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A PANEL ANALYSIS TO UNDERSTAND WHETHER DEBT IS A BURDEN OR GROWTH DRIVER IN HIGHLY INDEBTED COUNTRIES

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ABSTRACT

This research paper delves into the intricate relationship between external debt and economic growth across 56 countries, identified as the most indebted among those with available data. Utilizing a comprehensive dataset spanning from 1990 to 2021, sourced from World Development Indicators (WDI) and Worldwide Governance Indicators (WGI), the study employs a multifaceted analytical approach. It combines the power of Panel Autoregressive Distributed Lag (ARDL) to provide both short-term and long-term insights into the nexus between external debt and economic growth. Simultaneous Quantile Regression is employed to explore the influence and relationships between countries, offering a deeper and more comprehensive understanding of the dynamics at play. The analysis also encompasses economic and governance variables, including gross fixed capital formation (GFCF), government consumption (GOVCONS), inflation (INFL), rule of law (RULE), and voice and accountability (VOICE). Findings reveal that high external debt levels can hinder long-term economic growth, emphasizing the importance of prudent debt management. Investments in fixed capital exhibit a consistently positive impact on GDP growth across different segments, highlighting the need to foster capital accumulation and infrastructure development. Governance indicators such as the rule of law and voice and accountability, while not directly causal, remain pivotal for societal well-being and economic development. The research offers essential policy recommendations, urging fiscal responsibility, enhanced investment promotion, and governance improvements to ensure sustainable economic growth in an interconnected global economy. This study contributes valuable insights to policymakers, economists, and researchers, advancing the discourse on financial sustainability and the role of external debt in shaping the destinies of nations.

Keywords: External debt, GDP growth, PARDL, Simultaneous Quantile Regression

INTRODUCTION

External debt serves as a critical tool for countries to secure the necessary capital for vital investments in infrastructure, human capital, technology, and overall economic growth, as well as to address balance of payments challenges. It plays a pivotal role in supporting development initiatives and crisis mitigation strategies. IMF member countries, in particular, leverage external debt to finance strategic projects in sectors such as education, technology, and infrastructure, all of which are instrumental in propelling economic expansion, job creation, and competitiveness. However, it is paramount to exercise prudent debt management to ensure that borrowed resources are allocated efficiently and that fiscal sustainability is upheld. This approach not only minimizes potential risks associated with excessive debt but also maximizes the positive impact of external borrowing on the economic growth trajectories of IMF member nations. Effective debt management safeguards against overburdening future generations and contributes to achieving long-term development goals (Osano et al., 2016). Furthermore, by striking a careful balance between external debt and economic growth, countries can harness the benefits of debt financing while mitigating its potential downsides (Mupunga et al., 2015).

In an increasingly interconnected and globally interdependent economy, the intricate relationship between external debt and economic growth has risen to the forefront of concerns for policymakers, economists, and international financial institutions alike. The nexus between a nation's external debt levels and its overall economic performance has become a focal point of extensive scholarly research, policy discourse, and practical significance. As countries engage in international trade, investment, and financial transactions, the accumulation of external debt has become an integral facet of their economic landscape (Salvatore, 2019). This convergence of factors influencing a nation's economic growth and development is multifaceted, encompassing not only domestic policies and institutions but also international financial flows and obligations. External debt, representing a country's obligations to foreign creditors, can manifest in various forms, including public and private sector borrowings, multilateral loans, and commercial debts. Effective management of external debt becomes paramount as countries seek to strike a delicate balance between financing essential development projects and averting the potential adverse consequences of excessive indebtedness (Acharya et al., 2015). Sound debt management practices are essential to ensure that borrowed resources are channeled efficiently, thereby minimizing risks and maximizing the positive impact of external debt on a nation's economic growth and long-term development goals.

In today's global economy, understanding the intricate interplay between external debt and economic growth is of paramount importance for policymakers, economists, and financial institutions. Developed nations, characterized by robust financial systems and advanced infrastructure, leverage external debt strategically to fund major developmental projects, drive innovation, and enhance human capital. However, careful examination is vital due to potential risks, as highlighted by seminal research like Reinhart and Rogoff's (2010). Conversely, in developing countries, where economic progress often contends with resource limitations, external debt plays a crucial role in bridging funding gaps for critical development initiatives in areas such as healthcare, education, and infrastructure. Yet, prudent debt management is key to prevent adverse effects on growth, particularly in contexts of weak institutions and policies (Easterly, 2001; Chowdhury & Mavrotas, 2006). As nations grapple with striking a balance between utilizing external debt for growth-promoting activities and averting the risks of over-indebtedness, responsible debt management remains fundamental for sustainable development and economic prosperity (Barro, 1990; Aghion & Bolton, 1997). This study aims to contribute to this understanding by conducting a systematic analysis of IMF member countries, discerning patterns, threshold levels, and causal relationships between external debt and economic growth to inform effective policy discourse and decision-making.

we undertake a thorough investigation into the intricate relationship between external debt and economic growth across 56 nations designated

as the most indebted based on World Development Indicators (WDI). Recognizing the multifaceted nature of this connection, we employ a dual-method approach to gain a comprehensive understanding. Initially, we utilize the Panel Autoregressive Distributed Lag (ARDL) method to probe both short-term and long-term links between external debt and economic growth, capturing the evolving dynamics over time. This method unveils temporal dimensions, distinguishing transient from enduring effects. Complementing our analysis, we implement Simultaneous Quantile Regression, partitioning data based on quantiles of the dependent variable to unveil variations in the impact of external debt on countries at different stages of economic growth. Moreover, we enrich our study by incorporating a range of economic and social variables, including institutional quality, human capital, infrastructure development, and trade openness, to deepen our comprehension of the intricate factors shaping the nexus between external debt and economic growth. Additionally, we explore causality among these key variables using the PAIRWISE DUMITRESCU HURLIN test, shedding light on directional relationships. Through this comprehensive methodology, our research aims to unravel the complex dynamics between external debt and economic growth across diverse nations, offering valuable insights for policymakers, economists, and researchers and contributing to the global discourse on financial sustainability and the role of external debt in shaping national destinies.

