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Exploring the Macroeconomic Determinants of Private Non-Guaranteed External Debt in Low- and Middle-Income Countries

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Abstract

In recent years, developing economies have witnessed a marked shift in the composition of external debt, with private non-guaranteed (PNG) external debt rising relative to traditional public and publicly guaranteed (PPG) debt. This trend, particularly evident in low- and middle-income countries, raises financial stability concerns due to the lack of sovereign guarantees and the potential for contingent fiscal risks. Despite its growing importance, PNG external debt remains under explored in the literature, which has largely focused on PPG debt. Addressing this gap, this study examines the macroeconomic determinants of PNG external debt across 68 low- and middle-income countries from 2000 to 2023. Key explanatory variables include short-term external debt, GDP growth, exchange rate movements, financial development, trade openness, remittances, and foreign reserves. Using panel data from the World Bank and other global sources, the study employs Driscoll–Kraay standard errors, Feasible Generalized Least Squares (FGLS), and system GMM estimators to correct for heteroscedasticity, serial correlation, endogeneity, and cross-sectional dependence. The findings indicate that short-term debt, economic growth, exchange rate depreciation, and financial development drive PNG debt accumulation, while remittances, trade openness, and foreign reserves reduce it. The study provides timely insights for policymakers on managing private external liabilities within broader macro-financial frameworks.
Jel Classification: F24, F31, F34, F41, F63

Keywords

PNG External debt, Generalized Method of Moments, Driscoll Krray Standard Error, Low and Middle Income Countries.

1. Introduction

In recent decades, the composition of external debt in developing economies has undergone a profound transformation, marked by the rising prominence of private non-guaranteed (PNG) external debt—borrowed by private entities without sovereign backing. This structural shift reflects greater financial integration and expanding access to international capital markets, particularly in upper-middle-income countries in Latin America and Asia. However, similar patterns have also emerged in low- and middle-income countries (LMICs), where institutional weaknesses and shallow domestic financial systems make private external borrowing an increasingly attractive option (Presbitero & Pedersoli, 2023).

Between 2011 and 2016, the stock of PNG debt rose significantly relative to public and publicly guaranteed (PPG) debt, and while the trend has since stabilized, the implications are far-reaching (World Bank, 2020). Unlike PPG debt, PNG liabilities lack sovereign guarantees, making repayment contingent on the borrower's capacity to generate sufficient foreign exchange. Nonetheless, private sector distress can create *contingent liabilities* for governments, potentially triggering public bailouts and undermining fiscal stability (Reinhart, Rogoff, & Savastano, 2003; IMF, 2021). Concurrently, the creditor structure of public debt has evolved, with private creditors now holding the majority share—approximately 62% in 2019, up from 20% in the 1970s (World Bank, 2022). This increasing reliance on bond markets and commercial loans—often associated with shorter maturities, higher interest rates, and rollover risks—has diminished the role of concessional finance and exacerbated debt sustainability concerns, particularly in countries with underdeveloped financial regulation (Ari & Koc, 2018; Porzecanski, 2018).

Despite these vulnerabilities, PNG external debt continues to serve as a vital source of development finance. When well-managed, it can supplement domestic savings, stimulate investment, and contribute to economic growth (Pedersoli & Presbitero, 2022). However, macroeconomic instability, weak revenue generation, and fragile institutions often drive excessive or poorly allocated borrowing, thereby increasing financial fragility (Akram, 2015; Ehikioya et al., 2020). Macroeconomic fundamentals—such as GDP growth, exchange rate stability, trade openness, financial development, remittances, and foreign reserves—play a crucial role in shaping borrowing behavior and debt sustainability. Yet, empirical research has disproportionately focused on aggregate public or total external debt, largely neglecting the distinct dynamics of PNG debt (Miftari, 2022; Christensen et al., 2021).

Existing studies often overlook the unique characteristics of PNG debt, including its sensitivity to global credit conditions, lack of sovereign backing, and exposure to private default risk. While some scholars have examined the growth effects of PNG debt (e.g., Mijiyawa, 2024, 2025), there remains a dearth of research on its macroeconomic determinants. Moreover, mixed findings regarding the influence of foreign inflows—such as remittances and foreign direct investment—on external debt underscore the need for more nuanced, disaggregated analysis (Gilal et al., 2024; Ali et al., 2025; Mensah & Arku, 2024). This study aims to fill this critical gap by systematically analyzing the macroeconomic determinants of PNG external debt in LMICs. Specifically, it investigates how short-term debt ratios, GDP growth, exchange rate depreciation, trade openness, financial development, foreign reserves, and personal remittances influence the accumulation of private foreign liabilities. Using a balanced panel data set from 2000 to 2023, the study employs a triad of robust econometric techniques—Driscoll–Kraay standard errors (1998), Feasible Generalized Least Squares (FGLS) (Amemiya, 1978; Biørn, 2004), and System GMM (Arellano & Bond, 1991; Blundell & Bond, 1998)—to address issues such as heteroscedasticity, auto-correlation, cross-sectional dependence and endogeneity. The results reveal that short-term debt, GDP growth, exchange rate depreciation, and financial development significantly drive PNG external debt accumulation, while remittances, trade openness, and foreign reserves help reduce debt vulnerabilities. These findings offer actionable insights for policymakers seeking to manage rising private external debt without stifling growth-enhancing private investment.

