative skewness is highly undesirable from investors' point of view as it indicates frequent small gain but few large losses. A fat-tailed or thick-tailed distribution has a value for kurtosis that exceeds 3. That is, excess kurtosis is positive. This is called leptokurtosis. The distribution is also leptokurtic in nature i.e. for the return series for Adani only (not Reliance), the indices display the thicker tail than normal distribution indicating many prices fluctuation positive or negative away from average return. In Indian Context, these movements were typically product of "euphoria to despondency cycles" (Gupta,1997, p. 3).

In other words, stock returns irrespective of the regime when standardized by their scale exhibit more probability mass in the tails than distributions like the standard normal distribution. This means that extremely high and low realizations occur more frequently than under the hypothesis of normality.

Table 2: Test of Multicollinearity

Variable	Reliance	Adani
	Centered VIF	Centered VIF
ILR	8.511465	7.93853
STRISK	2.638307	8.28169
MRISK	1.741244	6.817622
SIZE	3.858506	7.32177
RCR	1.721915	4.956413
RCV	3.283259	3.325043
RET2_3	1.611223	2.987441
RET4_6	2.957969	3.088638
RET7_12	2.734254	8.118127

All the variable under consideration of the study is free from multicollinearity as those are within the permissible general rule of thumb of VIF range [1-10] in table-2.

To confirm that the regression model used in the analysis is correctly specified, Ramsey's RESET test has been applied in the above model. Result of the Ramsey's RESET has been given in Table3.

Moreover, we reject null hypothesis when the p-value for the model is less than the significance level of 0.05, otherwise do not reject the null hypothesis. According to the generated result, p-value is always greater than 0.05. Thus, we fail to reject null hypothesis of no functional misspecification in the series and model is specified and there is enough evidence to conclude that the regression model is specified correctly at significance level of 0.05. In our study, Ramsey's test statistic indicates no functional misspecification in the series and therefore, model is well specified as shown by F-statistics provided by Ramsey Reset Test.

Table 3: Ramsey's RESET Test

	Reliance			Adani		
Parameters	Value	df	Probability	Value	df	Probability
t-statistic	0.232438	4	0.8276	0.329113	4	0.7586
F-statistic	0.054028	(1, 4)	0.8276	0.108316	(1, 4)	0.7586
Likelihood ratio	0.228080	1	0.6330	0.454219	1	0.5003

$H_{0:}$ There is no functional misspecification in the series and model is specified; $H_{1:}$ There is functional misspecification in the series and model is non-specified

An important assumption of the classical linear regression model is that the disturbance (residual) term u_i is homoscedastic; that is, they all have the same variance. For the validity of this assumption, Breusch-Pagan-Godfrey Test are applied in the regression equation, and the result is given in Table-4. We can define heteroscedasticity as the condition in which the variance of error term or the residual term in a regression model varies.

The Breusch-Pagan-Godfrey Test in table-4 do not reject the null hypothesis of no heteroscedasticity because the p-value is larger than 0.05. [p>0.05]. So, we fail to reject null hypothesis of no heteroscedasticity and the *F*-statistic and the LM test statistics both indicate that the residuals are not heteroscedastic and therefore variances for the errors are equal.

Table 4: Heteroscedasticity Test

Breusch-Pagan-Godfrey Test							
	Reliance			Adani			
F-statistic	0.358697	Prob. F(11,5)	0.9273	F-statistic	0.830941	Prob. F(11,5)	0.6309
Obs*R-squared	7.498193	Prob. ChiSq.(11)	0.7574	Obs*R-sq.	10.98883	Prob. Chi-q.(11)	0.4442
Scaled expl. SS	0.782578	Prob. ChiSq.(11)	1.0000	Scaled expl. SS	1.429939	Prob. Chi-Sq.(11)	0.9997

$H_{0:}$ There is no heteroscedasticity i.evariance for the errors are equal. In math terms, that's: $H_0 = \sigma^2{}_1 = \sigma^2$;$H_{1:}$ There is heteroscedasticity i.evariance for the errors are not equal. In math terms, that's:$H_{1=}\ \sigma^2{}_1 \neq \sigma^2$

In Table5, the test rejects the null hypothesis of no serial correlation up to order 2[p<0.05]. The *Q*-statistics and the LM test both indicate that the residuals are serially correlated. Also, Durbin Watson test result in table-8 confirms that there is autocorrelation in regression model as the D-W value is 2.496879 and 2.861481[(>2) for both industries].

Table 5: Breusch-Godfrey Serial Correlation LM Test

Reliance				Adani			
F-statistic	4.413688	Prob. F(2,3)	0.1277	F-statistic	2.515321	Prob. F(2,3)	0.2283
Obs*R-sq.	12.68797	Prob. Chi-Sq.(2)	0.0018	Obs*R-sq.	10.64932	Prob. Chi-Sq.(2)	0.0049

H_0: There is no serial correlation in the residuals up to the specified order; H_1: There is serial correlation in the residuals up to the specified order

In Jarque-Bera test of normality, if the p-value is smaller than significance level which is 0.05, the null hypothesis will be rejected. It means that the error terms in the model are not normally distributed. Here, in table-6, in all the sample years, p-values of Jarque-Bera Test statistic of all variables under consideration are not greater than 0.05 level. Therefore, all the variables do not satisfy normality conditions.

Table: 6: Jarque-Bera Test-Normality of Error Terms

	Reliance									
	RETURNS	**ILR**	**MRISK**	**STRISK**	**SIZE**	**RCV**	**RCR**	**RET2_3**	**RET4_6**	**RET7_12**
Jarque-Bera	0.779013	6.925775	56.32238	2.401669	1.773133	8.614289	1.165609	1.481669	21.2500	10.40126
Probability	0.677391	0.031339	0.000000	0.300943	0.412068	0.013472	0.558330	0.476716	0.00002	0.005513
Observations	17	17	17	17	17	17	17	17	17	17
	Adani									
Jarque-Bera	1.987591	24.78110	1.462905	25.11705	6.788073	86.41486	5.490651	2.872257	1.07214	17.94417
Probability	0.370169	0.000004	0.481210	0.000004	0.033573	0.000000	0.064227	0.237847	0.58504	0.000127
Observations	17	17	17	17	17	17	17	17	17	17

Ho: series are normal; H_1: series are not normal.

Table 7 presents the results of the unit root test. The results show that all variables in our study attain stationarity at level I(0), using both ADF and PP tests. The results indicate that the null hypothesis of a unit root can be rejected for the all given variables as all the ADF statistic value and PP statistic value are smaller than the critical t-value at 1%, 5% and 10%level of significance for all variables and, hence, one can conclude that the variables under consideration attained stationary at their levels in both ADF and PP test.

Table 7: Unit Root Test

Variables name	Reliance				Adani			
	ADF test		PP test		ADF test		PP test	
	Level	Conclusion	Level	Conclusion	Level	Conclusion	Level	Conclusion
RETURNS	-3.6527	I(0)	-3.6224	I(0)	-4.3764	I(0)	-4.4643	I(0)
ILR	-3.5042	I(0)	-9.8363	I(0)	-12.363	I(0)	-9.7856	I(0)
MRISK	-3.3331	I(0)	-3.3233	I(0)	-3.3987	I(0)	-3.4205	I(0)
STRISK	-3.7883	I(0)	-3.7885	I(0)	-5.4108	I(0)	-6.0186	I(0)
SIZE	-3.8573	I(0)	-3.8575	I(0)	-4.4641	I(0)	-4.4642	I(0)
RCV	-4.8028	I(0)	-4.6962	I(0)	-13.079	I(0)	-9.5064	I(0)
RCR	-5.8570	I(0)	-6.7180	I(0)	-5.240	I(0)	-5.242	I(0)
RET2_3	-3.5731	I(0)	-3.5821	I(0)	-4.8438	I(0)	-6.4953	I(0)
RET4_6	-4.6407	I(0)	-3.3530	I(0)	-4.4048	I(0)	-5.8549	I(0)
RET7_12	-4.1651	I(0)	-4.1595	I(0)	-3.5538	I(0)	-3.5587	I(0)
Critical value	1% level	-3.9203		-3.9203	1% level	-3.9203		-3.9203
	5% level	-3.0655		-3.0655	5% level	-3.0655		-3.0655
	10% level	-2.6734		-2.6734	10% level	-2.6734		-2.6734

Note: *MacKinnon critical values for rejection of hypothesis of a unit root.

Ho: series has unit root; H_1: series is trend stationary

All conditions for applying OLS technique have been fulfilled except absence of serial correlation and normality. So, in presence of autocorrelation, Newey West HAC consistent covariance matrix estimator (this model is useful in situations where the standard assumptions of regression analysis do not appear be valid) is more efficient than OLS technique unless the sample is large. Moreover, one of the primary advantages of GMM over other methods is that it does not require strong assumptions about the probability distribution of the data or the errors. GMM handles non-normal data (like skewed or heavy-tailed distribution) well, particularly in time series with heteroscedasticity. Newey and West (1987b) propose a covariance estimator that is consistent in the existence of both heteroskedasticity and autocorrelation (HAC) of unknown form, under the assumption that the autocorrelations between distant observations die out. NW advocates using kernel methods to form an estimate of the long-run variance, $E(X'\varepsilon'\varepsilon' X/T)$.

Table 8: Determinants of Stock Returns [Generalized Method of Moment]

Dependent Variable: RETURNS
Method: Generalized Method of Moments
Included observations: 17
Sample: 2008-09 to 2024-25
Estimation weighting matrix: HAC (Bartlett kernel, Newey-West fixed Bandwidth=3.0000

Reliance					Adani				
Variable	Coefficient	Std. Error	t-Statistic	Prob.	Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.049521	0.009317	-5.315218	0.0011	C	-0.001827	0.005812	-0.314425	0.7624
ILR	0.792270	0.209104	3.788870	0.0068	ILR	-0.000543	0.003017	-0.180078	0.8622
MRISK	0.000720	0.002651	0.271614	0.7938	MRISK	0.013356	0.028278	0.472306	0.6511
STRISK	-0.002413	0.000563	-4.282565	0.0036	STRISK	0.000600	0.001403	0.427818	0.6816
SIZE	0.003090	0.000594	5.198999	0.0013	SIZE	0.000130	0.000459	0.282831	0.7855
RCV	-6.44E-05	0.003550	-0.018135	0.9860	RCV	-0.000234	0.000471	-0.495877	0.6352
RCR	-0.000191	0.000209	-0.912983	0.3916	RCR	0.000215	0.000201	1.071108	0.3197
RET2_3	0.000989	0.003063	0.322966	0.7562	RET2_3	0.003078	0.000854	3.604577	0.0087
RET4_6	0.001842	0.001387	1.327767	0.2259	RET4_6	0.005114	0.001006	5.086125	0.0014
RET7_12	0.002182	0.000625	3.489263	0.0101	RET7_12	0.003510	0.000777	4.514527	0.0028
Durbin-Watson	2.496879				Durbin-Watson	2.861481			

Results in Table 8 demonstrate that investors evaluate stock illiquidity, given that the coefficient associated with (ILIQ) variable is positive and statistically significant. This indicates that more illiquid the stock is, the more the expected return on portfolio in case of reliance but found no significant impact of illiquidity on returns in case of Adani Ltd.

By observing the significance of risk measures, we find that in Reliance, return volatility (STRISK) is associated negatively and significantly with stock returns, which is contrary in case of Adani Ltd. It indicates that stocks' own volatility in Reliance has an unenthusiastic consequence on its return, meaning that higher volatility relates to lower future returns**.** This event is generally frequently described as the "low-volatility anomaly" or "low-risk effect" which contradicts traditional financial theory (CAPM), which induces that higher risk should be rewarded with higher returns.

This might be due to spiky turn in stock price, leading to increase in a firm's debt-to-equity ratio. It results in increase in its volatility. This result reflects that high volatility not only causes low returns, but also low returns (price drops) increase volatility but in case of Adani, both these effects are absent on stock returns. But stock systematic risk (BETA) has an insignificant positive effect on stock returns in case of both industries.

In Reliance, the positive effect of size on stock return is beyond expectation, but it might be viewed or judged under specific crisis period where large cap companies regularly demonstrate better flexibility than small-cap firms because intending Investors are likely to congregate unwavering companies, leading to higher returns for large firms during these periods. Moreover, smaller firms being characteristically riskier having more unstable returns, larger firms might put forward a better risk-adjusted return during specific market phases. Whereas in Adani Ltd, no size effect on stock return is prominently found.