LITERATURE REVIEW

In this section, we conduct a comprehensive review of pertinent research to identify the key determinants associated with external debt and its impact on economic growth. External debt theories represent economic models aimed at elucidating the factors influencing a nation's choice to secure foreign loans and the resulting implications for its economic performance. A variety of external debt theories and empirical investigations have been conducted, and we delve into some of the most noteworthy ones in the following discourse.

There are several theoretical perspectives that provide different insights into the relationship between external debt and a country's economic growth. One such perspective is the neoclassical theory, which suggests that external borrowing is a rational choice driven by a nation's need for investment capital. Proponents of this view argue that external debt can facilitate faster economic growth by allowing a country to finance investments that would be unattainable through domestic savings alone. They emphasize that the benefits of external borrowing outweigh the disadvantages and that any negative outcomes, such as debt crises, result from imprudent borrowing and lending practices. In contrast, the endogenous growth theory suggests that an increase in public debt can hinder future generations by lowering the growth rate. While reducing public debt may boost long-term growth, it can be detrimental to the current generation, making it potentially Pareto optimal. This theory highlights the intergenerational trade-offs associated with external debt.

The dependency theory takes a different stance, positing that external debt represents a form of economic exploitation. According to this perspective, developed nations lend to developing ones to maintain their economic dominance. Advocates of dependency theory argue that external debt perpetuates underdevelopment in developing nations by diverting resources from domestic investments and perpetuating a cycle of debt and poverty. On the other hand, Keynesian theory suggests that external debt can be beneficial in the short term by stimulating economic growth through increased aggregate demand. However, it may lead to long-term issues such as inflation, balance of payments crises, and challenges related to debt sustainability. Keynesian proponents emphasize the trade-offs between short-term economic gains and potential long-term consequences associated with external borrowing. Lastly, the structuralist theory emphasizes the importance of domestic structural factors, such as income inequality, market dynamics, and political instability, in shaping the impact of external debt. Proponents of this view argue that external debt can exacerbate existing structural issues and trigger economic crises, including hyperinflation and currency devaluation. This perspective underscores the need to consider a country's unique structural conditions when assessing the

implications of external debt on its economic development.

In line with the conventional perspective, external debt is perceived as a potential obstacle to economic growth due to its propensity to deplete a nation's resources. The servicing of debt obligations necessitates the allocation of a country's resources, leaving fewer resources accessible for productive investments and other economically advantageous activities. Additionally, an excessive debt burden can erode foreign creditors' confidence, further impeding a nation's economic advancement. Debt overhang theory advances the notion that a substantial external debt load can dissuade foreign investment and stifle economic growth. According to this viewpoint, when a country carries a hefty external debt burden, prospective investors exhibit reluctance to invest, fearing that any profits generated may be redirected toward servicing the country's debt rather than being reinvested within the domestic economy. This can trigger a detrimental cycle where diminished investment contributes to sluggish economic growth, subsequently resulting in heightened external debt. Contrary to these views, debt neutrality theory asserts that external debt exerts no influence on economic growth. According to this perspective, external debt represents a straightforward resource transfer from one country to another and does not impact a nation's long-term growth prospects. In essence, a country's growth potential is contingent on its domestic policies and institutional framework, rather than the extent of its external debt.

Numerous studies have emphasized the favorable influence of external debt on economic growth, especially in countries characterized by factors such as high levels of human capital, effective governance, strong institutional quality, economic freedom, and advanced human development (Asante et al., 2023; Giri et al., 2023; Kumar & Batra, 2023; Mtar & Belazreg, 2023; Öncel et al., 2023). Additionally, investigations into the impact of concessional loans on economic growth indicate that concessional external debt tends to have a more substantial positive effect compared to non-concessional external debt (Asongu et al., 2018; Kasili, D. W. 2020; Yoon & Mah, 2020). Researchers have also explored the intricate relationship between external debt, disparities in infrastructure development, and various stages of economic development. These inquiries have revealed that the beneficial impact of external debt on economic growth is particularly pronounced in low-income countries that have made significant investments in infrastructure, alongside increased levels of financial development and institutional quality (Mugumisi, 2021).

Nonetheless, Reinhart and Rogoff's seminal work in 2010 reveals a contrasting narrative, establishing a negative association between external debt and economic growth, especially in advanced economies. Their extensive analysis spanning 44 countries from 1800 to 2008 posits that elevated external debt levels may engender a state of debt overhang, diminishing incentives for investment and ultimately leading to reduced economic growth. Similarly, findings by Asteriou et al. (2021) underscore the detrimental impact of high external debt levels on economic growth, particularly in nations characterized by feeble institutions and limited human capital. Furthermore, several studies highlight the adverse consequences of excessive external debt on economic growth, notably in countries plagued by high levels of corruption (Dey & Tareque, 2020; Gunarsa et al., 2020; Madhuhansi & Shantha, 2021; Makun, 2021; Manasseh et al., 2022).

On one hand, external debt can furnish nations with vital capital for investment, infrastructure development, and economic activities, thereby fostering economic growth and advancing overall development. This can result in increased employment opportunities, higher incomes, and an enhanced quality of life. Conversely, an undue burden of external debt can usher in a range of detrimental outcomes, including elevated interest payments, curtailed government expenditure on essential public services and goods, and an augmented risk of default. These factors collectively obstruct economic growth and development, potentially exacerbating poverty and hardship among the populace. This study aims to scrutinize the impact of external debt on economic growth and ascertain whether it exerts a positive or negative influence. Additionally, it will explore whether the effects of external debt are short-term or long-term in nature.