In doing so, this research contributes to the literature in three meaningful ways:

1. It shifts the analytical spotlight to PNG external debt, an area largely neglected in debt sustainability studies.
2. It integrates macroeconomic, institutional, and external factors to provide a comprehensive understanding of private borrowing dynamics.
3. It employs advanced econometric methods to ensure the reliability and policy relevance of its findings.

The remainder of the paper is structured as follows: Section 2 presents the literature review, Section 3 outlines the methodology, Section 4 discusses the empirical results, and Sections 5 and 6 provide policy recommendations and conclusions, respectively.

2. Literature Review

The growing relevance of private non-guaranteed (PNG) external debt in the financing portfolios of low- and middle-income countries (LMICs) has prompted increasing scholarly attention to its macroeconomic drivers. Unlike sovereign debt, PNG debt is incurred by private entities without government guarantees, making its accumulation more

susceptible to market signals, macroeconomic imbalances, and financial sector vulnerabilities. However, much of the extant literature has focused on aggregate public or total external debt, leaving PNG debt relatively under-explored.

Early country-level studies such as Lau and Lee (2016) and Gokmenoglu and Rafik (2018) investigate the short- and long-run determinants of external debt in countries like Thailand, the Philippines, and Malaysia. Using ARDL and VECM models, they find inflation, interest rates, and monetary aggregates (e.g., M2) to be influential, alongside fiscal expenditures and GDP. While informative, these studies are limited by their small scope and do not fully address issues of endogeneity or broader macro-financial interactions.

Panel-based studies offer more robust insights. Waheed (2017) and Dawood et al. (2021) employ GMM and fixed-effects estimations to account for heterogeneity and endogeneity across oil-exporting/importing and Asian countries. Dawood et al. identify economic growth and investment as debt-reducing factors, whereas trade openness and government spending aggravate debt levels. Waheed, meanwhile, emphasizes that structural characteristics, such as resource endowments and institutional capacity, condition the effects of macroeconomic variables. In Africa, Murwirapachena and Kapingura (2015) and Adamu and Rasiah (2016) underscore how weak growth fundamentals and reliance on volatile revenues (e.g., oil) contribute to debt buildup in South Africa and Nigeria. Yet, their time series approaches (e.g., VAR and ARDL) lack the flexibility to detect cross-sectional dependencies or nonlinearities typical of developing economies.

Recent contributions have incorporated non-traditional drivers of external debt. Azolibe (2021) finds that corruption and foreign aid dependence significantly elevate debt burdens in heavily indebted poor countries (HIPCs), while Mijiyawa and Oloufade (2023) show that remittances—despite being a stable source of foreign exchange—may encourage debt accumulation when foreign reserves are insufficient. These findings challenge the conventional view that remittances and aid are unequivocally beneficial for external debt sustainability. Expanding on the institutional angle, Mijiyawa (2022) cautions about a "second wave" of debt distress among HIPCs, citing governance weaknesses and post-relief complacency. Elkhishin and Mohieldin (2021) further argue that global financial volatility and domestic fragilities expose emerging markets to cyclical debt crises. Their macro-financial vulnerability framework is particularly relevant for analyzing PNG debt, which lacks sovereign risk buffers.

The role of exchange rates and foreign reserves in external debt dynamics remains ambiguous. While Mahara (2021) and Mensah and Arku (2024) find exchange rate depreciation to reduce debt levels, İlhan (2023) notes heterogeneous outcomes depending on country-specific contexts. Such mixed evidence likely stems from methodological inconsistencies and varied control for institutional or structural factors. Although non-linearities and threshold effects are rarely addressed, exceptions exist. Azolibe (2022) examines how debt deters FDI under the debt overhang hypothesis, while Athwari (2024) identifies feedback loops between exports and reserves using causality tests. However, these are often limited to single-country settings, restricting broader policy applicability.

On the theoretical front, Greiner (2008) and Ari and Koc (2018) underscore the importance of debt sustainability being tied to productivity-enhancing investments. Debt not anchored in long-run growth fundamentals can raise the cost of capital for the private sector and hinder private borrowing. Similarly, Green, Kirkpatrick, and Murinde (2006) and Mehrotra (2011) highlight the role of domestic financial development in facilitating efficient capital allocation, strengthening investor confidence, and improving access to external credit for private firms. A key critique from Porzecanski (2018) and Reinhart and Rogoff (2011) is the inadequacy of using the debt-to-GDP ratio as a sole indicator of sustainability. They advocate for multidimensional assessments that account for debt composition, currency mismatches, and contingent liabilities—factors that are especially pertinent to PNG debt, which often carries higher repayment risks and exposure to global credit conditions.