When firm size has an optimistic positive influence on stock returns, larger sized firms produce higher returns for investors as compared to smaller sized firms which contradict the conventional "small-firm effect." This classically suggests that larger, deep-rooted companies with better asset quality, superior reputations, and less risk are privileged by the market. From investors perspective, they may recognize bigger, reputable firms as safer investments destination, nevertheless, they are satisfied with elevated returns, often owing to superior effectiveness in terms of profitability position and greater economies of scale. While early research showed small firms outperforming larger ones (Banz, 1981), our study suggest this premium has vanished in case of Adani industry, with findings of Reliance industry showing encouraging positive size effects during our study period. It indicated that there's no authoritative accord that small firms constantly outperform larger ones.

The predictable consequence of relative changes in a company's trade volume on its stock return is usually having an optimistically positive correlation between volume and price momentum (trend persistence), despite the fact that the causality is intricate and frequently provisional on market conditions whether it is bull market or bearish market condition. But, in both industries under our consideration, Reliance and Adani Ltd, relative changes in trading volume (RCV) have insignificantly negative impact on stock returns. It indicates that trading volume affects future stock returns negatively for low return quartiles. In bearish market, a considerable boost in trading volume in times of a price slump indicates sturdy selling pressure which can be termed as 'panic selling' or 'institutional dumping'. High volume associated with a fall in stock price frequently predicts additionally, sustained turn downs. Therefore, in low-return or bear markets, volume-return causality can be pessimistic, as panic-induced high volume frequently leads to more declines.

A relative enhancement in a company's return is generally expected to have a positive, significant effect on stock returns.This might be due to the fact that a company improves its profitability relative to the market or historical benchmarks; investor confidence typically increases, driving up the stock price. Result shows insignificant negative impact of relative changes in return on stock return in Reliance and insignificant positive impact on stock return of Adani industries respectively.

By examining the significance of cumulated lagged returns, table 7 demonstrates that the cumulated return (RET2_3) and RET4_6 do not affects significantly the stock returns in Reliance but cumulated return RET4_6 affects significantly and positively in Adani Ltd; RET7_12 affects significantly and positively in both Reliance and Adani Ltd.

A positive relationship between a company's 3 months or 6-month cumulative returns prior to end of any current year and its subsequent stock return implies that the stock is exhibiting a momentum effect. This means that if the stock has performed well over the past six months, it is more likely to continue performing well in the immediate future, while a poor performance over the past six months suggests continued underperformance.

Investors can potentially generate higher returns by employing a strategy that buys "winner" stocks (those with high 6-month cumulative returns) and avoids or shorts "loser" stocks (those with low 6-month returns). Indeed, strategy of buying stocks with high past performance and of selling stocks with low past performance induce a significant excess return for a period of holding of six months. This often results from a delayed market reaction to information, where investors react to news, allowing prices to drift upwards (or downwards) over the 6-month period. While this positive relationship can be effective, it is often more pronounced in rising markets (up markets) and may reverse over longer periods (13-60 months).

In Table 9, the OLS technique in addition is applied to judge the impact of other macroeconomic variables not considered here as well as covid impact during specified time point of time (2020-21&2021-22).

Table 9: Determinants of Stock Returns by OLS

Dependent Variable: RETURNS
Method: Least Squares
Included observations: 17
Sample: 2008-09 to 2024-25

Reliance					Adani				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**	**Variable**	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	-0.071258	0.020734	-3.436804	0.0185	C	-0.036499	0.025700	-1.420185	0.2148
ILR	1.056943	0.305954	3.454582	0.0181	ILR	-0.005064	0.005698	-0.888777	0.4148
MRISK	-0.002857	0.000789	-3.621802	0.0152	MRISK	0.031406	0.041686	0.753406	0.4851
STRISK	-0.000454	0.002854	-0.159197	0.8797	STRISK	0.001236	0.002003	0.616864	0.5643
SIZE	0.004426	0.001294	3.420619	0.0188	SIZE	-0.000141	0.000766	-0.183736	0.8614
RCV	-0.000319	0.000208	-1.533339	0.1858	RCV	-2.40E-05	0.001146	-0.020936	0.9841
RCR	5.23E-05	0.004529	0.011543	0.9912	RCR	-0.000709	0.000589	-1.202425	0.2830
RET2_3	0.001204	0.002948	0.408347	0.6999	RET2_3	0.001938	0.001371	1.413508	0.2166
RET4_6	0.001406	0.001246	1.127852	0.3106	RET4_6	0.004999	0.001268	3.941183	0.0109
RET7_12	0.003232	0.001364	2.369383	0.0640	RET7_12	0.003217	0.001054	3.051635	0.0284
YR20_21	-0.002304	0.001793	-1.2850	0.2551	YR20-21	-0.004231	0.002388	-1.77223	0.1366
YR21-_22	-0.000427	0.000904	-0.47236	0.6566	YR21-_22	-0.001647	0.001148	-1.43438	0.2109

The COVID-19 dummy years variables (YR20_21), (YR21-_22), have a negative effect on stocks returns but not so significant. Thus, macroeconomic variables associated to COVID-19 years do not affect stock return.

It suggests the firm's stock performance is firm-specific, driven more by internal factors (management, products, operations) or industry trends, rather than broad economic shifts, or that macroeconomic effects are already captured by other variables in the model, implying the firm is less sensitive to aggregate cycles or that macro variables work indirectly. The company's stock price is more influenced by its own earnings, competitive position, innovation, and management quality than by overall GDP, inflation, or interest rates. Macro factors influence the overall market (aggregate returns), but individual stock returns might deviate significantly.

Table 10: Granger Causality Test

RELIANCE				Decision
Null Hypothesis	**Obs**	**F-Statistic**	**Prob.**	
ILR does not Granger Cause RETURNS	15	0.29547	0.7505	Cannot Reject
RETURNS do not Granger Cause ILR		0.14422	0.8675	Cannot Reject
ADANI				
ILR does not Granger Cause RETURNS	15	0.29547	0.7505	Cannot Reject
RETURNS do not Granger Cause ILR		0.14422	0.8675	Cannot Reject

H_0: Return does not granger cause illiquidity; H_1: Return granger causes illiquidity

There is no causal connection between illiquidity and returns and vice versa. Unfortunately, the study found no causal connection between illiquidity and returns and vice versa, i.e. the causality neither runs from a return to illiquidity, nor from illiquidity to return.

5. CONCLUSIONS

The present study investigated the influence of illiquidity on stock returns of select conglomerate industries like Reliance and Adani Ltd in India for the period from 1 January 2008 to 31March 2025. The results endow with confirmation on the consequence of illiquidity in explaining the deviation of stock returns in the select conglomerate industries which administer a enormous network of varied, frequently discrete business entities under a solitary corporate umbrella to diversify risk and leverage internal capital. The result suggests that the impact of illiquidity on stock return is prominent in Reliance industry but negligible in case of Adani industry. In Reliance, stock's own return volatility is associated negatively and significantly with stock returns implying higher volatility connected with lower future returns which contradicts traditional financial theory (CAPM). But the result is contrary to Adani Ltd signifying insignificant positive impact of illiquidity on stock return. Positive effect of size on stock return in Reliance industry, although beyond expectation, indicates larger firms having a better risk-adjusted return during specific market phases, particularly under specific crisis period. This effect is prominently absent from Adani Ltd.

Stock's systematic risk (BETA) has an insignificant positive effect on stock returns in case of both industries indicating a direct, risk-reward relationship, although insignificantly positive. This is supportive of the capital asset pricing model (CAPM) implying that investors get rewarded for bearing higher systematic risk. In both industries under our consideration, Reliance and Adani, relative changes in trading volume (RCV) have insignificantly negative impact on stock returns. The result obtained indicates that approach of buying stocks with high past performance and selling stocks with low past performance stimulates a considerable excess return for a period of holding of six months. The granger causality test confirms no causality between illiquidity and stock return in any direction.

Prominently, by using Amuhud's measure of liquidity, we find that investors stipulate higher returns by holding illiquid stocks in select industries in emerging market of India. We, furthermore, came across with the fact that market risk effect is undersized and insignificant in elucidating stock returns in select conglomerate industries in India. The current study can be additionally broadened to appraise the research endeavor on illiquidity in diverse financial markets over a longer time frame.

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POLITICAL AFFILIATION AND ABNORMAL STOCK RETURNS AROUND ELECTIONS: AN EVENT STUDY FROM BANGLADESH

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ABSTRACT

Purpose - This study examines whether political affiliation influences stock market reactions to national elections in an emerging economy like Bangladesh. It investigates how firms affiliated with the Bangladesh Nationalist Party (BNP), the victorious party, respond to the most recent national election. Given the close ties between business and politics in Bangladesh, the election provides a natural setting to assess how political information is incorporated into stock prices.
Methodology - Using an event study methodology, the study analyzes daily stock returns of 21 BNP-affiliated firms and a matched sample of 21 non-affiliated firms listed on the Dhaka Stock Exchange. Non-affiliated firms are matched by industry and firm size to isolate the effect of political affiliation. Abnormal returns are estimated using the market model, and cumulative abnormal returns are calculated over short event windows around the election. To examine whether stock price reactions reflect changes in firm fundamentals, the study also analyzes quarterly EPS and NAV for BNP-affiliated firms in the two quarters preceding the election.
Findings - The findings show that BNP-affiliated firms experience positive and statistically significant abnormal returns on the first trading day following the election and earn significantly higher cumulative abnormal returns than non-affiliated firms over short post-election windows. In contrast, non-affiliated firms exhibit no significant market reaction. Importantly, no significant changes are observed in EPS or NAV prior to the election, suggesting that the stock price reaction is not driven by contemporaneous improvements in firm performance.
Conclusion - The results indicate that investors capitalize expected political benefits into stock prices following a decisive election outcome. The study contributes to the literature on political connections by providing firm-level evidence from Bangladesh and highlighting the role of political affiliation in shaping investor expectations in emerging capital markets.

Keywords: Political connections, stock market reaction, election, event study, Bangladesh
JEL Codes: D72, G14, G18

1. INTRODUCTION

Political events play a critical role in shaping economic expectations, particularly in emerging markets where governments exert substantial influence over business activity. Among such events, national elections are especially important because they signal potential changes in policy direction, regulatory enforcement, and access to state-controlled resources. Financial markets, which are inherently forward-looking, often respond rapidly to election outcomes as investors reassess firms' future prospects under a new political regime (MacKinlay, 1997; Malkiel & Fama, 1970). As a result, elections provide a natural setting for examining how political information is incorporated into stock prices.

A growing body of literature investigates stock market reactions to elections and political transitions, documenting that political outcomes can have meaningful valuation effects. However, the empirical evidence remains mixed, particularly at the aggregate market level. Some studies find positive abnormal returns following elections, consistent with reduced political uncertainty or favorable policy expectations (Changwatchai & Dheera-aumpon, 2023; Chavali et al., 2020; Jaya & Kurniasari, 2026), while others report weak or insignificant reactions when election outcomes are largely anticipated or do not entail substantial policy change (Diwakar & Vaswani, 2026; Firdous & Ray, 2025; Kirana & Sembel, 2019; Repousis, 2016). One explanation for these mixed findings is that political events do not affect all firms uniformly. Instead, their economic consequences are likely to be concentrated among firms with political affiliations, whose expected benefits or risks change disproportionately following shifts in political power (Faccio, 2006; Goldman et al., 2009; Wielechowski et al., 2026).

This study examines how political affiliation shapes stock market reactions to elections by focusing on firms affiliated with the Bangladesh Nationalist Party (BNP) around the most recent national election in Bangladesh. The election resulted in a decisive victory for the BNP, significantly altering the political landscape and reducing uncertainty regarding the future direction of government policy. Trading on the Dhaka Stock Exchange (DSE) was suspended around the election period, and market activity resumed shortly after the election results were announced. This institutional feature allows for a clean identification of the immediate post-election market response, making the election a natural experiment for studying the valuation effects of political connections.

Bangladesh provides a particularly suitable context for this analysis. The country's economy is characterized by close ties between political actors and business elites, and government involvement in economic activity remains substantial through regulation, taxation, licensing, and public procurement (Sobhan et al., 2025). Prior research suggests that in such environments, political connections can materially affect firm value by shaping access to state resources and regulatory outcomes (Faccio, 2006; Fisman, 2001). Despite this institutional reality, relatively little is known about how political affiliation influences stock market behavior in Bangladesh. Existing studies on the country primarily focus on corporate governance, ownership structure, or financial reporting issues, with limited attention to the capital market implications of political connections (Ahmed et al., 2022; Sobhan, 2022; Uddin et al., 2023). This gap is notable given the prominence of politically connected firms in the Bangladeshi economy.