A collection of diverse studies has provided valuable insights into the intricate relationship between external debt and economic growth across various regions and time periods. In the ECOWAS region, N'Zue (2020) identified a nuanced dynamic, revealing that external debt can have a positive impact on economic performance up to specific thresholds but may become detrimental beyond those points. Meanwhile, Ale et al. (2023) uncovered a significant negative correlation between external debt and economic growth in South Asian countries, emphasizing the importance of promoting domestic savings and investment to reduce reliance on foreign debt. Omodero's (2019) study in Nigeria highlighted the adverse impact of foreign debt on economic growth, underlining the need for a strategic approach to borrowing and revenue generation. Finally, Ohiomu (2020) delved into the Nigerian context, revealing that debt overhang and crowding-out effects can hamper investment levels and, consequently, economic growth. These findings collectively underscore the complex interplay between external debt and economic growth, emphasizing the significance of prudent borrowing strategies and domestic economic policies to achieve sustainable development.

In conclusion, the literature review provides a comprehensive overview of the multifaceted relationship between external debt and economic growth, drawing from various economic theories and empirical studies. While neoclassical and endogenous growth theories suggest potential benefits of external borrowing for economic growth, dependency theory, Keynesian theory, and structuralist theory underscore the risks and negative consequences associated with high levels of external debt, particularly in the context of weak institutions and economic disparities. Empirical evidence presents a mixed picture, with some studies highlighting the positive impact of external debt on growth, especially in countries with favorable governance and human capital conditions, while others emphasize the detrimental effects, particularly in cases of excessive debt and corruption. The nuanced findings emphasize the importance of prudent debt management, strategic borrowing, and domestic policy initiatives to maximize the benefits of external debt while mitigating its potential risks, underscoring the need for a balanced approach to achieve sustainable economic development.

METHODOLOGY

Data

This study employs a dataset spanning from 1990 to 2021, drawing from reputable sources such as the World Development Indicators (WDI) and the Worldwide Governance Indicators (WGI). The dataset encompasses 56 countries identified as the most indebted among the 90 nations for which relevant data is accessible. It includes key variables vital to our analysis, such as GDP growth rate (GDPG), external debt (EXTDEBT), gross fixed capital formation (GFCF), government consumption (GOVCONS), and inflation rate (INFL), each of which plays a pivotal role in elucidating the intricate relationship between external debt and economic growth. By leveraging this rich dataset, our research endeavors to unravel the multifaceted dynamics that underlie this relationship, providing valuable insights to policymakers, economists, and researchers and contributing to the broader discourse on financial sustainability and the impact of external debt on a nation's economic trajectory.

Econometric Model

$$GDPG_{it} = \beta_0 + EXTDEBT_{it}\beta_1 + GFCF_{it}\beta_2 + GOVCONS_{it}\beta_3 + IMPORT_{it}\beta_4 + INFL_{it}\beta_5 + RULE_{it}\beta_6 + VOICE_{it}\beta_7 \dots\dots (1)$$

GDPG = Gross domestic product annual growth rate
EXTDEBT = External debt stock
GFCF = Gross fixed capital formation
GOVCONS = General government final consumption expenditure
IMPORT = Import of goods and services
INFL = Consumer price index
RULE = Rule of law
VOICE = Voice and accountability

Unit Root Test

A panel unit root test is a statistical method used to evaluate whether time series data in panel datasets, which combine cross-sectional and time series observations, exhibit unit root behaviour, indicating non-stationarity. Non-stationary data can complicate econometric analysis and modelling. These tests, including

the Levin-Lin & Chu (LLC) test and others, assess the stationarity of individual series within the panel, which is crucial for reliable statistical analyses.

The Levin-Lin & Chu test (LL&C)

The Levin-Lin & Chu test, commonly known as "Levin-Lin and Chu," is a prominent panel unit root test that was introduced by economists Andrew Levin and Chien-Fu Lin in 1992 and subsequently extended with the contribution of Chia-Shang James Chu in 2002. This test is a significant advancement from the Dickey-Fuller (DF) unit root test, offering a more comprehensive approach to evaluating stationarity in data. It employs a two-step procedure to assess stationarity. In the first step, the analysis focuses on unit-specific fixed effects, while in the second step, it delves into unit-specific time trends. The initial step involves the evaluation of divergence and lag coefficient patterns of the dependent variable across various units, making this method particularly valuable in the assessment of stationarity within a predominantly cross-sectional model

Cointegation

Panel cointegration is a statistical concept and technique used in econometrics to analyze the long-term relationships or associations among variables in panel datasets, which combine cross-sectional and time series data. Cointegration implies that two or more non-stationary time series variables have a stable long-run relationship, even if individually they may not be stationary. In the context of panel data, panel cointegration suggests that there is a cointegrating relationship that holds across multiple cross-sectional units over time.

PEDRONI COINTEGRATION TEST

Pedroni introduced the panel cointegration test in (Pedroni 1999, 2004), which assesses whether variables within a model exhibit long-term relationships by considering the results of their stationarity and unit root tests. Panel cointegration possesses several characteristics and allows for cross-sectional interdependence due to its diverse individual outcomes. Pedroni's framework comprises seven cointegration tests, grouped into two categories the panel-v statistic, the panel rho-statistic The remaining tests, such as the panel ADP test and the panel PP-test, are within the dimension, while the last three tests operate outside the dimensions. Regression within the dimension is based on pooling, whereas outside the dimension regression relies on averaging.

KAO Cointegration Test

The Kao (Kao 1997) cointegration test is an alternative approach employed to detect cointegration in panel data, emphasizing the existence of long-term relationships among variables across various entities and timeframes. This test evaluates cross-sectional interdependence and individual-specific differences within panel data

Lag Selection

In the fixed lag selection, the same lag length is applied to both independent and dependent variables, whereas in the automatic lag selection, the lag length is determined automatically, typically by selecting the first maximum lag for both types of variables. Automatic lag selection allows for the possibility of different lag selections for dependent and independent variables. In this study, we employ automatic lag selection, specifically using the Schwarz criteria for lag determination.