More recent empirical evidence also shows that remittances and FDI, though generally seen as beneficial, may play dual roles. Ali et al. (2025) find that these inflows help reduce external debt by improving fiscal space and foreign reserves, while Gilal et al. (2024) observe that, in Pakistan, remittances and capital formation may actually increase external debt when not productively absorbed. Both studies highlight the importance of how such inflows are managed within the broader macroeconomic framework. In terms of debt composition, Mijiyawa (2024, 2025) provides key insights. His 2024 study shows that private external debt can foster growth in LMICs by improving investment efficiency, particularly through bond financing. However, his 2025 work reveals a non-linear relationship—private debt boosts growth only up to a certain threshold (around 46% of total debt), beyond which it becomes detrimental. This inverted U-shape warns of excessive reliance on private financing without appropriate regulatory and institutional safeguards.

However, institutional quality emerges as a critical factor. Akinadewo and Akinkoye (2020) demonstrate how poor debt oversight and fiscal opacity in Nigeria erode investor confidence and limit private sector access to external finance. Similarly, Ari and Koc (2018) stress aligning debt strategies with sustainable development goals to avoid spillovers from public to private debt vulnerabilities.

On the other hand, Ariani and Cahyadin (2019) examine the ASEAN-8 countries over the period 2005–2016 and provide evidence that rising external debt across the region was primarily driven by macroeconomic expansion and institutional weaknesses. Their use of a Fixed Effects Model (FEM) allows them to control for unobservable country-specific characteristics, which adds robustness to their empirical estimates. Their findings show that higher GDP is positively correlated with external debt, potentially reflecting either increased borrowing capacity or growing developmental financing needs. Conversely, both exports and better governance (as proxied by CPI) are negatively related to external debt, suggesting that trade earnings and institutional quality can mitigate external borrowing. Interestingly, foreign exchange reserves and budget deficits were found to be statistically insignificant, indicating that their roles might be secondary or indirect in this context. The study is valuable for policy recommendations, especially in highlighting the importance of trade and anti-corruption measures. However, the limited timeframe and exclusion of dynamic effects might constrain the generalizability of the findings.

Similarily, Pyeman et al. (2016), focusing on Malaysia from 1972 to 2012, apply time series methods including ADF tests, Granger causality, and multiple regression to evaluate how GDP, exports, and FDI influence external debt. Their findings reinforce those of Ariani and Cahyadin by showing that economic growth and export performance are significant determinants of debt accumulation. They add value by incorporating FDI as a variable, showing its significant influence on external debt. This suggests that capital inflows not only supplement but also potentially substitute or complement external borrowing. The long-term national focus allows for a more nuanced understanding of Malaysia's specific economic trajectory and debt policy evolution. Nevertheless, the single-country approach limits comparative insights, and the exclusion of institutional variables such as governance or fiscal discipline may overlook critical aspects that influence debt sustainability.

However, ,Sağdıç and Yıldız (2020) shift the focus to the Central Asia and Caucasus region, covering 1995 to 2017, and employ panel regression analysis to understand the role of fiscal and macroeconomic variables. Unlike the previous studies, they emphasize public expenditure and debt servicing as positive contributors to external debt, underscoring the dependency of these governments on foreign borrowing to finance their spending and manage prior obligations. In contrast, macroeconomic stability indicators such as inflation, current account balance, and domestic savings are found to reduce reliance on external debt. This broader approach provides important insights into how fiscal imbalances and weak internal financing capabilities can exacerbate external borrowing needs. The study is particularly relevant in contexts where domestic capital markets are underdeveloped. However, the absence of institutional quality measures, such as governance or corruption indicators, limits the ability to assess how non-economic factors shape debt dynamics.

Summary and Gap

Taken together, the literature suggests that PNG external debt in LMICs is shaped by a complex mix of macroeconomic conditions, structural features, and institutional quality. However, empirical evidence directly targeting PNG debt as a dependent variable remains scarce, and few studies deploy advanced panel techniques to address issues of endogeneity, cross-sectional dependence, or heteroscedasticity.

This study addresses this gap by using a panel of low- and middle-income countries and applying Driscoll–Kraay standard errors, Feasible Generalized Least Squares (FGLS), and System GMM to provide robust estimates of the macroeconomic determinants of PNG external debt. In doing so, it offers a novel contribution to the literature, advancing understanding of private external liabilities and informing debt sustainability strategies in the face of rising private-sector borrowing.

3. Methodology

3.1 Sample,Data, Sources, Variables description and Model

The data for 68 low and middle income countries for the period from 2000 to 2023 is sourced from World Development Indicator, the database of the World Bank. The list of selected countries is given in Appendix. The details of included variables, their notations, description and sources are presented in table 1.