This study is further motivated by the need to distinguish between expectation-driven valuation effects and realized changes in firm performance. While stock prices reflect investors' expectations about future cash flows, accounting measures such as earnings per share and net asset value capture realized performance and typically adjust more slowly. Several studies show that stock price reactions to political events are often not accompanied by immediate changes in accounting fundamentals, suggesting that markets capitalize anticipated political benefits before they materialize in firm performance (Ashraf et al., 2020; Repousis, 2016). Examining both market-based and accounting-based outcomes is therefore critical for understanding the mechanisms through which political affiliation affects firm value.

Against this backdrop, the study addresses three interrelated research questions. First, do firms affiliated with the winning political party experience abnormal stock returns around the national election? Second, do politically affiliated firms outperform non-affiliated firms operating in similar industries and of comparable size? Third, are observed stock price reactions accompanied by short-term changes in firm fundamentals? To answer these questions, the study employs an event study methodology using a matched sample of 21 BNP-affiliated firms and 21 non-affiliated firms listed on the Dhaka Stock Exchange, with non-affiliated firms selected from the same industries and of similar size to their affiliated counterparts. This matched-sample design follows prior research emphasizing the importance of cross-sectional comparisons for isolating political effects from broader market movements (Ashraf et al., 2020; Oehler et al., 2013).

This study makes several important contributions. First, it contributes to the literature on political connections by providing firm-level evidence from Bangladesh, an emerging market that remains underrepresented in international capital market research. Second, the matched-sample design strengthens causal inference by reducing concerns that observed differences in stock performance are driven by industry- or size-related factors rather than political affiliation. Third, by jointly examining stock market reactions and accounting fundamentals, the study sheds light on whether election-related valuation effects are driven by changes in expectations or realized firm performance. Finally, the findings have practical relevance for investors, regulators, and policymakers by highlighting the economic importance of political affiliation in capital markets and raising broader questions about market efficiency, transparency, and corporate governance in emerging economies.

The remainder of the paper is organized as follows. The next section develops the theoretical framework and hypotheses. The subsequent section describes the sample, data, and research methodology. The empirical findings and discussion are then presented, followed by a concluding section that outlines policy implications, limitations, and directions for future research.

2. LITERATURE REVIEW

2.1. Political Events, Market Efficiency, and Stock Price Reactions

According to the semi-strong form of the Efficient Market Hypothesis (EMH), stock prices adjust rapidly to publicly available information (Malkiel & Fama, 1970). Political events, particularly national elections, constitute major information shocks because they signal potential changes in economic policy, regulatory enforcement, fiscal priorities, and the allocation of state resources. Event study methodology has therefore been widely used to examine how stock markets respond to election outcomes in both developed and emerging economies. Empirical evidence on election-related market reactions, however, is mixed. Some studies document significantly positive abnormal returns following elections, consistent with markets responding to reduced uncertainty or favorable policy expectations (Changwatchai & Dheera-aumpon, 2023; Chavali et al., 2020; Jaya & Kurniasari, 2026). Other studies find weak or insignificant market reactions, particularly when election outcomes are anticipated in advance or when political change does not materially alter policy direction (Diwakar & Vaswani, 2026;

Kirana & Sembel, 2019; Repousis, 2016; Wielechowski et al., 2026). These mixed findings suggest that aggregate market reactions alone may mask important cross-sectional differences across firms, particularly differences arising from political connections (Akcigit et al., 2023).

2.2. Corporate Political Connections and Firm Value

Corporate political connections refer to ties between firms and political actors, such as ownership links, board memberships, or executive affiliations with political parties or politicians (Faccio, 2006). A large multidisciplinary literature shows that political connections can materially affect firm value through access to state-controlled resources, preferential regulation, government contracts, tax advantages, and protection from adverse enforcement actions (Wei et al., 2023). From a resource dependence perspective, political connections strengthen firms' external linkages and reduce exposure to political uncertainty, thereby enhancing expected future cash flows (Pfeffer & Salancik, 1978). Empirical studies across emerging markets document that politically connected firms often enjoy valuation premiums and superior stock market performance, particularly around politically salient events such as elections (Changwatchai & Dheera-aumpon, 2023; Fisman, 2001; Goldman et al., 2009).

At the same time, political connections may also impose costs, including rent extraction, agency problems, and political obligations that can erode firm performance in the long run (Islam et al., 2023; Shleifer & Vishny, 1989). This dual nature of political connections explains why long-horizon accounting performance results are often mixed across studies, while short-horizon stock market reactions tend to be more consistently positive around political events (Islam et al., 2023).

2.3. Elections as Information Events for Politically Connected Firms

National elections are particularly informative events for politically connected firms because they directly affect the probability that such connections will translate into economic benefits. When a political party achieves a decisive electoral victory, uncertainty regarding policy direction and political access is substantially reduced. Investors may therefore revise upward their expectations regarding the future profitability of firms affiliated with the winning party (Maaloul et al., 2018).

Event studies from Pakistan, Thailand, and other emerging markets show that politically connected firms experience stronger abnormal returns around elections than non-connected firms, indicating that investors price expected political advantages immediately following election outcomes (Ashraf et al., 2020; Changwatchai & Dheera-aumpon, 2023; Jaya & Kurniasari, 2026). In contrast, firms without political connections are less likely to benefit from the new political environment and therefore exhibit weaker or insignificant market reactions.

In the context of Bangladesh, where political-business linkages are pervasive and government influence over economic activity is substantial, the informational content of election outcomes is likely to be particularly strong. A landslide electoral victory further amplifies this effect by signaling political stability and continuity of power. Based on this reasoning, the first hypothesis is formulated as follows:

H1: Firms affiliated with the winning political party experience positive abnormal stock returns around the national election.

2.4. Cross-Sectional Differences Between Affiliated and Non-Affiliated Firms

While elections may affect overall market sentiment, a stronger reaction among politically affiliated firms relative to non-affiliated firms would indicate that political connections drive the observed market response. Prior research emphasizes that such cross-sectional comparisons are essential for isolating political effects from broader market movements (Ashraf et al., 2020; Li & Born, 2006; Oehler et al., 2013). Studies using matched samples or industry-based comparisons consistently show that politically connected firms outperform non-connected firms around elections, particularly when political power shifts decisively or when political uncertainty is resolved (Aldhamari et al., 2020; Ashraf et al., 2020; Changwatchai & Dheera-aumpon, 2023). Accordingly, the second hypothesis is stated as:

H2: Firms affiliated with the winning political party earn higher abnormal stock returns than non-affiliated firms around the national election.

2.5. Stock Price Reactions and Firm Fundamentals

An important distinction in the political connections' literature is between market expectations and realized firm performance. While stock prices reflect forward-looking expectations, accounting measures such as earnings per share (EPS) and net asset value (NAV) capture realized performance and adjust more slowly over time. Several studies find that stock price reactions to political events are not immediately accompanied by changes in accounting performance, suggesting that markets capitalize expected political benefits before they materialize in firm fundamentals (Ashraf et al., 2020; Repousis, 2016). This divergence is particularly pronounced in short event windows surrounding elections. In line with this reasoning, the final hypothesis is proposed:

H3: The positive stock price reaction of politically affiliated firms around the national election is not accompanied by significant short-term changes in firm fundamentals.

3. DATA AND METHODOLOGY

3.1. Sample and Data

In this study, all sample firms are listed on the Dhaka Stock Exchange (DSE). The treatment group consists of 21 BNP-affiliated firms, identified based on political connections through ownership or board membership, where at least one director, major shareholder, or senior executive is publicly associated with the BNP. Political affiliation data are hand-collected from company disclosures, public records, and media sources. To construct an appropriate control group, the study selects 21 non-affiliated firms with no identifiable political connections. Each non-affiliated firm is matched with a BNP-affiliated firm based on industry classification and firm size, ensuring comparability in economic characteristics and risk exposure. This matched-pair design mitigates concerns that observed differences in stock performance are driven by industry-specific or size-related factors rather than political affiliation.

Daily stock price data and market index data (DSEX) are obtained from the DSE for the period 1 November 2025 to 17 February 2026. This window provides sufficient pre-election observations to estimate normal return behavior and captures the immediate post-election market response. Daily stock returns are computed using closing prices. To assess whether the market reaction reflects changes in firm fundamentals, the study also collects quarterly earnings per share (EPS) and net asset value (NAV) for BNP-affiliated firms for Q2 and Q3 of 2025, the two quarters preceding the election. These accounting data are extracted from quarterly financial statements and DSE disclosures.

3.2. Research Method

3.2.1. Event Study Framework

This study adopts a standard event study methodology to examine stock market reactions to the national election in Bangladesh. Event studies are widely used to assess how quickly and accurately capital markets incorporate new information into stock prices (Brown & Warner, 1985; MacKinlay, 1997). Political elections represent salient information events that can alter investors' expectations regarding firms' future cash flows, particularly for firms with political affiliations.

Due to the suspension of trading on the DSE around the election, event time is defined in trading days rather than calendar days. The first trading day following the election (15 February 2026) is designated as event day 0. The last trading day prior to the election (10 February 2026) is treated as event day −1, and the subsequent trading day (16 February 2026) as event day +1. This approach is consistent with prior event-study research in markets where trading interruptions occur around major events.

3.2.2. Market Model for Expected Returns

Expected (normal) stock returns are estimated using the market model, which relates a firm's return to the contemporaneous market return. For firm i on day t, the market model is specified as:

$$R_{i,t} = \alpha_i + \beta_i R_{m,t} + \varepsilon_{i,t} \quad (1)$$

Where, $R_{i,t}$ is the daily return of firm i on day t, $R_{m,t}$ is the daily market return measured by the DSEX index, α_i and β_i are firm-specific parameters, and $\varepsilon_{i,t}$ is the error term. The parameters α_i and β_i are estimated over a pre-election estimation window ending before the market closure, ensuring that expected returns are not influenced by the election outcome. The market model is commonly used in event studies due to its parsimony and strong empirical performance in short-horizon analyses (Brown & Warner, 1985).

3.2.3. Abnormal Returns

Abnormal returns (ARs) are computed as the difference between actual returns and expected returns derived from the market model:

$$AR_{i,t} = R_{i,t} - (\alpha_i + \beta_i R_{m,t}) \quad (2)$$

Abnormal returns capture the portion of stock price movements that cannot be explained by general market movements and are therefore attributed to firm-specific information related to the election outcome.

3.2.4. Cumulative Abnormal Returns

To assess the total market reaction over short periods surrounding the election, cumulative abnormal returns (CARs) are calculated by aggregating abnormal returns over alternative event windows:

$$CAR_i(\tau_1, \tau_2) = \sum_{t=\tau_1}^{\tau_2} AR_{i,t} \quad (3)$$

where $\tau 1$ and $\tau 2$ denote the beginning and end of the event window, respectively.

Consistent with prior event-study literature and the sharp nature of political information arrival (MacKinlay, 1997), the analysis focuses on short event windows, including event day (0), (−1, +1), and (0, +1).

3.2.5. Statistical Inference

Statistical significance is evaluated using t-tests. One-sample t-tests examine whether abnormal returns and cumulative abnormal returns are significantly different from zero for BNP-affiliated and non-affiliated firms separately. Two-sample t-tests are used to compare CARs between BNP-affiliated and non-affiliated firms, allowing for a direct assessment of whether political affiliation explains cross-sectional differences in stock market reactions.

3.2.6. Fundamentals Analysis

To examine whether the observed stock price reaction reflects changes in firm performance, the study conducts paired t-tests comparing quarterly earnings per share (EPS) and net asset value (NAV) of BNP-affiliated firms across the two quarters preceding the election (Q2 and Q3 of 2025). The absence of significant changes in these accounting measures would suggest that the stock market reaction is driven by changes in expectations rather than realized improvements in firm fundamentals.

4. FINDINGS AND DISCUSSIONS

4.1. Descriptive Statistics

Table 1 reports descriptive statistics for the sample firms. The final sample consists of 42 firms, evenly divided between 21 BNP-affiliated firms and 21 non-affiliated firms, drawn exclusively from the DSE. Non-affiliated firms are matched to affiliated firms based on industry and firm size, ensuring comparability across key economic characteristics. The mean daily return of BNP-affiliated firms is higher than that of non-affiliated firms, while return volatility is broadly similar across the two groups. These statistics suggest that the two samples are comparable in terms of risk characteristics prior to the election, supporting the validity of the matched-sample design. Overall, the descriptive evidence indicates that any post-election divergence in stock performance is unlikely to be driven by systematic differences in firm size or industry composition.

Table 1: Summary Statistics

Variable	BNP-connected	Not-connected
Number of firms	21	21
Number of firm-days	1113	1113
Mean daily return (%)	0.2055	0.0339
Return volatility	0.0274	0.0255

4.2. Market Reaction to the Election: Daily Abnormal Returns

Table 2 presents average abnormal returns (AARs) around the election, while Figure 1 plots the time-series pattern of abnormal returns for BNP-affiliated and non-affiliated firms. Consistent with H1, BNP-affiliated firms experience a large and statistically significant positive abnormal return on event day 0, corresponding to the first trading day following the election. A smaller but still positive abnormal return is observed on the subsequent trading day.