Panel ARDL

Pesaran et al. (1997, 2004) introduced the ARDL approach as a method for conducting cointegration analysis in single equation models. This approach involves a two-step process to estimate long-term relationships. Firstly, it examines whether there is a cointegrated relationship among all the variables. If such a relationship is identified, the ARDL results are used to estimate the long-run coefficients. This approach underscores the importance of imposing cross-equation restrictions on long-run parameters, which are determined using maximum-likelihood estimation and validated by the Hausman test. The estimation is carried out using the PMG Estimator, which averages unrestricted coefficients from individual countries. It serves as a robust alternative to other panel estimators like DOLS and FMOLS. The Panel ARDL model is an extension of the ARDL (p, q) model introduced by Pesaran et al., and it is employed

to establish a standard log-linear functional specification for estimating long-run relationships between variables (Fatima, M., Naz, S., & Khan, S. U. 2023).

$$\Delta GDPG = a_i + \sum_{f=1}^{m-1} \beta_{ij} \Delta EXTDEBT_{i,t-j} + \sum_{g=0}^{n-1} \beta_{ij} \Delta GFCF + \sum_{h=1}^{0-1} \beta_{ij} \Delta GOVCONS_{i,t-j} + \sum_{i=1}^{p-1} \beta_{ij} \Delta IMPORT_{i,t-j} + \sum_{j=1}^{q-1} \beta_{ij} \Delta INFL_{i,t-j} + \sum_{j=1}^{q-1} \beta_{ij} \Delta RULE_{i,t-j} + \sum_{j=1}^{q-1} \beta_{ij} \Delta VOICE_{i,t-j} \emptyset_1 GDPG_{i,t-j} + \emptyset_2 EXTDEBT_{i,t-j} + \emptyset_3 GFCF_{i,t-j} + \emptyset_4 GOVCONS_{i,t-j} + \emptyset_5 IMPORT_{i,t-j} + \emptyset_6 INFL_{i,t-j} + \emptyset_7 RULE_{i,t-j} + \emptyset_8 VOICE_{i,t-j} + \varepsilon_{it} \dots (2)$$

Panel Causality Test

Dumitrescu and Hurlin (2012) introduced a statistical test for analyzing causality in panel data. This test represents an extension of the Granger causality test and is formulated as follows in the regression equation:

$Y_{i,t} = \alpha_0 + \Sigma^{K}_{k=1} + \gamma_{ik} x_{i,t-k} + \varepsilon_{i,t}$

In the equation mentioned above:

$x_{i,t}$ and $y_{i,t}$ represent observations of two stationary variables for an individual i at a given time period t.The coefficients in the equation can vary across individuals but are assumed to remain constant over time.K represents the lag order, which is assumed to be the same for all individuals, leading to the requirement for a balanced panel dataset.

Simultaneous Quantile Regression

Simultaneous linear quantile regression (Tokdar, S. T., & Kadane, J. B. 2012), unlike ordinary least squares (OLS) regression, doesn't treat all cross-sectional units the same and isn't limited to estimating the conditional mean. In response to the limitations of pooled OLS, researchers developed quantile regression as an alternative approach. It goes beyond predicting the mean and provides insights into the distribution of data points. Quantile regression offers a holistic view of how an independent variable influences a dependent variable at various quantile levels. In this study, we utilize simultaneous quantile regression, a method proposed by certain researchers, to precisely gauge the effects of our variables and validate their expected significance.

ESTIMATION OUTCOMES

Table 1

Correlation Matrix

Variables	GDPG	EXTDEBT	GFCF	GOVCONS	IMPORT	INFL	RULE	VOICE
GDPG	1.000							
EXTDEBT	-0.063	1.000						
GFCF	0.203	-0.058	1.000					
GOVCONS	-0.154	0.154	-0.044	1.000				
IMPORT	0.0132	0.089	0.290	0.056	1.000			
INFL	-0.119	0.041	-0.022	0.0380	0.001	1.000		
RULE	0.066	-0.101	0.135	0.0857	0.280	-0.070	1.000	
VOICE	0.0391	-0.060	0.113	0.019	0.238	-0.0807	0.661	1.000

The correlation table reveals the relationships among several economic and governance indicators. Notably, GDP growth rate (GDPG) is positively correlated with gross fixed capital formation (GFCF) and imports (IMPORT), suggesting that higher investment and increased imports tend to be associated with economic growth. Conversely, government consumption (GOVCONS) shows a negative correlation with GDP growth, indicating that a larger share of government spending relative to the economy's size may hinder growth. Additionally, external debt (EXTDEBT) exhibits no strong correlation with GDP growth. The table also demonstrates weak correlations between rule of law (RULE) and voice and accountability (VOICE) with the economic variables, highlighting the relatively low impact of these governance indicators on economic performance. Inflation (INFL) shows a mixed correlation pattern, with weak negative correlation with GDP growth, suggesting that moderate inflation may not significantly hinder economic growth.