Table 1: ***Variables, their notation, description and sources***

Variable	Notation	Description	Source
External Debt Stock private and non guaranteed	ledspng	Private and non guaranteed external debt stock as a dependent variable and transformed to logarithm	WDI
Short term external debt	lsteded	Short term external debt to total external debt stock with maturity of less than one	WDI

		year as an independent variable and transformed into logarithm	
Exchange rate	ler	Official exchange rate; units of local currency per US dollar	WDI
Trade Openness	ltradeg	Total Trade to GDP ratio as an independent Variable and transformed into logarithm	WDI
Financial development	ldcpg	Total domestic Credit to private to GDP ratio as an independent variable and transformed into logarithm	WDI
Real Economic growth	lgdpg	Real GDP growth rate as an independent Variable and transformed into logarithm	WDI
Personal remittances	lremg	Personal remittances to GDP ratio as an independent Variable and transformed into logarithm	WDI
Foreign Reserves	lresed	Foreign Reserves to external debt ratio as an independent variable and transformed into logarithm	WDI

Source: Authors' Preparation

3.2 Econometric Model

This study estimates the equation 1 in order investigate the macroeconomic determinants of external debt private and non guaranteed.

$$ledspng_{it} = \alpha + \beta_1 lsteded_{it} + \beta_2 ler_{it} + \beta_3 ltradeg_{it} + \beta_4 lgdpg_{it} + \beta_5 lremg_{it} + \beta_6 lresed_{it} + \beta_7 ldcpg_{it} + \epsilon_{it} \quad \ldots\ldots (1)$$

Where:

ledspng is log of external debt private and non guaranteed as a dependent variable

lsteded is log of short term external debt to total external debt ratio

ler is log of exchange rate

ltradeg is the log of trade to GDP ratio

lgdpg is log of real GDP growth rate

lremg is log of remittances to GDP ratio

lresed is log of reserves to external debt ratio

ldcpg is log of domestic credit to private sector to GDP ratio

ϵ is error term with zero mean and constant variance, *i* is country and *t* is time period.

3.3 Conceptual Framework

Figure 1 outlines the conceptual framework for analyzing the macroeconomic determinants of private non-guaranteed external debt in low and middle-income countries. In this framework, the central focus is on identifying both the demand- and supply-side macroeconomic factors that influence the accumulation of private external liabilities not guaranteed by the public sector.

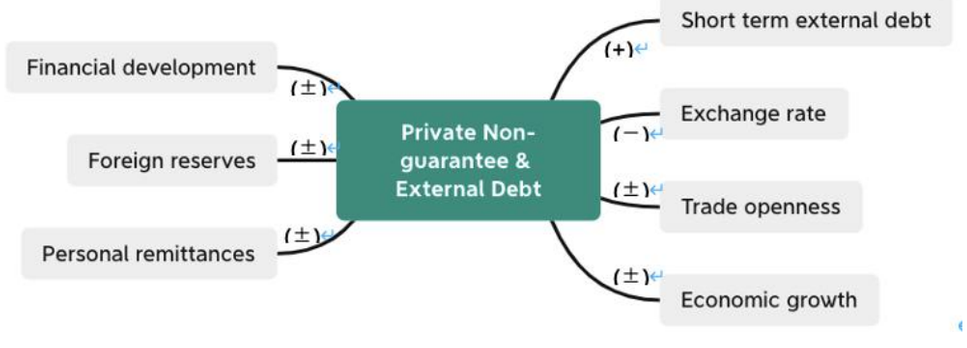
On the left-hand side, the model includes three key domestic financial and external inflow variables: financial development, foreign reserves, and personal remittances. Each of these variables is expected to have an ambiguous effect (±) on private external debt. Financial development can either reduce external borrowing by increasing access to domestic credit or facilitate more foreign debt through greater integration into global capital markets. Foreign reserves may discourage external borrowing by signaling

macroeconomic strength, or conversely, encourage it by increasing lenders' confidence. Similarly, personal remittances might reduce the need for debt by providing alternative financing or increase borrowing potential by improving creditworthiness and domestic liquidity.

On the right-hand side, the framework incorporates macroeconomic variables that reflect external and structural conditions: short-term external debt, exchange rate, trade openness and economic growth. Short-term external debt is expected to have a positive relationship with private external debt, as firms may rely on short-term financing to meet working capital or investment needs. The exchange rate is anticipated to have a negative or mixed effect; a depreciating currency increases the cost of foreign debt servicing, potentially discouraging borrowing, while an appreciating currency may make foreign borrowing more attractive. Trade openness is associated with an ambiguous effect—it can facilitate private borrowing by improving access to international markets or reduce the need for debt if export earnings are sufficient to finance investments. Lastly, economic growth may either stimulate borrowing by increasing investment opportunities or reduce it by enhancing domestic revenue and reducing dependence on external finance.

In summary, the framework captures the complex and often context-dependent macroeconomic drivers of private non-guaranteed external debt, acknowledging that their effects may vary across different structural and institutional environments in low and middle-income countries.

Figure 1 Conceptual Framework



3.4 Econmetric Techinique for Estimation

The empirical analysis in this study proceeds through a structured and rigorous econometric approach aimed at addressing the inherent challenges of panel data estimation. We begin with preliminary analyses, including descriptive statistics to summarize the central tendencies and dispersion of the variables, pairwise correlation coefficients to identify initial linear relationships among regressors and panel unit root tests (using Fisher-type ADF and PP tests) to determine the stationarity properties of the series.

Following this, we estimate the main empirical model (Equation 1) using two robust panel estimation techniques to ensure both inference validity and estimation efficiency. The first method applies the Driscoll–Kraay standard error estimator developed by Driscoll and Kraay (1998), while the second employs the Feasible Generalized Least Squares (FGLS) estimator, originally proposed by Amemiya (1977), as a robustness check.