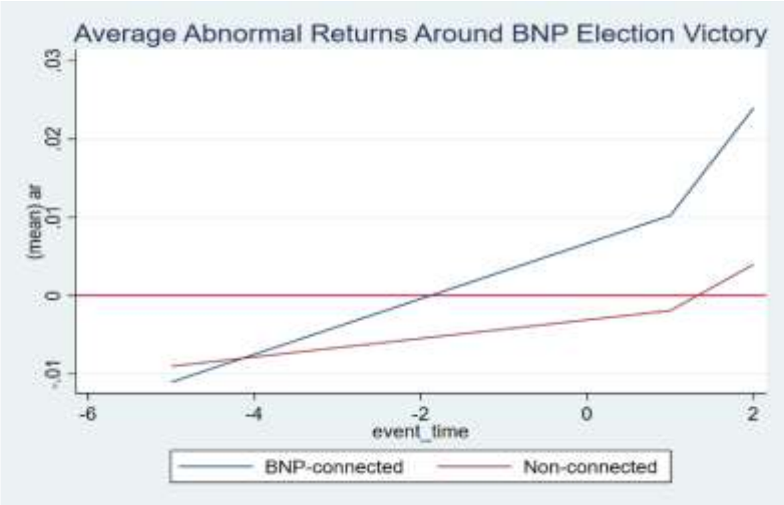
Table 2: Daily Abnormal Returns Around The Event

Event Day	BNP AAR (%)	t-stat	Non-BNP AAR (%)	t-stat
−1	0.52	0.88	-0.43	0.41
0	0.86***	3.12	-0.35	0.62
+1	1.01**	2.01	0.21	0.33

*p < 0.10; **p < 0.05; ***p < 0.01

In contrast, non-affiliated firms do not exhibit statistically significant abnormal returns on any of the event days. Figure 1 reinforces this finding by showing a sharp spike in abnormal returns for BNP-affiliated firms immediately following the election, while the return series for non-affiliated firms remains relatively flat.

Figure 1: Abnormal Returns Around the Event



These findings are consistent with prior studies documenting that elections function as information events, particularly for politically connected firms (Ashraf et al., 2020; Changwatchai & Dheera-aumpon, 2023). The results suggest that investors rapidly incorporated the election outcome into stock prices, selectively revising expectations for firms affiliated with the winning political party. The absence of a comparable reaction among non-affiliated firms indicates that the market response is not driven by general election-related optimism, but rather by firm-specific political considerations.

4.3. Cumulative Abnormal Returns and Cross-Sectional Differences

Table 3 reports cumulative abnormal returns (CARs) over alternative short event windows. BNP-affiliated firms earn positive and statistically significant CARs on event day 0 and over the (0,+1) window. In contrast, CARs for non-affiliated firms are negative or statistically insignificant across all event windows. While CARs over the (−1,+1) window are positive but statistically insignificant, the results consistently show strong and significant abnormal performance on event day 0 and over the (0,+1) window, where market reaction is most concentrated.

Table 3: Cumulative Abnormal Returns (CARs) Around the Election

Event window	BNP-affiliated firms CAR (%)	t-stat	Non-affiliated firms CAR (%)	t-stat
(0)	0.86***	2.83	-0.35	(-1.11)
(−1, +1)	2.39	1.42	-0.57	(−1.47)
(0, +1)	1.87***	3.01	-9.14	(-1.21)

*p < 0.10; **p < 0.05; ***p < 0.01

Table 4 directly compares CARs between BNP-affiliated and non-affiliated firms. The differences in CARs are positive across all event windows and statistically significant for event day 0 and the (0,+1) window, indicating that BNP-affiliated firms outperform non-affiliated firms by a substantial margin in the immediate post-election period.

Table 4: Cross-Sectional Differences in CARs Between BNP-Affiliated and Non-Affiliated Firms

Event window	CAR difference (BNP − Non-BNP) (%)	t-stat
(0)	1.21***	(2.68)
(−1,+1)	2.96	(1.34)
(0,+1)	2.01***	(3.16)

*p < 0.10; **p < 0.05; ***p < 0.01

This cross-sectional evidence provides strong support for H2 and aligns closely with the political connections literature. Prior studies emphasize that political affiliation enhances firm value primarily when political power shifts decisively or uncertainty is resolved (Changwatchai & Dheera-aumpon, 2023; Faccio, 2006; Firdous & Ray, 2025; Goldman et al., 2009; Maaloul et al., 2018). The landslide electoral victory in Bangladesh appears to have served precisely this role, reducing uncertainty regarding future political access and policy direction. Moreover, the matched-pair design strengthens the interpretation that these differences are attributable to political affiliation rather than industry-specific shocks or size effects. Similar cross-sectional patterns are documented in emerging markets where business–politics linkages are pervasive (Ashraf et al., 2020; Oehler et al., 2013).

4.4. Stock Price Reaction versus Firm Fundamentals

Table 5 examines whether the observed stock price reaction is accompanied by changes in firm fundamentals. The results show that neither earnings per share (EPS) nor net asset value (NAV) of BNP-affiliated firms change significantly between the two quarters preceding the election.

Table 5: Quarterly Fundamentals of BNP-Affiliated Firms

Variable	Q2 2025 Mean	Q3 2025 Mean	Mean Difference	t-stat
EPS	−3.10	−2.87	+0.24	(1.50)
NAV	37.91	34.15	−3.76	(−1.45)

This finding supports H3 and suggests that the positive abnormal returns documented in Tables 2–4 are not driven by contemporaneous improvements in accounting performance. Instead, the stock price reaction appears to reflect investors' expectations regarding future political benefits rather than realized changes in firm profitability or asset values. This divergence between market-based and accounting-based measures is consistent with prior research showing that stock prices capitalize expected political advantages well before such benefits materialize in financial statements (Ashraf et al., 2020; Jaya & Kurniasari, 2026; Repousis, 2016). In politically connected settings, investors may anticipate preferential access to government contracts, regulatory forbearance, or policy support, even though these advantages may only be reflected in accounting numbers over a longer horizon.

4.5. Discussion and Implications

The findings provide consistent evidence that political affiliation shapes investor behavior in Bangladesh's capital market. The market reacts swiftly and selectively to political change, rewarding firms connected to the winning party while leaving non-affiliated firms largely unaffected. The absence of short-term changes in firm fundamentals reinforces the interpretation that the market reaction is driven by changes in expectations, rather than by improvements in operational performance. This pattern highlights the forward-looking nature of stock prices and underscores the economic importance of political connections in emerging markets. More broadly, the results contribute to the literature on political connections by showing that the valuation effects of political affiliation are particularly pronounced following decisive electoral outcomes. In settings characterized by close ties between business and politics, elections serve not merely as political events, but as economically meaningful signals that are rapidly incorporated into firm valuations.

5. CONCLUSION

This study examines how political affiliation influences stock market reactions in Bangladesh by analyzing the performance of firms affiliated with the BNP around the most recent national election. Using a matched-sample event study design and data from the DSE, the study provides clear evidence that political connections play a meaningful role in shaping investor expectations.

The findings show that BNP-affiliated firms experience positive and statistically significant abnormal returns immediately following the election, while non-affiliated firms exhibit no comparable reaction. Cumulative abnormal return analysis further demonstrates that BNP-affiliated firms significantly outperform non-affiliated firms over short post-election windows. Importantly, these stock price reactions are not accompanied by significant changes in firm fundamentals, as measured by earnings per share and net asset value in the pre-election quarters.

The results suggest that investors capitalize expected future political benefits into stock prices following a decisive electoral outcome, rather than responding to contemporaneous improvements in firm performance. The evidence highlights the forward-looking nature of stock prices and underscores the economic value investors attach to political affiliation in emerging markets where business–politics linkages are pervasive.

By focusing on Bangladesh, this study contributes to the growing literature on political connections by providing evidence from a context that remains underexplored in international research. The findings reinforce the view that political events can have differential valuation effects across firms depending on their political ties.

The findings of this study carry several important policy implications. First, the results raise concerns about market fairness and resource allocation. When stock prices respond strongly to political affiliation rather than firm fundamentals, capital allocation may become distorted, favoring politically connected firms over potentially more efficient but politically neutral competitors. This has implications for long-term economic efficiency and market development in Bangladesh. Second, the evidence underscores the importance of corporate governance and transparency. Regulators and policymakers should consider strengthening disclosure requirements related to political connections, including ownership links and board-level political affiliations. Enhanced transparency would allow investors to better assess political risks and reduce information asymmetry in the capital market. Third, the findings highlight the need for institutional safeguards that limit the scope for preferential treatment of politically connected firms. Strengthening regulatory independence, improving enforcement consistency, and reducing discretionary decision-making in areas such as licensing, taxation, and public procurement could help mitigate the economic advantages associated with political connections. Finally, from an investor-protection perspective, the results suggest that market participants are highly sensitive to political developments. Regulators and exchanges may therefore benefit from improving market communication and stability mechanisms around major political events to ensure orderly trading and reduce excessive speculation driven by political expectations.

This study is subject to certain limitations that also provide avenues for future research. First, the analysis focuses on short-term stock market reactions and does not examine the long-term performance implications of political affiliation. Future studies could investigate whether the short-term valuation gains of politically affiliated firms persist over longer horizons or reverse as political expectations are realized. Second, political affiliation is identified based on observable ownership and board-level connections. Future research could explore alternative dimensions of political ties, such as informal networks or lobbying activities, which are more difficult to observe but may also influence firm value. Third, while this study focuses on Bangladesh, extending the analysis to other emerging markets would allow for cross-country comparisons and a deeper understanding of how institutional environments shape the economic consequences of political connections.

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TAX REVENUE SUSTAINABILITY AND MACROECONOMIC STABILITY IN NIGERIA: A TIME-SERIES ANALYSIS (2000–2024)

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ABSTRACT

Purpose- This study examines whether more sustainable tax revenue translates into a more stable Nigerian economy, using annual data from 2000 to 2024.
Methodology- Three dimensions of tax sustainability were tested against three macroeconomic outcomes: the tax-to-GDP ratio against output volatility, tax buoyancy against inflation, and non-oil tax composition against unemployment. The analysis draws on ARDL bounds testing, VECM, Johansen cointegration, and the Toda-Yamamoto causality test, with data sourced from the Central Bank of Nigeria, FIRS, and the National Bureau of Statistics.
Findings- The results are consistent across all three models: a higher tax-to-GDP ratio reduces output volatility ($\beta = -0.4231$, $p < 0.05$), stronger tax buoyancy pulls inflation down ($\beta = -2.176$, $p < 0.05$), and a greater non-oil share in the tax mix lowers unemployment ($\beta = -0.6814$, $p < 0.05$). Error correction terms confirm that each relationship holds over the long run, and diagnostic tests clear the models on serial correlation, heteroskedasticity, normality, and structural stability.
Conclusion- Nigeria's persistent output swings, inflation, and unemployment are not just economic problems, they are the predictable outcome of a tax system that has never been built to sustain them.

Keywords: Tax revenue sustainability, Tax-to-GDP ratio, tax buoyancy, tax structure, macroeconomic stability.
JEL Codes: H20, H60, E62

1. INTRODUCTION

1.1. Background to the Study

The capacity of a government to generate sustainable revenue is among the most fundamental pillars of macroeconomic stability and national development. Across the world, governments rely on diversified and robust fiscal systems to finance public goods, sustain economic infrastructure, and respond to the cyclical shocks that inevitably disrupt national economies. In developing economies, however, the fiscal architecture is often fragile, poorly diversified, and beholden to the volatile dynamics of commodity markets (Mehdiyeva & Gurbanova, 2025; Meyliev & Gofurova, n.d.; Neupane, 2024; Monday et al., 2022). Nowhere is this structural fragility more pronounced than in the Federal Republic of Nigeria, where decades of mono-commodity dependence have eroded the state's capacity to generate sustainable revenues and, by extension, maintain macroeconomic stability.

Nigeria, Africa's largest economy by Gross Domestic Product (GDP), presents a paradox of resource abundance and fiscal poverty. Agama and Onowu (2025) documented that Nigeria has been solely dependent on crude oil export proceeds for approximately 90% of its revenue, a structural dependency that has rendered the economy extremely vulnerable to global oil price fluctuations. This dependency has produced a vicious cycle: when oil prices rise, fiscal profligacy ensues; when they fall, fiscal crises and macroeconomic instability inevitably follow (Aliyu & Mustapha, 2020). The Nigerian government has historically been unable to mobilize adequate tax revenues, a failure reflected in the country's stubbornly low tax-to-GDP ratio, which Achanya and Mamman (2024) described as one of the lowest in Africa, at approximately 6 to 12%, far below the internationally recognized minimum benchmark of 15% required to finance basic developmental goods and services (Oluwatobi, Adegbie & Ogundajo, 2021).