Table 2
Descriptive Statistics

	GDPG	EXTDEBT	GFCF	GOVCONS	IMPORT	INFL	RULE	VOICE
Mean	3.196	63.257	20.829	13.781	37.910	68.890	-0.596	-0.482
Median	3.907	48.324	20.384	13.625	34.51	5.836	-0.560	-0.470
Maximum	35.224	1111.270	93.547	91.419	115.42	23773.13	0.911	1.151
Minimum	-51.021	-61.409	-18.291	-36.27	-57.99	-146.72	-2.3516	-2.973
Std. Dev.	5.707	68.954	8.241	7.009	18.091	818.42	0.587	0.6803
Observations	1792	1792	1792	1792	1792	1792	1792	1792

Authors Calculation

The descriptive statistics table provides a summary of key statistical measures for the variables in the dataset. For instance, it reveals that the mean GDP growth rate (GDPG) is approximately 3.196%, with a median value of 3.907%. The data also indicates a wide range of values, as evidenced by the minimum and maximum values for each variable. Notably, external debt (EXTDEBT) exhibits substantial variation, with a minimum of -61.409 and a maximum of 1111.270. Gross fixed capital formation (GFCF) and government consumption (GOVCONS) have relatively lower standard deviations, suggesting less dispersion around their means compared to other variables like inflation (INFL) and voice and accountability (VOICE). Additionally, the negative values for rule of law (RULE) and voice and accountability (VOICE) imply that these variables are likely measured on a scale where higher values indicate better governance.

Table 3
Unit Root

Variable	At Level	At 1st Difference		Outcomes	
	II***	II & T**	II***	II & T**	
GDPG	10.6545 (0.0000) **	7.87649 (0.000) **	-	-	I (0)
EXTDEBT	3.10890 (0.0009)	0.2292 (0.4093)	-	16.0407 (0.000)	I (0)
GOVCONS	5.46785 (0.000)	1.87709 (0.0303)	-	-	I (0)
IMPORT	5.09978 (0.000)	4.17690 (0.000)	-	-	I (0)
INFL	11.0804 (0.000)	9.5843 (0.000)	-	-	I (0)
RULE	3.4966 (0.000)	2.4245 (0.007	-	-	I (0)
VOICE	6.33412 (0.000)	2.3694 (0.008	-	-	I (0)
II* II& T** represent individual intercept and intercept and trend respectively.					

Authors Calculation

The unit root test table provides insights into the stationarity properties of the variables, which is crucial in time series analysis. In this context, stationarity implies that a variable's statistical properties, such as mean and variance, remain constant over time. The table shows the test results for the variables at their original level and after taking their first differences. For GDP growth rate (GDPG), external debt (EXTDEBT), government consumption (GOVCONS), imports (IMPORT), inflation rate (INFL), rule of law (RULE), and voice and accountability (VOICE), the p-values for the tests at the first difference level are all less than 0.05 (typically the significance level), indicating that after differencing, these variables become stationary. This suggests that these variables are integrated of order 1 (I(1)), meaning they have a unit root in their original form but not in their differenced form. Overall, the unit root test results imply that for these economic and governance indicators, taking the first difference is necessary to achieve stationarity, which is a prerequisite for many time series modeling techniques and econometric analyses.

Table 4
Pedroni Cointegration test

Tests	II and IT	No Intercept or Trend
P-v-S	-3.2184(0.999)	-0.88736(0.812)
P-rho-S	0.26578(0.604)	-2.64274(0.004)
P-PP-S	-24.8390(0.000)	-20.7.033(0.000)
P-ADF-S	10.5878(0.000)	9.53188(0.000)
G-rho-S	2.4746(0.993)	0.7912(0.2144)
G-PP-S	-36.34985(0.000)	-28.4536(0.000)
G-ADF-S	8.39351(0.000)	8.7753(0.000)
In this table, P, G and S indicate panel, group and statistic. Therefore, II and IT shows individual intercept and trend respectively.		

Authors Calculation

The Pedroni cointegration table assesses the presence of cointegration among the variables, which indicates a long-term relationship between them. Cointegration suggests that even though the variables may individually have unit roots (non-stationary), there exists a linear combination of them that is stationary, implying a stable long-term connection. In this

table, the "P," "G," and "S" categories correspond to different cointegration tests: panel, group, and statistic, respectively. "II" and "IT" represent individual intercept and trend terms, respectively. For the economic and governance indicators such as GDP growth rate (GDPG), external debt (EXTDEBT), government consumption (GOVCONS), inflation rate (INFL), rule of law (RULE), and voice and accountability (VOICE), the results indicate cointegration, especially when considering panel statistics (P) and group statistics (G). The p-values associated with the panel statistics (P) for both individual intercept and trend terms (II and IT) are all significant at a 0.05 significance level ($p < 0.05$), suggesting evidence of cointegration. Similarly, the group statistics (G) and their associated p-values also suggest the presence of cointegration. The Pedroni cointegration table indicates the likelihood of long-term relationships or cointegration among these indicators.

and concise model for the given data, crucial for accurate subsequent modeling and forecasting procedures.

Table 5

Kao Residual Cointegration Test

Test		**Intercept and Trend**
ADF	t-statistic	Prob.
	-11.50805	0.0000
Residual variance	34.93448	
HAC variance	15.44838	

Authors calculation

The Kao Residual Cointegration Test table provides important information regarding the presence of cointegration among the variables, including GDP growth rate (GDPG), external debt (EXTDEBT), gross fixed capital formation (GFCF), government consumption (GOVCONS), inflation rate (INFL), rule of law (RULE), and voice and accountability (VOICE). The key test statistic, the ADF (Augmented Dickey-Fuller) t-statistic, has a highly significant value of -11.50805 with a probability (Prob.) of 0.0000, indicating strong evidence of cointegration. This suggests that these variables share a stable long-term relationship, which is essential information for conducting meaningful and robust econometric analyses.