The Driscoll–Kraay estimator is well-suited for macroeconomic panel datasets characterized by potential heteroscedasticity, serial correlation and cross-sectional dependence—features commonly present in multi-country studies where global or regional shocks affect multiple units simultaneously. Unlike traditional clustered or White-robust standard errors, the Driscoll–Kraay method explicitly corrects for both temporal and spatial correlations across panels. Moreover, it is compatible with fixed effects models, which allows us to control for unobserved, time-invariant heterogeneity across countries, thus enhancing the reliability of statistical inference (Hoechle, 2007).

To complement this, we apply the Feasible Generalized Least Squares (FGLS) method and one step system GMM by Blundell, R., & Bond, S. (1998) and Arellano, M., & Bond, S. (1991) as a robustness check. FGLS transforms the original regression model to account for heteroscedastic and serially correlated error structures within panel units, aiming to improve estimation efficiency. This approach is particularly useful in panel settings where N is large relative to T, and where the variance–covariance structure of the error terms can be consistently estimated (Baum, 2006). One of the core strengths of FGLS lies in its ability to produce efficient coefficient estimates under a wide range of non-spherical error structures. However, it assumes that the variance–covariance structure is correctly specified, which may not always be verifiable in practice. While FGLS can accommodate some cross-sectional dependence, it generally performs best when such dependencies are moderate or explicitly modeled. The system GMM Model accounts for potential endogeneity problem.

Together, these three estimation techniques offer complementary strengths. The Driscoll–Kraay method ensures robust inference in the presence of complex error structures, particularly in macro panels with long time series, while FGLS provides efficient parameter estimates when error variance and autocorrelation are prominent and correctly

specified. Besides, System GMM accounts for potential endogeneity problem By employing these methods, we aim to validate the consistency of our results across different econometric specifications, thereby enhancing the credibility and robustness of our empirical findings (Hoechle, 2007; Roodman, 2009).

4. Results and Discussions

4.1 Descriptive Statistics

Table 2 presents the descriptive statistics for the main variables used in the analysis, offering an initial overview of their distributions, central tendencies, and ranges. These statistics help to understand the nature and variability of the macroeconomic indicators across the panel of low and emerging economies.

The dependent variable, log of private non-guaranteed external debt stock (ledspng), shows a mean value of 21.372 with a standard deviation of 2.946 and ranges from 6.908 to 26.49. This wide dispersion suggests considerable heterogeneity in the size of private external debt burdens among the sample countries, likely reflecting differences in financial development, private sector access to global capital markets, and macroeconomic stability.

The variable lsteded, representing the log of short-term external debt as a share of total external debt, has a mean of 1.847 and a standard deviation of 1.719, with a minimum value of –9.21 and a maximum of 4.13. The negative minimum suggests that in some cases, the short-term debt ratio may be extremely low or possibly influenced by transformation or scaling issues in logarithmic conversion. Still, the data generally reveal a broad range in the maturity structure of external debt across countries. Ler, the log of the official exchange rate, averages 3.949 with a standard deviation of 2.541, ranging from –3.113 to 22.629. The wide range indicates substantial variation in exchange rate regimes or inflation-adjusted exchange levels, which could significantly affect external debt valuation and sustainability.

The trade openness variable, ltradeg (log of trade-to-GDP ratio), is more tightly distributed, with a mean of 4.072, standard deviation of 0.454, and a range from 0.906 to 5.332. This suggests that most countries in the sample maintain relatively similar degrees of openness, though there are outliers with exceptionally low or high trade integration. The lgdpg variable, capturing the log of real GDP growth rate, has a mean of 1.369 and standard deviation of 0.759, with values ranging from –3.24 to 4.148. The presence of negative values reflects periods of contraction in some countries, while others achieved high growth, indicative of macroeconomic volatility across the sample.

Lrem, the log of personal remittances as a percentage of GDP, averages 0.797, with a relatively large standard deviation of 1.692. The minimum value is –7.012 and the maximum is 3.986, pointing to vast disparities in the reliance on remittances—some countries are highly dependent on these flows, while others receive negligible amounts. Lresed, representing the log of the ratio of foreign reserves to external debt, has a mean of 3.385 and standard deviation of 1.121, spanning from –1.339 to 8.253. This highlights substantial variation in external liquidity buffers, which can influence a country's resilience to debt shocks.

Finally, ldcpg, the log of domestic credit to the private sector as a percentage of GDP, has a mean of 3.064 and standard deviation of 0.916. With a range from –0.96 to 5.1, this variable captures differences in financial sector development and access to domestic credit across countries. Overall, these descriptive statistics reveal pronounced heterogeneity across key macroeconomic and financial indicators, underscoring the importance of accounting for country-specific dynamics in the subsequent econometric analysis. Such variation also justifies the use of panel methods capable of handling cross-sectional and temporal heterogeneity

Table 2: ***Descriptive Statistics***

Variable	Mean	Std. Dev.	Min	Max
ledspng	21.372	2.946	6.908	26.49
lsteded	1.847	1.719	-9.21	4.13
ler	3.949	2.541	-3.113	22.629
ltradeg	4.072	.454	.906	5.332
lgdpg	1.369	.759	-3.24	4.148
lremg	.797	1.692	-7.012	3.986
lresed	3.385	1.121	-1.339	8.253
ldcpg	3.064	.916	-.96	5.1

Source: authors Calculation

4.2 Coefficient of Correlation Matrix

Table 3 presents the matrix of Pearson correlation coefficients among the key variables used in the study, offering insights into the linear relationships and potential multicollinearity among them. The analysis provides a preliminary understanding of how the macroeconomic and financial variables are interrelated, especially in the context of private non-guaranteed (PNG) external debt dynamics in low and emerging economies.