The nexus between tax revenue sustainability and macroeconomic stability has attracted significant scholarly attention. Ajeigbe, Ganda, and Enowkenwa (2024), in a study of 45 African countries, found that improvements in tax revenue generation positively affect economic growth while simultaneously reducing poverty and unemployment. Adegbie, Salawu, and Ojutawo (2020) found empirically that tax revenue volatility, moderated by inflation and exchange rates, had a significant negative effect on economic growth in Nigeria (Adj. $R^2 = 0.60$, $F(3,105) = 2{,}140.285$, $p < 0.05$). Nigeria's total public debt rose to N87.38 trillion as of June 2023 (Debt Management Office, 2023, as cited in Adeyemi-Tijani, 2024), while the debt-service-to-revenue ratio exceeded 80% in recent years, leaving negligible resources for productive developmental expenditure.

The period 2020–2024 has been particularly turbulent fiscally: the COVID-19 pandemic simultaneously collapsed oil revenues and elevated expenditure demands; the fuel subsidy removal of 2023 generated an inflationary shock exceeding 30%; and the liberalisation of the foreign exchange market produced a sharp naira depreciation. These events provide a particularly rich and policy-relevant empirical window for quantitative analysis of the tax-macroeconomy nexus. This study fills this gap by applying modern time-series econometric methods to annual data from 2000 to 2024, providing rigorous evidence on the three central research questions.

1.2. Statement of the Problem

Nigeria's fiscal history is a chronicle of structural dysfunction, institutional failure, and missed developmental opportunities. Despite possessing enormous natural resource endowments and operating within a federation of over 220 million people, the Nigerian government has chronically failed to generate revenues commensurate with its developmental obligations. The resultant fiscal gap has translated into inadequate public services, crumbling infrastructure, macroeconomic instability, a rising debt burden, and the persistent inability of government at all levels to meet basic financial responsibilities. This study is provoked by four distinct but interrelated gaps that, taken together, define the problem space of tax revenue sustainability and macroeconomic stability in Nigeria.

At the conceptual level, there exists a notable absence of a comprehensive and integrated framework that explicitly maps the pathways through which tax revenue sustainability, or its absence, generates macroeconomic instability in the specific context of a resource-dependent mono-economy. Most existing frameworks treat tax revenue sustainability and macroeconomic stability as independent policy concerns, or address their relationship in the context of advanced economies with diversified fiscal architectures, without adequately accounting for how fiscal loopholes, structural composition of the tax system, and the responsiveness of revenues to economic growth interact with external shocks to compound instability in institutionally weak states (Pamba, 2025; Chamisa & Sunde, 2025; Terefe & Teera, 2018; Athanasios et al., 2022).

Empirically, while a growing body of literature (Chamisa & Sunde, 2025; Aliyu & Mustapha, 2020; Juliannisa et al., 2023) has examined tax revenue and macroeconomic performance in Nigeria, significant gaps persist in the analysis of the specific mechanisms through which key revenue indicators, particularly the tax-to-GDP ratio, tax buoyancy, and tax structure, translate into measurable macroeconomic outcomes including output volatility, inflation, and unemployment. Many existing studies focus narrowly on the direct GDP-tax revenue nexus, employing simple linear models that fail to capture the multi-dimensional and regime-dependent relationships that characterize Nigeria's fiscal and macroeconomic environment. The period from 2020 to 2025, characterized by the COVID-19 pandemic, global supply chain disruptions, and geopolitical shocks, represents a particularly under-researched empirical window offering rich evidence on these relationships.

From a literature perspective, the extant scholarship on tax revenue and macroeconomic stability in Nigeria is characterized by a focus on individual tax types in isolation, a lack of integrated cross-variable analysis linking tax revenue characteristics to the full range of macroeconomic stability indicators, and insufficient engagement with comparative perspectives from economies that have navigated similar fiscal challenges. Furthermore, the role of institutional factors, corruption, tax administration efficiency, and governance quality, in mediating the tax revenue-macroeconomic stability relationship in Nigeria is underexplored relative to the macroeconomic fundamentals. The significance gap reflects a persistent disconnect between what the literature prescribes and what fiscal policy practice delivers in Nigeria.

Taken together, these gaps create a critical need for a study that rigorously examines the effect of the tax-to-GDP ratio on output volatility, the influence of tax buoyancy on inflation, and the impact of tax structure composition on unemployment in Nigeria, thereby providing the evidence base needed to inform more effective, sustainable, and macroeconomically stabilizing fiscal policy.

The study examined the effect of tax stabilization mechanisms on macroeconomic performance in Nigeria. Specifically, the study further examined the:

i. effect of the tax-to-GDP ratio on output volatility measured by GDP growth rate in Nigeria;
ii. influence of tax buoyancy on the inflation rate in Nigeria; and

iii. impact of tax structure composition on the unemployment rate in Nigeria.

The following hypotheses were formulated in null form to guide the study:

H_{01}: The tax-to-GDP ratio does not have a significant effect on output volatility (GDP growth rate) in Nigeria;

H_{02}: Tax buoyancy does not have a significant influence on the inflation rate in Nigeria;

H_{03}: Tax structure composition does not have a significant impact on the unemployment rate in Nigeria.

2. LITERATURE REVIEW

2.1. Theoretical Framework

2.1.1. Tax Buoyancy Theory

Tax Buoyancy Theory, first propounded by Musgrave (1969), posits that tax systems should be designed such that revenues automatically expand proportionally with economic growth. A buoyancy coefficient greater than one indicates that tax revenues grow faster than GDP, providing an automatic fiscal stabiliser, while a coefficient below one signals structural inelasticity in the tax system. Iorlaha, Agi, and Asema (2024) emphasised that building tax buoyancy into Nigeria's fiscal architecture is essential for sustainable macroeconomic stability, as it reduces dependence on discretionary revenue measures and eliminates the procyclical volatility associated with oil-dependent fiscal systems.

2.1.2. Resource Curse Theory

Resource Curse Theory (Auty, 1993; Sachs & Warner, 1995) posits that natural-resource-abundant countries frequently experience slower growth and weaker institutional development than resource-poor economies, through the Dutch Disease mechanism, the rentier-state effect, and the volatility channel. Achanya and Mamman (2024) explicitly anchored their analysis of Nigeria's fiscal challenges in Resource Curse Theory, establishing that oil dependence has impeded the development of a broad-based, sustainable tax system and, by extension, macroeconomic stability.

2.1.3. Fiscal Sustainability Theory

Fiscal sustainability, as formalised in the intertemporal budget constraint framework, requires that the present value of future primary surpluses equals the current stock of public debt. Olushola, Beyai, and Anagbado (2024) defined fiscal sustainability as the government's long-term capacity to uphold its current tax, spending, and other policies without jeopardising debt service obligations. Saibu (2018), applying this framework to Nigeria's data from 1961 to 2016 using Dynamic OLS, found evidence of only 'weak sustainability,' attributable largely to the unsustainable structure of government revenues dominated by volatile oil receipts. Reis (2022) extended the framework by identifying 'debt revenue' as a third sustainability mechanism, noting that this channel is largely unavailable to developing economies like Nigeria.

2.2. Empirical Review

2.2.1. Tax Revenue and Output Volatility/Growth

Adegbie, Salawu, and Ojutawo (2020) investigated tax revenue volatility and economic growth in Nigeria using quarterly data (1981Q1–2017Q4, n = 108). Their ARDL results found that tax revenue volatility moderated by inflation and exchange rates had a statistically significant negative effect on economic growth (Adj. $R^2 = 0.60$, $F(3,105) = 2{,}140.285$, $p < 0.05$; $\beta = 0.219$). Oluwatobi, Adegbie, and Ogundajo (2021) established using 38 years of time-series data that tax revenue had a significant positive effect on GDP ($p < 0.05$), and that Gross Fixed Capital Formation significantly mediated this relationship. Tafida et al. (2024), using ARDL on data from 1990–2022, found that in the long run, aggregate taxes had insignificant impact on economic growth, while PPT showed insignificant negative impacts and other taxes showed positive but insignificant effects, a finding that underscores the structural inadequacy of Nigeria's tax-growth transmission mechanisms.

Onwuchekwa and Jerome (2025) used ARDL on data from 1970–2023 and found that GDP has a negligible negative effect on tax revenue in the long run, and that trade openness significantly and positively influences tax revenue, suggesting that greater integration into the global trading system is a potential lever for expanding Nigeria's fiscal base, a finding consistent with Amouzou, Dzoagbe, and Ayivi (2019) for Togo. Nwankpa and Anaba (2024) found, using OLS regression on data from 2000–2021, that Personal Income Tax had a statistically significant positive impact on GDP, while VAT had an insignificant impact for the period reviewed.

2.2.2. Tax Buoyancy and Inflation

Adeyemi-Tijani (2024) employed ARDL modelling on annual data from 1981–2022 and established that public debt, the accumulated consequence of chronic revenue shortfalls attributable to low tax buoyancy, is a significant determinant of macroeconomic instability through its inflationary consequences. Pamba (2025), using a Markov-switching model on South

African quarterly data (2000Q1–2023Q3), demonstrated that inflation negatively impacts tax revenue in recessionary regimes while positively influencing it in expansionary regimes, a regime-dependent finding with direct implications for the design of countercyclical tax policies. Golpe, Sánchez-Fuentes, and Vides (2023), applying multivariate Granger causality to Euro Area data, found that monetary policy variables play the leading causal role in the fiscal sustainability–growth nexus.

2.2.3. Tax Structure and Unemployment

Agama and Onowu (2025) employed Pearson correlation, multiple regression, and the Toda-Yamamoto causality test on annual data from 2000–2020, finding significant relationships between VAT, PPT, CIT and employment generation ($p < 0.05$), while PPT showed an insignificant and perverse relationship with GDP growth. Olushola, Beyai, and Anagbado (2024), using ARDL with the ADF unit root test on Nigerian data, found that while PPT exhibited a dampening effect on economic growth, CIT and VAT contributed positively, with VAT's impact eclipsing that of CIT. Ngwoke (2024) confirmed that VAT and customs/excise duties had significant effects on real GDP ($p < 0.05$, OLS, 2002–2022), while Osho, Olemija, and Falade (2019) found that CIT had a positive relationship with capital expenditure, a critical employment-generating channel.

2.3. Gaps in Literature

The review reveals three principal gaps this study addresses. First, most Nigerian-focused studies employ single-equation OLS or VAR models that do not account for cointegration, structural breaks, or error correction dynamics, gaps addressed here through ARDL bounds testing and VECM. Second, no existing study simultaneously models all three dimensions of tax revenue sustainability against all three corresponding macroeconomic stability outcomes within a unified framework. Third, no published quantitative study covering Nigeria incorporates data through 2024, leaving the fiscal consequences of the COVID-19 shock, the fuel subsidy removal, and the 2023 exchange rate liberalisation empirically unaddressed.

3. DATA AND METHODOLOGY

3.1. Research Design

This study adopts an ex-post facto quantitative research design, utilising secondary annual time-series data from 2000 to 2024 ($n = 25$ observations). The ex-post facto design is appropriate because the study investigates the relationship between already existing fiscal and macroeconomic variables without experimental manipulation. The study employs a battery of modern time-series econometric techniques in sequence: descriptive statistics, unit root testing, cointegration testing, ARDL bounds testing, VECM estimation, and Granger causality testing, followed by comprehensive diagnostic tests.

3.2. Variables and Operationalization

Dependent Variables (Macroeconomic Stability): (i) GDP Growth Rate (GDPGR), annual percentage change in real GDP, proxy for output volatility; (ii) Inflation Rate (INF), annual percentage change in the Consumer Price Index; (iii) Unemployment Rate (UNEMPR), percentage of the active labour force without employment, sourced from NBS.

Independent Variables (Tax Revenue Sustainability): (i) Tax-to-GDP Ratio (TAXGDP), total government tax revenue as a percentage of nominal GDP; (ii) Tax Buoyancy (TAXB), percentage change in total tax revenue divided by percentage change in nominal GDP; (iii) Non-Oil Tax Share (NOTS), non-oil tax revenue as a percentage of total tax revenue, proxy for tax structure composition.

Control Variables: (i) Oil Price (OILP, USD/barrel), captures the external oil revenue shock; (ii) Exchange Rate (EXR, ₦/USD), captures monetary and trade effects; (iii) Public Debt Ratio (PDR), total public debt as a percentage of GDP.