Table 6

Lag Length Criteria:

Lag	**LogL**	**LR**	**FPE**	**AIC**	**SC**	**HQ**
0	-41584.07	NA	6.33e+12	55.01729	55.04897	55.02909
1	-28272.83	26446.41	158907.6	37.51697	**37.83371***	37.63492
2	-27976.58	585.0473	119535.8	37.23225	37.83405	37.45636
3	-27783.95	378.1396	103128.3	37.08458	37.97145	**37.41484***
4	-27657.21	**247.2689***	**97079.14***	**37.02409***	38.19602	37.46050

Authors Calculation

based on the Schwarz Criterion (SC), which balances model goodness of fit and complexity, a lag length of 1 appears to be the optimal choice for the time series analysis involving GDP growth rate (GDPG), external debt (EXTDEBT), gross fixed capital formation (GFCF), government consumption (GOVCONS), inflation rate (INFL), rule of law (RULE), and voice and accountability (VOICE). This choice signifies that a single lag in the analysis is likely to provide a well-fitted

Table 7
CD Test results

TEST	GDPG	EXTDEBT	GFCF	GOVCONS	IMPORTS	INFL	RULE	Voice
Breusch-Pagan LM	3872.3***	15141.***	8932.1***	9506.77	7666.59***	8789.9***	12504.61**	12011.63***
Pesaran scaled LM	41.017***	244.07***	132.18***	142.54***	109.38***	129.62***	196.5***	187.67***
Bias-Corrected scale LM	40.113***	243.17***	131.28***	141.63***	108.4***	128.72***	195.65***	186.7***
Pesaran CD	36.07***	44.44***	26.55***	4.796***	19.97***	62.9***	0.582***	9.63***

Authors Calculation

The cross-section dependency (CD) tests consistently demonstrate substantial and significant cross-sectional dependencies among the analyzed variables. The Breusch-Pagan LM tests reveal pronounced cross-sectional heteroskedasticity, particularly notable for GDP growth rate (GDPG), external debt (EXTDEBT), gross fixed capital formation (GFCF), imports (IMPORTS), inflation rate (INFL), rule of law (RULE), and voice and accountability (VOICE), emphasizing varying variances across different cross-sectional units. The Pesaran scaled LM and Bias-Corrected scale LM tests further affirm this dependency, indicating that variances are not uniform across units. The Pesaran CD test provides additional compelling evidence of cross-sectional dependence across all variables, underlining the necessity to consider and address this interdependence when interpreting and analyzing these economic and governance indicators. Accounting for cross-sectional dependencies is crucial for ensuring accurate model specifications and robust empirical conclusions in the context of this data.

Table 8
Long Run results by using Panel ARDL technique:

Long Run Equation				
Series	Coefficients	Std. Error	t-Statistic	Prob.
EXTDEBT	-0.005506	0.001804	-3.052062	0.0023
GFCF	0.089624	0.016445	5.449922	0.0000
GOVCONS	-0.046361	0.027037	-1.714760	0.0866
IMPORT	0.037663	0.009425	3.995895	0.0001
INFL	-0.005345	0.001340	-3.988551	0.0001
VOICE	0.071548	0.245845	0.291030	0.7711
RULE	0.702311	0.296138	2.371566	0.0179

Authors Calculation

The long-run panel ARDL results provide insights into the equilibrium relationships among the variables, indicating how they collectively influence the GDP growth rate (GDPG) in the long term. External debt (EXTDEBT) has a statistically significant negative coefficient of -0.005506, suggesting that in the long run, a higher level of external debt negatively impacts GDP growth rate. This implies that excessive reliance on external borrowing can hinder a country's economic growth over time. Gross fixed capital formation (GFCF) exhibits a positive and highly significant coefficient of 0.089624. This indicates that increased investments in fixed capital have a positive impact on GDP growth rate in the long run, emphasizing the importance of capital accumulation for sustained economic growth. Government consumption (GOVCONS) has a coefficient of -0.046361, although it is statistically significant at the 10% significance level (p-value of 0.0866). This suggests that government consumption may have a negative influence on long-term GDP growth. Imports (IMPORT) have a positive and statistically significant coefficient of 0.037663, indicating that higher levels of imports can positively impact GDP growth rate in the long run, possibly reflecting the benefits of international trade and market access. Inflation (INFL) shows a statistically significant negative coefficient of -0.005345, implying that persistent high inflation rates can have a detrimental effect on long-term economic growth. Voice and accountability (VOICE) do not appear to have a statistically significant impact on long-term GDP growth, as indicated by the non-significant coefficient of 0.071548. Rule of law (RULE) has a positive and statistically significant coefficient of 0.702311, suggesting that a stronger rule of law

is associated with higher long-term GDP growth.

Table 9

Short run results

Short Run Equation				
Series	Coefficients	Std. Error	t-Statistic	Prob.
Cointeg01	-0.829411	0.042332	-19.59296	0.0000
EXTDEBT	-0.104772	0.015861	-6.605710	0.0000
GFCF	0.200011	0.061454	3.254647	0.0012
GOVCONS	-0.489974	0.109033	-4.493819	0.0000
IMPORT	0.059760	0.036159	1.652683	0.0987
INFL	-0.001404	0.020728	-0.067746	0.9460
VOICE	0.466279	1.437112	0.324455	0.7456
RULE	1.607029	1.279897	1.255593	0.2095
C	1.433439	0.204583	7.006644	0.0000

Authors Calculation

The short-run panel ARDL results indicate several key relationships among the variables. Notably, external debt (EXTDEBT) exhibits a significant negative effect on short-term GDP growth, implying that an increase in external debt has an adverse immediate impact on economic growth. Conversely, gross fixed capital formation (GFCF) exerts a positive influence on short-term GDP growth, suggesting that higher investments in fixed capital contribute positively to economic expansion in the short run. Government consumption (GOVCONS) is found to have a negative impact on short-term GDP growth, indicating that increased government spending may temporarily hinder economic growth. Other variables, including imports (IMPORT), inflation (INFL), voice and accountability (VOICE), and rule of law (RULE), do not exhibit statistically significant short-run effects on GDP growth. These findings offer valuable insights into the immediate dynamics of the analyzed economic and governance indicators. The cointeg01 is ecm value which is negative and lies between 0-1 which also suggest that there is long run raltionship .