The dependent variable, ledspng (log of private non-guaranteed external debt stock), shows a positive correlation with lsteded (log of short-term external debt to total external debt ratio) at 0.358, indicating that higher short-term debt shares are associated with greater private external debt accumulation. This may reflect private borrowers' preference or reliance on short-term international financing. Ledspng also exhibits a moderate positive correlation with ldcpg (log of domestic credit to private sector) at 0.289, suggesting that financial deepening may be linked to increased access to external borrowing by the private sector.

On the other hand, ledspng is negatively correlated with lrem (log of remittances to GDP ratio) at –0.353, implying that countries more dependent on remittances tend to have lower private external debt. This could reflect substitution effects, where remittances provide alternative financing, reducing the private sector's need to borrow externally. It also shows a modest negative correlation with trade openness (ltradeg) at –0.225, which may suggest that more open economies rely less on private external debt, possibly due to greater trade financing or stronger domestic capital markets.

The correlation between ledspng and exchange rate (ler) is weak and negative (–0.086), implying a minimal linear association. Similarly, ledspng and real GDP growth (lgdpg) exhibit a very weak positive correlation of 0.088, indicating that economic growth does not have a strong direct relationship with private debt accumulation in the short run. Among the independent variables, several notable relationships emerge. For example, lsteded and ldcpg show a positive correlation (0.343), possibly indicating that economies with more private domestic credit also experience a higher share of short-term external debt. Conversely, lrem and ledspng (–0.353) and lrem and ler (–0.118) suggest that remittances may dampen both borrowing and exchange rate pressures. Interestingly, lrem and trade openness (ltradeg) are positively correlated (0.361), hinting that more open economies may also be greater recipients of remittances.

The correlation between lresed (foreign reserves to external debt ratio) and other variables is generally weak, with the highest being a mild positive correlation with ldcpg (0.170). This suggests a limited role for reserve adequacy in directly influencing the other macroeconomic variables, though it may still be critical in debt sustainability frameworks.

Overall, the matrix does not indicate severe multicollinearity, as no correlation coefficient exceeds the threshold of 0.8 commonly considered problematic in regression analysis. Nonetheless, some moderate associations (such as between ledspng and lsteded or lrem) are meaningful and warrant further investigation through multivariate panel regression techniques. These correlations serve as a useful foundation for developing the empirical model and interpreting causality in the subsequent econometric analysis.

Table 3: ***Matrix of correlations***

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) ledspng	1.000							
(2) lsteded	0.358	1.000						
(3) ler	-0.086	-0.106	1.000					
(4) ltradeg	-0.225	0.093	-0.208	1.000				
(5) lgdpg	0.088	0.061	0.099	-0.100	1.000			
(6) lremg	-0.353	-0.157	-0.118	0.361	0.022	1.000		
(7) lresed	-0.023	0.046	0.089	0.001	0.015	-0.110	1.000	
(8) ldcpg	0.289	0.343	-0.310	0.320	-0.098	0.117	0.170	1.000

Source: Authors Calculation

4.3 Unit root Test results

Table 4 presents the results of panel unit root tests conducted using both the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) methods to determine the stationarity properties of the variables included in the empirical model. Establishing whether the variables are stationary is a crucial preliminary step in panel data econometrics, as it affects the validity of the regression estimates and informs the appropriate choice of estimation techniques.

The results show that all variables are stationary at their levels, as indicated by statistically significant test statistics in both the ADF and PP columns. These variables include the log of private non-guaranteed external debt stock (ledspng), the log of short-term external debt to total external debt ratio (lsteded), the log of official exchange rate (ler), the log of trade openness (ltradeg), the log of real GDP growth rate (lgdpg), the log of remittances to GDP ratio (lrem), the log of foreign reserves to external debt ratio (lresed), and the log of domestic credit to private sector as a percentage of GDP (ldcpg). In each case, the null hypothesis of a unit root is rejected at conventional significance levels, confirming that the variables are stationary in levels—that is, integrated of order zero, or I(0).