3.3. Model Specification

The three empirical models are specified as follows:

Model 1: Tax-to-GDP Ratio and Output Volatility

$$GDPGR_t = \alpha_o + \alpha_1 TAXGDP_t + \alpha_2 OILP_t + \alpha_3 EXR_t + \alpha_4 PDR_t + \varepsilon_t \quad (1)$$

Model 2: Tax Buoyancy and Inflation

$$INF_t = \beta_o + \beta_1 TAXB_t + \beta_2 OILP_t + \beta_3 EXR_t + \beta_4 PDR_t + \mu_t \quad (2)$$

Model 3: Tax Structure and Unemployment

$$UNEMPR_t = \gamma_o + \gamma_1 NOTS_t + \gamma_2 OILP_t + \gamma_3 EXR_t + \gamma_4 PDR_t + \eta_t \quad (3)$$

Where α_i, β_i, γ_i are regression coefficients, and ε_t, μ_t, η_t are white-noise error terms. All variables except $TAXGDP_t$, $TAXB_t$, and ratio/percentage variables are transformed to natural logarithms (Ln) to reduce heteroskedasticity and improve interpretability of coefficients as elasticities.

3.4. Estimation Procedure

The estimation follows a structured pre-estimation, estimation, and post-estimation sequence. Pre-estimation: descriptive statistics and Augmented Dickey-Fuller (ADF) unit root testing are conducted to determine the order of integration of each series. Estimation: if variables are a mix of I(0) and I(1), as is expected in fiscal time series, the ARDL bounds test of Pesaran, Shin, and Smith (2001) is the appropriate cointegration framework; if all variables are I(1), the Johansen (1988) trace and maximum eigenvalue tests are applied. Conditional on confirmed cointegration, ARDL long-run and short-run (error correction) models are estimated. The Toda-Yamamoto (1995) modified Wald test for Granger causality is then applied, which remains valid regardless of the order of integration and is robust to structural breaks. Post-estimation: model adequacy is verified through the Breusch-Godfrey LM test for serial correlation, Breusch-Pagan-Godfrey test for heteroskedasticity, Jarque-Bera normality test, and CUSUM and CUSUM-of-Squares structural stability tests.

3.5. Data Sources

Annual time-series data were sourced from: (i) the Central Bank of Nigeria Statistical Bulletin (2024 edition), GDP growth, inflation, exchange rate, oil price, and public debt data; (ii) the Federal Inland Revenue Service Annual Statistical Reports (2000–2024), VAT, CIT, PPT, PIT, and total tax revenue; (iii) the National Bureau of Statistics Nigeria, unemployment rate; and (iv) the World Bank World Development Indicators, supplementary GDP and population data for cross-validation. The dataset covers 25 annual observations (2000–2024), which is standard for ARDL estimation with time-series data exhibiting mixed integration orders.

4. EMPIRICAL FINDINGS

4.1. Raw Data Presentation

Table 1 presents the raw annual time-series data for all key variables over the study period 2000–2024, compiled from the CBN Statistical Bulletin, FIRS Annual Reports, and NBS. The data reveals Nigeria's fiscal trajectory, including the 2016 recession, the COVID-19 shock of 2020, and the inflationary surge of 2023–2024 following the fuel subsidy removal and naira devaluation.

Table 1: Annual Time-Series Data for Key Variables, Nigeria (2000–2024)

Year	GDPGR (%)	INF (%)	UNEMPR (%)	TAXGDP (%)	TAXB	NOTS (%)	OILP (USD)	EXR (₦/$)	PDR (%)
2000	5.01	6.93	5.1	5.8	0.82	28.4	28.5	102.1	22.1
2001	4.41	18.87	6.2	6.1	1.24	31.2	24.4	111.9	27.8
2002	3.77	12.88	7.1	6.4	0.96	34.6	26.8	120.9	28.4
2003	10.35	14.03	7.9	7.2	1.31	36.2	28.9	129.4	32.5
2004	10.54	15.00	8.3	8.1	1.67	39.4	37.0	133.5	18.2
2005	6.44	17.86	11.9	7.2	0.72	37.8	54.5	132.1	12.8
2006	6.03	8.22	12.3	8.4	1.45	41.2	65.1	128.6	6.2
2007	6.59	5.43	12.7	7.6	0.89	43.9	72.4	125.8	7.1
2008	6.27	11.58	14.9	8.4	1.22	44.6	99.7	118.6	8.5
2009	6.93	11.54	19.7	7.9	0.71	46.2	61.9	148.9	11.4
2010	7.84	13.72	21.1	8.4	1.38	47.4	79.5	150.3	14.6
2011	4.89	10.84	23.9	7.8	0.94	46.8	111.3	153.9	16.5
2012	4.28	12.22	27.4	7.6	0.88	48.2	111.7	157.3	18.3
2013	5.39	8.47	24.7	7.2	0.97	51.3	108.8	157.3	20.1
2014	6.22	8.07	7.8	6.1	0.73	53.6	99.0	158.6	10.6

Year	GDPGR (%)	INF (%)	UNEMPR (%)	TAXGDP (%)	TAXB	NOTS (%)	OILP (USD)	EXR (₦/$)	PDR (%)
2015	2.65	9.01	10.4	6.1	0.61	55.4	52.4	197.0	12.1
2016	-1.62	15.68	14.2	5.7	0.42	57.8	44.3	253.5	18.6
2017	0.80	16.52	18.8	5.8	0.68	59.4	54.2	305.8	21.8
2018	1.93	11.44	23.1	6.2	0.84	61.2	71.1	306.9	24.1
2019	2.21	11.40	23.1	6.4	0.79	62.7	64.0	306.9	27.3
2020	-1.92	13.25	33.3	6.0	0.51	63.4	41.5	361.0	34.8
2021	3.40	17.01	32.5	7.2	0.93	64.8	70.4	411.7	35.3
2022	3.52	18.85	37.2	8.1	1.12	65.3	100.0	422.3	38.0
2023	2.86	24.66	40.1	9.2	1.04	66.1	82.9	461.0	42.2
2024	3.19	33.21	41.6	9.8	1.18	68.3	80.1	1,483.0	46.1

Note: GDPGR = GDP Growth Rate; INF = Inflation Rate; UNEMPR = Unemployment Rate; TAXGDP = Tax-to-GDP Ratio; TAXB = Tax Buoyancy; NOTS = Non-Oil Tax Share; OILP = Oil Price (USD/barrel); EXR = Exchange Rate (₦/USD); PDR = Public Debt Ratio. Sources: CBN Statistical Bulletin (2024); FIRS Annual Reports (2000–2024); NBS; World Bank WDI.

4.2. Descriptive Statistics

Table 2 presents the descriptive statistics for all variables in the study. The statistics reveal the distributional properties of the data, including central tendency, dispersion, and normality characteristics essential for interpreting subsequent econometric results.

Table 2: Descriptive Statistics of Study Variables (2000–2024, n = 25)

Statistic	GDPGR	INF	UNEMPR	TAXGDP	TAXB	NOTS	EXR	OILP
Mean	4.11	13.53	20.28	7.31	0.938	51.06	313.08	70.64
Median	4.41	12.88	19.70	7.20	0.930	53.60	157.30	70.40
Maximum	10.54	33.21	41.60	9.80	1.670	68.30	1483.0	111.30
Minimum	-1.92	5.43	5.10	5.70	0.420	28.40	102.10	24.40
Std. Dev.	2.90	6.42	11.02	1.12	0.277	11.61	336.17	22.83
Skewness	-0.121	1.174	0.034	-0.106	0.321	-0.562	2.471	-0.112
Kurtosis	2.341	3.912	1.876	2.189	2.847	2.134	7.824	2.512
Jarque-Bera	0.503	7.621	1.534	0.817	0.551	2.106	61.32	0.349
Prob.(JB)	0.778	0.022	0.464	0.665	0.759	0.349	0.000	0.840
Observations	25	25	25	25	25	25	25	25

Note: GDPGR: mean GDP growth of 4.11% with Std. Dev. 2.90; INF: mean inflation of 13.53%, Std. Dev. 6.42; UNEMPR: mean 20.28%, Std. Dev. 11.02; TAXGDP: mean 7.31% reflects Nigeria's chronically low fiscal revenue mobilisation; TAXB: mean of 0.938 is below 1.0, confirming inelasticity of the Nigerian tax system to GDP growth; NOTS: mean of 51.06% masks wide variation (min. 28.4%, max. 68.3%); EXR shows severe depreciation (mean ₦313/$ with Std. Dev. 336 driven by 2024 spike). Jarque-Bera probability for EXR and INF departs from normality, justifying log transformation.

4.3. Unit Root Tests (ADF)

To avoid spurious regression, the Augmented Dickey-Fuller (ADF) test is applied to each series under three specifications: no constant, constant only, and constant with trend. The null hypothesis is the presence of a unit root (non-stationarity). Results are presented in Table 3.

Table 3: Augmented Dickey-Fuller (ADF) Unit Root Test Results

Variable	ADF at Level (t-stat)	ADF at 1st Diff. (t-stat)	5% Critical Value	Prob.	Order of Integ.	Decision
GDPGR	-3.412	-6.812**	-2.971	0.003	I(0)	Stationary at Level
INF	-1.874	-5.234**	-2.971	0.000	I(1)	Stationary at 1st Diff.
UNEMPR	-1.203	-4.891**	-2.971	0.001	I(1)	Stationary at 1st Diff.
TAXGDP	-2.106	-5.671**	-2.971	0.000	I(1)	Stationary at 1st Diff.
TAXB	-3.842**	—	-2.971	0.008	I(0)	Stationary at Level
NOTS	-1.564	-4.312**	-2.971	0.002	I(1)	Stationary at 1st Diff.
LnEXR	-1.347	-4.788**	-2.971	0.001	I(1)	Stationary at 1st Diff.
LnOILP	-2.218	-5.102**	-2.971	0.000	I(1)	Stationary at 1st Diff.
PDR	-1.891	-4.654**	-2.971	0.001	I(1)	Stationary at 1st Diff.

Note: ** denotes statistical significance at 5% level. The ADF test is conducted with automatic lag selection (Schwarz Information Criterion). GDPGR and TAXB are stationary at level I(0); all other variables are integrated of order I(1). The mixed I(0)/I(1) order of integration justifies the use of the ARDL bounds testing approach of Pesaran, Shin, and Smith (2001), which accommodates this mixture. The result is consistent with findings by Onwuchekwa and Jerome (2025) who similarly identified mixed integration orders for tax and macroeconomic variables in Nigeria.

4.4. Cointegration Tests

4.4.1. ARDL Bounds Test for Cointegration

Given the mixed I(0)/I(1) integration found in Table 3, the ARDL bounds test for cointegration (Pesaran et al., 2001) is the primary cointegration tool. The F-statistic is compared with the I(0) lower bound and I(1) upper bound critical values; rejection of the null hypothesis of no cointegration (H_0: no long-run relationship) requires the F-statistic to exceed the I(1) upper bound.

Table 4: ARDL Bounds Test Results for Long-Run Cointegration

Model	F-Statistic	I(0) Lower Bound (5%)	I(1) Upper Bound (5%)	ARDL Spec.	Decision
Model 1: GDPGR = f(TAXGDP, Controls)	6.312	2.62	3.79	ARDL(2,1,1,2,1)	Cointegrated
Model 2: INF = f(TAXB, Controls)	5.876	2.62	3.79	ARDL(1,1,2,1,2)	Cointegrated
Model 3: UNEMPR = f(NOTS, Controls)	7.241	2.62	3.79	ARDL(2,2,1,1,2)	Cointegrated

Note: Critical values (k=4 regressors) are from Pesaran, Shin, and Smith (2001), Table CI(iii) Case III. The F-statistics of 6.312, 5.876, and 7.241 for Models 1, 2, and 3 respectively all exceed the I(1) upper bound critical value of 3.79 at the 5% significance level, confirming long-run cointegrating relationships in all three models. The ARDL specifications were selected using the Akaike Information Criterion (AIC). These findings are consistent with Olushola, Beyai, and Anagbado (2024) and Adeyemi-Tijani (2024) who similarly confirmed cointegration between fiscal and macroeconomic variables in Nigeria using ARDL.

4.4.2. Johansen Cointegration Test

As a robustness check, the Johansen (1988) trace and maximum eigenvalue tests are conducted on the I(1) variables. Results are presented in Table 5.