The Simultaneous Quantile Regression results table provides insights into how changes in the independent variables impact the conditional quantiles of GDP growth rate (GDPG) at various points in its distribution. This type of analysis is particularly useful for understanding how the determinants of GDP growth may vary across different quantiles, revealing potential heterogeneity in the relationships. EXTDEBT The coefficient for external debt is negative and statistically significant across most quantiles, indicating that an increase in external debt generally exerts a negative influence on GDP growth at various points in its distribution. This suggests that high external debt levels are associated with lower GDP growth across different percentiles. IMPORT Imports show mixed effects. At some quantiles (e.g., 10th and 20th), they have a negative impact on GDP growth, while at others (e.g., 70th, 80th, and 90th), they have a positive and significant effect. This suggests that the relationship between imports and GDP growth varies along the distribution of GDP growth rates. INFL Inflation's impact on GDP growth appears to be largely insignificant across quantiles, with coefficients close to zero at all levels. GOVCONS Government consumption negatively affects GDP growth across most quantiles, with statistically significant coefficients. This implies that higher government consumption tends to have an adverse effect on economic growth, regardless of the position in the GDP growth rate distribution. GFCF exhibits a consistently positive and statistically significant effect on GDP growth at various quantiles. This indicates that higher investments in fixed capital tend to boost economic growth across different segments of the distribution. RULE The impact of the rule of law varies. While it is positive and statistically significant at some quantiles (e.g., 90th), it is not significant at others (e.g., 10th and 20th). This suggests that the rule of law may have a more pronounced effect on GDP growth in certain segments of the distribution. VOICE The coefficients for voice and accountability are generally not statistically significant across most quantiles, indicating that this variable may not strongly influence GDP growth at different points in its distribution. The constant term represents the intercept. It is positive and statistically significant, indicating that there is a baseline level of GDP growth across all quantiles.

Table 10
Simultaneous Quantile regression

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VAR.	q10	q20	q30	q40	q50	q60	q70	q80	q90
extdebt	0.000946	-0.00585	-0.00639***	-0.00312*	-0.00227***	-0.00298***	-0.00415***	-0.00337***	-0.00456**
	(0.00643)	(0.00359)	(0.00235)	(0.00189)	(0.000796)	(0.000972)	(0.000944)	(0.00123)	(0.00186)
import	-0.0421**	-0.00786	0.00110	-0.00154	-0.000675	-0.000358	0.0135**	0.0195***	0.0346***
	(0.0182)	(0.00933)	(0.00929)	(0.00594)	(0.00543)	(0.00571)	(0.00580)	(0.00508)	(0.0117)
infl	-0.00968	-0.00431	-0.00266	-0.00118	-0.00125	-0.000325	-0.000357	0.000622	0.000504
	(0.00599)	(0.00378)	(0.00182)	(0.00120)	(0.000876)	(0.000664)	(0.000816)	(0.000900)	(0.000894)
govcons	-0.154***	-0.146***	-0.0945***	-0.0999***	-0.103***	-0.0868***	-0.0773***	-0.0575***	-0.0573**
	(0.0409)	(0.0256)	(0.0255)	(0.0157)	(0.0123)	(0.0154)	(0.0184)	(0.0135)	(0.0274)
gfcf	0.0808*	0.0632***	0.0903***	0.0938***	0.0965***	0.0892***	0.0783***	0.0651***	0.0685***
	(0.0413)	(0.0226)	(0.0224)	(0.0141)	(0.0136)	(0.0129)	(0.0170)	(0.0152)	(0.0248)
rule	1.632***	1.430***	0.665**	0.304*	0.131	0.143	-0.0561	0.0579	-0.362
	(0.519)	(0.354)	(0.267)	(0.166)	(0.241)	(0.236)	(0.332)	(0.284)	(0.464)
voice	0.633	-0.286**	-0.175*	-0.145	-0.208*	-0.349**	-0.458	-0.520**	-0.744*
	(0.496)	(0.141)	(0.103)	(0.0965)	(0.120)	(0.176)	(0.287)	(0.236)	(0.388)
Constant	1.937	3.132***	2.385***	2.963***	3.484***	4.001***	4.269***	4.938***	5.443***
	(1.202)	(0.592)	(0.643)	(0.326)	(0.337)	(0.338)	(0.480)	(0.437)	(0.754)
Pseudo R^2	0.0979	0.0621	0.0464	0.0439	0.0413	0.0378	0.0363	0.0330	0.0411
Obs.	1,792	1,792	1,792	1,792	1,792	1,792	1,792	1,792	1,792

Note: Standard errors are in the parenthesis.
*,** and *** show significant level at 1%, 5% and 10% respectively.
Authors calculation

Table 11

Pairwise Dumitrescu Hurlin Causility:

Null hypothesis		T-statistic	Prob
EXTDEBT	GDPG	5.6315	0.000
		8.8928	0.000
GOVCONS	GDPG	4.4877	0.000
GDPG ----- GOVCONS		0.9781	0.328
GFCF	GDPG	3.5298	0.000
		10.9933	0.000
IMPORT	GDPG	3.9855	0.000
		4.6194	0.000
INFL	GDPG	8.6119	0.000
		6.6049	0.000
RULE ----- GDPG		1.5372	0.124
		1.1536	0.248
VOICE	GDPG	5.9164	0.000
GDPG ----- VOICE		0.5543	0.579
GOVCONS	EXTDEBT	10.7109	0.000
		6.5741	0.000
GFCF	EXTDEBT	5.8267	0.000
		5.6628	0.000
IMPORT	EXTDEBT	12.417	0.000
		2.1061	0.035
INFL	EXTDEBT	11.716	0.000
		10.309	0.000
RULE	EXTDEBT	7.8995	0.000
		6.5067	0.000
VOICE	EXTDEBT	11.7624	0.000
		6.5825	0.000
GFCF	GOVCONS	8.6799	0.000
		6.9924	0.000
IMPORT	GOVCONS	9.1785	0.000
		7.9426	0.000
INFL	GOVCONS	12.4639	0.000
		7.8527	0.000
RULE	GOVCONS	12.463	0.000
		7.8527	0.000
VOICE	GOVCONS	7.2678	0.000
		4.1220	0.000
IMPORT	GFCF	7.2516	0.000
		4.545	0.000
INFL	GFCF	5.9207	0.000
		10.920	0.000
RULE	GFCF	8.0307	0.000
		3.5936	0.000
VOICE	GFCF	2.5243	0.011
		5.277	0.000
INFL	IMPORT	3.343	0.000
		11.509	0.000
RULE	IMPORT	6.0982	0.000
		4.9263	0.000
VOICE	IMPORT	3.0754	0.000
		5.4877	0.000
RULE ----- INFL		1.4203	0.155
		0.9359	0.349
VOICE	INFL	4.7548	0.000
		2.2412	0.025
VOICE	RULE	3.0817	0.000
		3.2249	0.000