The consistency of results between the ADF and Phillips-Perron tests further strengthens confidence in the conclusion that the data are free from non-stationarity issues. This outcome is methodologically important, as it permits the use of level-based econometric estimation methods such as pooled OLS, fixed effects, Driscoll–Kraay standard errors, and Feasible Generalized Least Squares (FGLS), without the need for differencing or cointegration modeling. Thus, the stationarity of the variables supports the robustness and appropriateness of the econometric techniques applied in the subsequent analysis

Table 4: ***Unit Root Test results***

ADF Unit root test			**Phillips Perron Unit root test**		
Variable	**level**	**1st differenc**	**level**	**1st differenc**	**Order**
ledspng	246.4871*		222.7781*		I(0)
lsteded	217.0442*		258.5443 *		I(0)
ler	188.2223 *		205.0436 *		I(0)
ltradeg	119.8956 *		181.0835 *		I(0)
lgdpg	257.1009*		845.5796*		I(0)
lremg	279.2440*		279.2440 *		I(0)
lresed	156.0826 *		156.3826 *		I(0)
ldcpg	213.2512*		120.8084*		I(0)

Source: Authors Calculation

4.4 Results of Driscoll Krray Standard Error Model

Table 5 presents the estimation results from the Driscoll–Kraay standard error model, with the dependent variable being the log of private non-guaranteed external debt stock (ledspng). This method accounts for heteroscedasticity, serial correlation and cross-sectional dependence, making it well-suited for macro-panel data involving multiple countries over time. The model is statistically significant overall, as reflected by a highly significant F-statistic ($F(7, 23) = 61.44$, $p < 0.01$) and the R^2 value of 0.3504 indicates that approximately 35% of the variation in private external debt stock is explained by the included explanatory variables.

The short-term external debt ratio (lsteded) has a large and highly significant positive coefficient ($\beta = 0.477$, $p < 0.01$), suggesting that countries with higher reliance on short-term debt also experience larger stocks of private non-guaranteed debt. This is consistent with findings from Mehrotra (2011), who emphasized the role of financial liberalization in encouraging short-term borrowing by private actors in emerging markets, often at the expense of long-term sustainability.

The log of GDP growth rate (lgdpg) also shows a positive and statistically significant effect ($\beta = 0.355$, $p = 0.043$), implying that faster-growing economies tend to accumulate more private foreign debt. This aligns with the pro-cyclical nature of capital flows as documented by Jha (2001) and Greiner (2008), where private borrowers in booming economies find it easier to tap into international capital markets.

The log of domestic credit to private sector (ldcpg) is strongly positively associated with ledspng ($\beta = 1.351$, $p < 0.01$), reflecting that deeper domestic financial markets enable greater private sector borrowing both domestically and externally. This supports findings by Green et al. (2006), who highlight that financial development not only increases credit access but also boosts the capacity of firms to borrow internationally.

The exchange rate (ler) exhibits a negative and significant coefficient (β = –0.045, p < 0.01), indicating that currency depreciation (a higher ler value) is associated with a reduction in private external debt. This can be explained by the fact that a weaker currency raises the cost of foreign-denominated debt, thereby discouraging new borrowing—a dynamic also observed in the studies by Akram (2015) and Yusuf & Mohd (2023). The log of remittances to GDP ratio (lrem) has a strong and significant negative effect (β = –0.517, p < 0.01). This suggests that remittance inflows substitute for external borrowing by the private sector, possibly by providing alternative sources of liquidity for households and small firms. This finding is in line with Adams and Cuecuecha (2013) and Ali, G. A., Hong, L., & Ghumro, N. H. (2025), who argue that remittances reduce dependence on formal credit markets, including foreign debt channels.

Trade openness (ltradeg) also negatively influences private external debt (β = –1.531, p < 0.01), indicating that more open economies tend to rely less on external borrowing. This could be attributed to increased trade earnings that provide internal financing and reduce the need for foreign loans. This aligns with findings by Reinhart and Rogoff (2011), who show that countries with diversified trade structures are often less dependent on volatile external debt markets. The foreign reserves to external debt ratio (lresed) has a negative coefficient (β = –0.325) that is only marginally significant (p = 0.078). This suggests a tentative inverse relationship—higher reserves reduce the need for private sector borrowing abroad—but the evidence is not robust. Still, this result is directionally consistent with Saliya (2023), who notes that countries with stronger reserve positions can buffer external vulnerabilities and reduce reliance on private external capital.

In sum, the Driscoll–Kraay results confirm that macroeconomic fundamentals and financial structure significantly influence the accumulation of private non-guaranteed external debt in low and emerging countries. Variables such as short-term debt, GDP growth and financial development amplify private borrowing, while remittances, trade openness and exchange rate depreciation act as dampening forces. These findings are broadly consistent with the theoretical underpinnings of external finance and align with a range of empirical studies, reinforcing the multifaceted nature of external debt dynamics and the importance of balancing growth with financial risk management.

Table 5: ***Results of Driscoll- Krray Standard Error Model***

D.V= ledspng	Coefficient	D.Kstd. err	T- value	P-value
lsteded	0.477	0.068	7.010	0.000
ler	-0.045	0.011	-4.150	0.000
ltradeg	-1.531	0.324	-4.720	0.000
lgdpg	0.355	0.165	2.140	0.043
lremg	-0.517	0.062	-8.320	0.000
lresed	-0.325	0.176	-1.840	0.078
ldcpg	1.351	0.159	8.510	0.000
_cons	23.723	1.171	20.260	0.000
R^2	0.3504			
F(7, 23)	61.44			0.000

Source: Authors' calculations

4.5 Robustness check through FGLS

To reinforce the empirical validity of the baseline results, this study employs two alternative estimation techniques—Feasible Generalized Least Squares (FGLS) and one-step system Generalized Method of Moments (GMM)—as robustness checks against the primary Driscoll–Kraay (DK) standard error model. Both models are well-suited to addressing key econometric concerns in panel data, including serial correlation, heteroscedasticity, cross-sectional dependence and endogeneity.