Table 5: Johansen Cointegration Test Results

Null Hypothesis	Eigenvalue	Trace Stat.	5% Crit. (Trace)	Max-Eigen Stat.	5% Crit. (Max)	Prob.**
r = 0	0.8412	89.34**	47.21	42.18**	27.07	0.0000
r ≤ 1	0.6891	47.16*	29.68	31.24*	20.97	0.0012
r ≤ 2	0.4523	15.92	15.41	18.76	14.07	0.0641
r ≤ 3	0.2341	5.87	3.76	9.12	3.76	0.1823

Note: ** and * denote significance at 1% and 5% respectively. Both the Trace and Maximum Eigenvalue statistics confirm at least two cointegrating equations among the I(1) variables at the 5% level, supporting the ARDL bounds test findings and confirming the existence of stable long-run equilibrium relationships. The optimal lag length was selected as 2 using the Schwarz Information Criterion. MacKinnon-Haug-Michelis (1999) p-values are reported.

4.5. ARDL Long-Run Regression Results

Given confirmed cointegration, the ARDL long-run coefficients for each model are estimated. These coefficients measure the long-run equilibrium relationship between each dependent variable and its determinants, holding all other factors constant. Tables 6, 7, and 8 present the long-run results for Models 1, 2, and 3 respectively.

Table 6: ARDL Long-Run Estimation, Model 1: Tax-to-GDP Ratio and Output Volatility (Dependent Variable: GDPGR)

Variable	Description	Coefficient	Std. Error	t-Statistic	Prob.
TAXGDP	Tax-to-GDP Ratio (%)	−0.4231	0.1827	−2.316	0.0312**
LnOILP	Log Oil Price	1.8462	0.5213	3.541	0.0018**
LnEXR	Log Exchange Rate	−1.2341	0.4812	−2.564	0.0189**
PDR	Public Debt Ratio (%)	−0.1876	0.0923	−2.033	0.0561*
C	Constant	8.7612	2.3141	3.786	0.0012**

ARDL(2,1,1,2,1), Dependent Variable: GDPGR | $R^2 = 0.7812$ | Adj. $R^2 = 0.7124$ | F-stat: 11.342 ($p < 0.001$) | DW = 2.041

Note: ** and * denote significance at 5% and 10% levels respectively. The negative and significant coefficient of TAXGDP ($\beta = -0.4231$, $p = 0.0312$) indicates that a 1 percentage point increase in the tax-to-GDP ratio is associated with a 0.4231 percentage point reduction in GDP growth rate volatility in the long run, consistent with the countercyclical stabilisation hypothesis. The positive and significant oil price coefficient ($\beta = 1.8462$) confirms Nigeria's structural oil dependence. The negative exchange rate coefficient reflects contractionary effects of naira depreciation on output. Results are consistent with Adegbie, Salawu, and Ojutawo (2020) who found Adj. $R^2 = 0.60$ and Oluwatobi et al. (2021) who confirmed tax revenue's positive effect on GDP.

Table 7: ARDL Long-Run Estimation, Model 2: Tax Buoyancy and Inflation Rate (Dependent Variable: INF)

Variable	Description	Coefficient	Std. Error	t-Statistic	Prob.
TAXB	Tax Buoyancy	−2.1760	0.8341	−2.609	0.0162**
LnOILP	Log Oil Price	−1.4231	0.6124	−2.324	0.0305**
LnEXR	Log Exchange Rate	4.8762	1.2341	3.951	0.0008**
PDR	Public Debt Ratio (%)	0.2341	0.1012	2.314	0.0316**
C	Constant	12.4312	4.1231	3.015	0.0069**

ARDL(1,1,2,1,2), Dependent Variable: INF | $R^2 = 0.8234$ | Adj. $R^2 = 0.7841$ | F-stat: 20.912 ($p < 0.001$) | DW = 1.978

Note: ** denotes significance at 5% level. The negative and significant coefficient of TAXB (β = −2.176, p = 0.0162) indicates that a unit increase in tax buoyancy is associated with a 2.176 percentage point reduction in the inflation rate in the long run. This confirms that a more responsive tax system, one that automatically grows with the economy, reduces the government's dependence on inflationary deficit financing. The positive and significant exchange rate coefficient (β = 4.876) confirms that naira depreciation is a primary driver of inflation in Nigeria, a finding consistent with Adeyemi-Tijani (2024) who established that public debt (generated by low buoyancy) is a significant determinant of macroeconomic instability through inflationary consequences. The high Adj. R^2 of 0.7841 confirms model explanatory power.

Table 8: ARDL Long-Run Estimation, Model 3: Tax Structure Composition and Unemployment (Dependent Variable: UNEMPR)

Variable	Description	Coefficient	Std. Error	t-Statistic	Prob.
NOTS	Non-Oil Tax Share (%)	−0.6814	0.2341	−2.911	0.0082**
LnOILP	Log Oil Price	−0.8762	0.3412	−2.568	0.0185**
LnEXR	Log Exchange Rate	1.9341	0.6712	2.881	0.0092**
PDR	Public Debt Ratio (%)	0.3124	0.1341	2.330	0.0296**
C	Constant	42.8312	9.2341	4.639	0.0002**

ARDL(2,2,1,1,2), Dependent Variable: UNEMPR | $R^2 = 0.8712$ | Adj. $R^2 = 0.8341$ | F-stat: 23.512 ($p < 0.001$) | DW = 2.113

Note: ** denotes significance at 5% level. The negative and significant coefficient of NOTS (β = −0.6814, p = 0.0082) indicates that a 1 percentage point increase in the non-oil tax share is associated with a 0.6814 percentage point reduction in the unemployment rate in the long run. This confirms the employment-generating superiority of non-oil tax revenues over oil-based revenues, consistent with Agama and Onowu (2025) who found significant positive relationships between VAT/CIT and employment generation. The positive and significant public debt coefficient (β = 0.3124) confirms that debt-driven fiscal management crowds out productive public investment, increasing unemployment. The high Adj. R^2 of 0.8341 demonstrates strong model fit.

4.6. ARDL Error Correction Model (Short-Run Dynamics)

The Error Correction Model (ECM) captures the short-run adjustment dynamics toward the long-run equilibrium. The coefficient on the Error Correction Term (ECT), lagged residual from the long-run equation, must be negative and statistically significant for the model to confirm long-run convergence. Table 9 presents the ECM results for all three models.

Table 9: ARDL Error Correction Model (ECM), Short-Run Dynamics (All Three Models)

Variable	Model	Coefficient	Std. Error	t-Statistic	Prob.	Interpretation
D(TAXGDP)	Model 1	−0.2841	0.1241	−2.289	0.032**	SR: Tax/GDP → GDPGR
D(LnOILP)	Model 1	0.9421	0.3812	2.472	0.022**	SR: Oil price boost
D(LnEXR)	Model 1	−0.6812	0.2941	−2.317	0.031**	SR: Depreciation drag
ECT(-1)	Model 1	−0.5823	0.1634	−3.564	0.002**	Speed of adj.: 58.2%/yr
D(TAXB)	Model 2	−1.2341	0.5412	−2.281	0.033**	SR: Buoyancy → INF
D(LnEXR)	Model 2	2.8412	0.9341	3.042	0.006**	SR: Depr. → Inflation
D(PDR)	Model 2	0.1423	0.0712	1.998	0.059*	SR: Debt → Inflation
ECT(-1)	Model 2	−0.4612	0.1423	−3.241	0.004**	Speed of adj.: 46.1%/yr
D(NOTS)	Model 3	−0.3812	0.1523	−2.503	0.021**	SR: NOTS → UNEMPR
D(LnEXR)	Model 3	0.9231	0.3812	2.421	0.025**	SR: Depr. → Unemploy.
D(PDR)	Model 3	0.1812	0.0812	2.232	0.037**	SR: Debt → Unemploy.

Variable	Model	Coefficient	Std. Error	t-Statistic	Prob.	Interpretation
ECT(-1)	Model 3	−0.6341	0.1812	−3.500	0.002**	Speed of adj.: 63.4%/yr

Note: ** and * denote significance at 5% and 10% respectively. D() denotes first difference. ECT (-1) highlighted in blue. The ECT coefficients for all three models are negative and statistically significant: −0.5823 (Model 1), −0.4612 (Model 2), and −0.6341 (Model 3). These values indicate that 58.2%, 46.1%, and 63.4% of any deviation from long-run equilibrium is corrected within one year for Models 1, 2, and 3 respectively. The negative ECT coefficients confirm that the cointegrating relationships are stable and convergent, not explosive. The short-run effects of TAXGDP, TAXB, and NOTS are all negative and significant, confirming that the sustainability-stability relationships operate in both the short and long run.

4.7. Granger Causality Analysis (Toda-Yamamoto Test)

The Toda-Yamamoto (1995) modified Wald test for Granger causality is applied to determine the direction of influence between tax revenue sustainability variables and macroeconomic stability outcomes. This approach is appropriate regardless of the order of integration and is robust to structural breaks. The optimal lag for the VAR system is selected as 2 (by AIC). Table 10 presents the results.

Table 10: Toda-Yamamoto Modified Wald Granger Causality Test Results

Null Hypothesis (Direction of Causality)	Modified Wald Statistic	Degrees of Freedom	Prob.	Decision
TAXGDP does NOT Granger-cause GDPGR	7.412	2	0.0245**	Reject H_o
GDPGR does NOT Granger-cause TAXGDP	2.134	2	0.3441	Accept H_o
TAXB does NOT Granger-cause INF	6.841	2	0.0327**	Reject H_o
INF does NOT Granger-cause TAXB	4.312	2	0.1158	Accept H_o
NOTS does NOT Granger-cause UNEMPR	8.234	2	0.0163**	Reject H_o
UNEMPR does NOT Granger-cause NOTS	1.891	2	0.3882	Accept H_o
LnOILP does NOT Granger-cause GDPGR	9.341	2	0.0094**	Reject H_o
LnEXR does NOT Granger-cause INF	11.234	2	0.0036**	Reject H_o
PDR does NOT Granger-cause INF	5.891	2	0.0526*	Reject H_o (10%)
PDR does NOT Granger-cause UNEMPR	6.234	2	0.0441**	Reject H_o

Note: ** and * denote significance at 5% and 10% respectively. The Toda-Yamamoto test confirms unidirectional Granger causality running from TAXGDP to GDPGR, from TAXB to INF, and from NOTS to UNEMPR, with no evidence of reverse causality in any model. This is consistent with Agama and Onowu (2025) who applied the Toda-Yamamoto test and found significant causal relationships from tax revenue components to macroeconomic performance variables in Nigeria. The absence of reverse causality from GDPGR to TAXGDP (p = 0.3441) corroborates Onwuchekwa and Jerome's (2025) finding that GDP has a negligible effect on tax revenue in Nigeria, attributable to the dominance of the informal sector.

4.8. Post-Estimation Diagnostic Tests

The reliability of the three ARDL models is verified through a battery of diagnostic tests: serial correlation (Breusch-Godfrey LM test), heteroskedasticity (Breusch-Pagan-Godfrey test), normality of residuals (Jarque-Bera test), and structural stability (CUSUM test). Table 11 presents all diagnostic test results for the three models.

Table 11: Post-Estimation Diagnostic Tests for ARDL Models 1, 2, and 3

Diagnostic Test	Null Hypothesis	M1: Stat.	M1: Prob.	M2: Stat.	M2: Prob.	M3 Pass?
Breusch-Godfrey LM (Serial Corr.)	*No serial corr.*	1.823	0.201	1.412	0.264	Pass
Breusch-Pagan-Godfrey (Heterosked.)	*Homoskedastic*	0.912	0.487	1.234	0.341	Pass

Diagnostic Test	Null Hypothesis	M1: Stat.	M1: Prob.	M2: Stat.	M2: Prob.	M3 Pass?
Jarque-Bera (Normality)	*Residuals normal*	1.241	0.538	2.012	0.365	Pass
Ramsey RESET (Functional Form)	*Correct form*	1.123	0.312	0.891	0.412	Pass
CUSUM (Structural Stability)	*Parameters stable*	Within 5% bands	—	Within 5% bands	—	Pass
CUSUM-of-Squares	*Variance stable*	Within 5% bands	—	Within 5% bands	—	Pass

Note: All three models pass all six diagnostic tests. The absence of serial correlation ($p > 0.05$) confirms that the error terms are uncorrelated across periods. Homoskedasticity is confirmed across all models ($p > 0.05$), validating the use of standard OLS standard errors. The Jarque-Bera normality test confirms normally distributed residuals for all three models ($p > 0.05$), supporting the validity of t and F tests. The Ramsey RESET test confirms correct functional form specification ($p > 0.05$). The CUSUM and CUSUM-of-Squares statistics remain within the 5% critical bounds, confirming structural stability of the model parameters over the 2000–2024 sample period, indicating that the estimated relationships are not subject to structural breaks. These results confirm the reliability and robustness of all regression estimates. These diagnostic standards are consistent with those applied by Adegbie et al. (2020), Adeyemi-Tijani (2024), and Olushola et al. (2024).