Notes: →, ↔, and ---- represent unidirectional causality, bidirectional causality, and no causality respectively

Authors calculation

The Pairwise Dumitrescu-Hurlin Causality test results reveal various causal relationships among the economic and governance indicators. Notably, external debt (EXTDEBT), government consumption (GOVCONS), gross fixed capital formation (GFCF), imports (IMPORT), and inflation (INFL) exhibit unidirectional causality effects on GDP growth rate (GDPG), indicating that changes in these variables can significantly influence economic growth. Meanwhile, the rule of law (RULE) and voice and accountability (VOICE) do not display significant causal relationships with GDPG. Additionally, there are bidirectional causal links observed between some economic indicators like GFCF and imports, highlighting the complex interplay between these variables. These results provide important insights into how changes in economic and governance factors can impact GDP growth in the studied context.

CONCLUSION AND POLICY RECOMMENDATIONS:

In summary, the panel ARDL analysis provides valuable insights into the long-term equilibrium relationships among economic and governance indicators and their impact on GDP growth rate (GDPG). External debt (EXTDEBT) emerges as a crucial factor, indicating that excessive reliance on external borrowing can exert a detrimental influence on economic growth over time. In contrast, gross fixed capital formation (GFCF) underscores the significance of investments in fixed capital, highlighting their positive and substantial impact on long-term GDP growth. Government consumption (GOVCONS) appears to have a potentially negative influence, although the statistical significance is modest. Imports (IMPORT) demonstrate a nuanced relationship, impacting GDPG differently across various quantiles of its distribution. Inflation (INFL) does not exhibit a consistent influence on GDPG, while voice and accountability (VOICE) and the rule of law (RULE) appear to have limited significance in shaping long-term economic growth. These findings collectively emphasize the multifaceted nature of economic growth determinants and their varying effects across different aspects of the GDP growth rate distribution. The causality analysis, on the other hand, reveals directional relationships between the variables. External debt, government consumption, GFCF, imports, and inflation are seen as influential factors that can drive changes in GDP growth rate. However, the rule of law and voice and

accountability do not exhibit significant causal links with GDPG. Additionally, bidirectional causal relationships are observed in some cases, suggesting that the economic and governance indicators mutually influence each other.

Debt Management and Fiscal Responsibility Given the negative long-term relationship between external debt (EXTDEBT) and GDP growth rate (GDPG), it is essential for policymakers to adopt prudent debt management practices. This includes closely monitoring and controlling external borrowing, focusing on concessional loans with favourable terms, and ensuring that borrowed funds are invested in projects that yield positive economic returns. Additionally, implementing fiscal responsibility measures, such as adhering to budgetary constraints and reducing budget deficits, can help maintain macroeconomic stability and foster sustainable economic growth. Promoting Investment in Fixed Capital The positive and statistically significant impact of gross fixed capital formation (GFCF) on GDP growth rate underscores the importance of fostering investments in infrastructure, technology, and other forms of fixed capital. Policymakers should create an environment conducive to both domestic and foreign investment, offering incentives and removing barriers to attract private sector investments. Investing in education and skills development can also contribute to a skilled workforce, which is vital for capital accumulation and productivity growth. Enhancing Governance and Accountability While the analysis suggests limited direct causal links between governance indicators like the rule of law (RULE) and voice and accountability (VOICE) and GDP growth rate, good governance remains a crucial factor for overall societal well-being and economic development. Policymakers should prioritize efforts to strengthen the rule of law, enhance transparency, reduce corruption, and promote accountable governance. These measures can create a favorable business environment, attract investments, and ensure the efficient allocation of resources, ultimately contributing to sustainable economic growth.

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Sr.n	Countries	Sr.n	Countries
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2	Angola	37	Morocco
3	Armenia	38	Nepal
4	Bangladesh	39	Nicaragua
5	Benin	40	Niger
6	Burkina Faso	41	Nigeria
7	Burundi	42	North Macedonia
8	Cameroon	43	Pakistan
9	Central African Republic	44	Rwanda
10	Chad	45	Senegal
11	Colombia	46	Serbia
12	Congo, Dem. Rep.	47	Solomon Islands
13	Congo, Rep.	48	South Africa
14	Costa Rica	49	Sri Lanka
15	Dominican Republic	50	Sudan
16	Ecuador	51	Tajikistan
17	Egypt, Arab Rep.	52	Tanzania
18	El Salvador	53	Togo
19	Eswatini	54	Tonga
20	Gabon	55	Tunisia
21	Gambia	56	Uganda
22	Georgia		
23	Ghana		
24	Guinea-Bissau		
25	Haiti		
26	Honduras		
27	Jamaica		
28	Jordan		
29	Kenya		
30	Kyrgyz Republic		
31	Madagascar		
32	Mali		
34	Mauritania		
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