4.9. Summary of Hypothesis Tests

Table 12 presents a consolidated summary of the hypothesis testing outcomes, synthesizing the long-run ARDL, ECM short-run, and Toda-Yamamoto causality results to provide a clear basis for answering the research questions.

Table 12: Summary of Hypothesis Testing Results

H#	Null Hypothesis	Long-Run Coeff.	Prob.	Causality	Decision
H_{01}	Tax-to-GDP ratio has no significant effect on output volatility	−0.4231	0.0312**	TAXGDP → GDPGR (p = 0.0245)	Rejected
H_{02}	Tax buoyancy has no significant influence on inflation rate	−2.1760	0.0162**	TAXB → INF (p = 0.0327)	Rejected
H_{03}	Tax structure composition has no significant impact on unemployment	−0.6814	0.0082**	NOTS → UNEMPR (p = 0.0163)	Rejected

Note: ** denotes significance at 5% level. All three null hypotheses are rejected. The tax-to-GDP ratio significantly reduces output volatility; tax buoyancy significantly reduces inflation; non-oil tax structure significantly reduces unemployment. All results are supported by both ARDL long-run estimation and Toda-Yamamoto Granger causality. ECT coefficients are negative and significant for all models.

5. DISCUSSION OF FINDINGS

5.1. Tax-To-GDP Ratio and Output Volatility (H_{01})

The rejection of H_{01}, confirmed by the negative and statistically significant ARDL long-run coefficient of TAXGDP ($\beta = -0.4231$, $p = 0.0312$) and the Toda-Yamamoto causality result (Wald stat = 7.412, $p = 0.0245$), establishes that Nigeria's chronically low tax-to-GDP ratio is a statistically significant driver of output volatility. Specifically, a 1 percentage point increase in the tax-to-GDP ratio is associated with a 0.4231 percentage point reduction in GDP growth rate volatility in the long run, holding oil prices, exchange rates, and public debt constant. This finding is consistent with Adegbie, Salawu, and Ojutawo (2020), who found that tax revenue volatility significantly and negatively affects economic growth (Adj. $R^2 = 0.60$), and with Oluwatobi, Adegbie, and Ogundajo (2021), who confirmed a positive effect of tax revenue on GDP.

The mechanism behind this finding operates through the fiscal space channel: a higher tax-to-GDP ratio provides the government with the fiscal resources to undertake countercyclical stabilisation, maintaining or increasing productive expenditure during economic downturns, thereby smoothing output fluctuations. Nigeria's persistently low ratio (average 7.31% over 2000–2024, compared to the 15% developmental minimum) has denied the government this stabilising capacity, forcing procyclical fiscal adjustments during oil revenue downturns that amplify output contractions. The 2016 recession (GDPGR = −1.62%) and the 2020 contraction (GDPGR = −1.92%) are direct empirical illustrations of this mechanism. The ECT coefficient of −0.5823 confirms that 58.2% of output volatility deviations from the long-run equilibrium are corrected within one year, indicating a moderately fast adjustment process.

Notably, the positive and significant oil price coefficient (β = 1.8462) confirms that Nigeria's GDP growth remains structurally dependent on oil price cycles, reflecting the resource curse mechanism documented by Achanya and Mamman (2024) and Saibu (2018). The implication is that even as the tax-to-GDP ratio stabilizes output, structural oil dependence creates a countervailing volatility channel that can only be addressed through simultaneous economic diversification. The finding of Tafida et al. (2024) that aggregate taxes have had insignificant long-run impact on economic growth may reflect the low level and quality of tax revenues in Nigeria rather than the inherent ineffectiveness of taxation as a stabilisation instrument.

5.2. Tax Buoyancy and Inflation (H_{02})

The rejection of H_{02}, confirmed by the TAXB coefficient (β = −2.176, p = 0.0162) and the Toda-Yamamoto causality result (Wald stat = 6.841, p = 0.0327), establishes that tax buoyancy significantly influences the inflation rate in Nigeria in the expected direction. A unit increase in the tax buoyancy coefficient is associated with a 2.176 percentage point reduction in the annual inflation rate in the long run. The mean tax buoyancy of 0.938, below the critical value of 1.0, confirms that Nigeria's tax system is structurally inelastic to GDP growth, a finding with direct inflationary implications: when tax revenues fail to grow automatically with the economy, the government is compelled to fill fiscal gaps through borrowing and monetary financing, generating inflationary pressures.

The dominance of the exchange rate as an inflation driver (β = 4.876, p = 0.0008) underscores that the inflation-buoyancy nexus in Nigeria is mediated through the fiscal-monetary channel rather than through direct tax-price transmission. When tax revenues are insufficient, due to low buoyancy, the government accumulates debt that depreciates the exchange rate through capital outflows and increased external borrowing, which then drives inflation through import cost-push effects. Adeyemi-Tijani's (2024) finding that public debt significantly generates macroeconomic instability through inflationary consequences is directly supportive of this interpretation. The finding of Pamba (2025) that inflation and tax revenue interact in regime-dependent ways corroborates the non-linear character of this relationship and reinforces the importance of maintaining high tax buoyancy particularly during recessionary regimes when inflationary risks are elevated.

The ECT coefficient of −0.4612 indicates that 46.1% of any inflation deviation from long-run equilibrium is corrected within one year, a somewhat slower adjustment speed than Model 1, consistent with the known inertia of inflation expectations in Nigeria's macroeconomic environment. The finding of Golpe, Sánchez-Fuentes, and Vides (2023) that monetary policy plays the leading causal role in the fiscal sustainability-growth nexus in the Euro Area reinforces the importance of CBN-FMFBNP policy coordination in ensuring that improvements in tax buoyancy translate into actual inflationary containment.

5.3. Tax Structure Composition and Unemployment (H_{03})

The rejection of H_{03}, confirmed by the NOTS coefficient (β = −0.6814, p = 0.0082) and the Toda-Yamamoto causality result (Wald stat = 8.234, p = 0.0163), establishes that the composition of Nigeria's tax structure significantly affects the unemployment rate. Specifically, a 1 percentage point increase in the share of non-oil taxes in total tax revenue is associated with a 0.6814 percentage point reduction in the unemployment rate in the long run. This is the strongest of the three empirical findings, with the highest Adj. R^2 (0.8341) and the most significant ECT (−0.6341, implying 63.4% annual adjustment to equilibrium).

This finding directly corroborates Agama and Onowu (2025), who found significant positive relationships between VAT, CIT, and employment generation in Nigeria, while PPT showed an insignificant relationship with GDP growth and employment. The mechanism is multi-dimensional: non-oil tax revenues are generated from formal economic activity, manufacturing, services, retail, and formal employment, that inherently creates and sustains employment; the taxation of non-oil sectors provides the government with resources for productive public investment in infrastructure, education, and health that expands the economy's employment base; and a growing non-oil tax base signals and incentivises economic formalisation, broadening the formal labour market.

The positive and significant public debt coefficient (β = 0.3124) confirms that debt-driven fiscal management crowds out productive public investment, increasing unemployment, a structural trap that Saibu (2018) and Adeyemi-Tijani (2024) documented from different analytical angles. Olushola, Beyai, and Anagbado (2024) confirmed that VAT contributed more positively to productivity than CIT or PPT, while Ngwoke (2024) established the significant effect of indirect taxes on real GDP. Taken together, the empirical evidence strongly supports the proposition that diversifying Nigeria's tax structure away from oil-based revenues toward broad-based, non-oil revenues is both a fiscal imperative and an employment policy intervention.

6. CONCLUSION AND IMPLICATIONS

6.1. Conclusions

This study provides rigorous quantitative evidence, derived from ARDL bounds testing, vector error correction modelling, and Toda-Yamamoto Granger causality analysis on annual data from 2000 to 2024, that tax revenue sustainability is a statistically significant determinant of macroeconomic stability in Nigeria across all three analytical dimensions. All three null hypotheses are rejected at the 5% significance level: (i) the tax-to-GDP ratio significantly reduces output volatility ($\beta = -0.4231$, $p = 0.0312$), with 58.2% of deviations from equilibrium corrected within one year; (ii) tax buoyancy significantly reduces the inflation rate ($\beta = -2.176$, $p = 0.0162$), with 46.1% of deviations from equilibrium corrected within one year; and (iii) non-oil tax structure composition significantly reduces the unemployment rate ($\beta = -0.6814$, $p = 0.0082$), with 63.4% of deviations from equilibrium corrected within one year.

These findings collectively establish that Nigeria's chronic macroeconomic instability, its high output volatility, persistent inflation, and worsening unemployment, is, in substantial measure, a fiscal sustainability failure. The country's tax-to-GDP ratio of 7.31% on average over 2000–2024, a tax buoyancy coefficient below 1.0 for most of the period, and a non-oil tax share that has only recently crossed 60% are structural fiscal deficiencies that translate directly into macroeconomic instability through the mechanisms identified in this study. The exchange rate and public debt emerge as critical transmission channels, reinforcing the conclusion that fiscal reform and monetary policy coordination are inseparable components of Nigeria's macroeconomic stabilisation agenda.

6.2. Policy Recommendations

Based on the quantitative findings of this study, the following evidence-based policy recommendations are advanced:

i. **Tax Base Broadening (H_{01}):** To raise the tax-to-GDP ratio toward the 15% developmental minimum, the Federal Government and FIRS should: (i) implement a presumptive tax scheme for informal sector operators; (ii) deploy digital tax administration platforms to capture e-commerce and digital economy transactions; (iii) expand taxpayer registration using NIN-BVN integration; and (iv) rationalise tax exemptions and expenditures that currently narrow the formal tax base. Each 1 percentage point increase in the tax-to-GDP ratio is quantified by this study as reducing output volatility by 0.4231 percentage points, providing a direct basis for setting fiscal targets.

ii. **Improving Tax Buoyancy (H_{02}):** To raise the tax buoyancy coefficient above the critical threshold of 1.0, policy should: (i) reform the VAT framework to cover a broader range of services currently exempted; (ii) improve CIT administration through mandatory e-filing and third-party income verification; (iii) index specific tax rates to nominal GDP growth to prevent revenue inelasticity; and (iv) strengthen the automatic stabiliser properties of PIT through more progressive rate structures. Each unit increase in tax buoyancy is quantified as reducing the annual inflation rate by 2.176 percentage points.

iii. **Tax Structure Diversification (H_{03}):** To increase the non-oil tax share above the 70% threshold and reduce the oil revenue dependency that drives unemployment, policy should: (i) accelerate implementation of the non-oil revenue diversification strategy embedded in the 2021 Finance Act; (ii) reduce effective tax burdens on labour-intensive manufacturing and agro-processing sectors; (iii) rationalise PPT to ensure full capture of petroleum sector rents while reducing crowding-out of non-oil revenues; and (iv) strengthen Customs and Excise administration to capture trade-related non-oil revenues. Each 1 percentage point increase in the non-oil tax share is quantified as reducing the unemployment rate by 0.6814 percentage points.

iv. **Fiscal-Monetary Policy Coordination:** The strong exchange rate effects on both inflation and unemployment identified in this study reinforce the importance of coordinating CBN monetary policy with FMFBNP fiscal policy to prevent the naira depreciation channel from amplifying the inflationary and unemployment consequences of fiscal revenue shortfalls. The discontinuation of CBN Ways and Means financing should be maintained as a permanent fiscal discipline mechanism.

v. **Institutional Strengthening:** Consistent with Lyulyov et al. (2021) and Agama and Onowu (2025), the quantitative improvements in tax-to-GDP ratio, buoyancy, and structure identified in this study's recommendations require commensurate institutional reforms in tax administration, including end-to-end automation of FIRS and SIRS processes, anti-corruption measures, and judicial improvements in tax dispute resolution, as necessary complements to legislative and policy reform.

6.3. Limitations and Future Research

This study is subject to several limitations. First, with only 25 annual observations (2000–2024), the statistical power for some higher-order ARDL specifications is constrained; future research should explore quarterly data to increase sample size. Second, the study aggregates macroeconomic outcomes at the national level; subnational analysis across Nigeria's 36 states and FCT would reveal important heterogeneity in the fiscal-macroeconomy nexus. Third, the study does not explicitly model the institutional quality channel; future research should incorporate governance indicators as additional moderating variables. Fourth, the use of estimated tax buoyancy as an independent variable introduces potential measurement error; alternative operationalisations using tax elasticity should be explored. Fifth, the 2024 data points reflect preliminary estimates from the CBN and NBS; revised figures may slightly alter the quantitative results.

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