Table 6 reports the FGLS regression results, which are closely aligned with those of the DK model in both sign and significance of coefficients. FGLS, known for improving estimation efficiency under panel-specific error variance structures, confirms the robustness of the main findings. Short-term external debt (lsteded) remains positively and significantly associated with private external debt (Coef. = 0.477, p < 0.01), underscoring its role as a major driver of external borrowing by the private sector. Similarly, trade openness (ltradeg) continues to exhibit a significant negative impact (Coef. = –1.531, p < 0.01), suggesting that more globally integrated economies tend to rely less on private foreign liabilities.

Remittance inflows (lrem) retain their strong negative association (Coef. = –0.517, p < 0.01), reaffirming the substitution effect whereby remittances offset the need for private-sector external borrowing. Financial development (ldcpg) and GDP growth (lgdpg) are again positively linked to private external debt, indicating that expanding domestic financial markets and economic activity facilitate external capital access. Importantly, the foreign reserves to external debt ratio (lresed) is now statistically significant (Coef. = –0.325, p < 0.01) in contrast to its marginal role in the DK model, strengthening the argument that higher reserves can buffer against excessive reliance on external private finance. Only the exchange rate (ler) appears insignificant (p = 0.217), although its negative sign is consistent with expectations.

Table 6: Results of FGLS regression

D,V = ledspng	Coef.	St.Err.	t-value	p-value	Sig
lsteded	.477	.077	6.21	0	***
ler	-.045	.037	-1.23	.217	
ltradeg	-1.531	.216	-7.09	0	***
lgdpg	.355	.117	3.04	.002	***
lremg	-.517	.061	-8.42	0	***
lresed	-.325	.086	-3.78	0	***
ldcpg	1.351	.143	9.42	0	***
Constant	23.723	.956	24.81	0	***

Source: Authors' Calculation

Table 7 presents the results from the one-step system GMM model, designed to address potential endogeneity and dynamics in the panel structure. The lagged dependent variable (L.ledspng) is positive and significant (Coef. = 0.664, p < 0.01), confirming strong inertia in private external debt accumulation. The direction and approximate magnitudes of the remaining coefficients largely mirror those in the DK and FGLS models, demonstrating remarkable consistency.

In the GMM model, remittances (lremg) and short-term external debt (lsteded) retain their negative and positive associations, respectively, with statistical significance at the 10% level. Financial development (ldcpg) remains positively and significantly linked with private debt (p = 0.027), while trade openness (ltradeg) and reserves (lresed) continue to exert mitigating effects. Exchange rate (ler) and GDP growth (lgdpg) appear insignificant in this dynamic specification, suggesting that their influence may be partially absorbed in the model's lag structure or affected by instrumenting.

Model diagnostics further validate the GMM estimation. The AR(1) test is significant, as expected in differenced GMM, while AR(2) is not, satisfying the requirement for no second-order serial correlation. The Hansen test (p = 0.402) confirms instrument validity, despite the Sargan test suggesting over identification. Crucially, with only 11 instruments for 42 groups, the model avoids over fitting—a common concern in GMM estimation.

In sum, both FGLS and GMM results closely replicate the findings from the Driscoll–Kraay estimator. Across all three models, short-term debt, financial development and remittances consistently emerge as significant determinants of private non-guaranteed external debt. This triangulated robustness enhances confidence in the study's conclusions and underscores their applicability to macro-financial policy making in low and middle-income economies.

Table 7: *Results of one step system GMM*

ledspng	Coef.	St.Err.	t-value	p-value	Sig
L.ledspng	.664	.124	5.35	0	***
lremg	-.147	.08	-1.84	.065	*
lsteded	.159	.083	1.92	.055	*
ler	-.011	.035	-0.31	.754	
ltradeg	-.554	.311	-1.78	.075	*
lresed	-.132	.073	-1.80	.072	*
ldcpg	.439	.198	2.22	.027	**

lgdpg	.089	.057	1.55	.121	
Constant	8.375	3.266	2.56	.01	**
AR(1)			-1.91	0.056	**
AR(2)			-0.96	0.338	
Sargan test $Chi^2(2)$	11.89			0.003	***
Hansen test $Chi^2(2)$				4.02	
Number of instruments	11				
Number of groups	42				
Wald chi2(8)	77152.48			0.000	***

Source: Authors' Calculations

5. Policy Implications

The results of this study carry important policy implications for low and emerging economies grappling with rising stocks of private non-guaranteed (PNG) external debt. A key finding is the strong and consistent positive relationship between short-term external debt and private foreign borrowing. This suggests that excessive reliance on short-term liabilities heightens vulnerability to rollover risks and external shocks. Policymakers should therefore prioritize managing the composition of external debt by encouraging longer-term borrowing, deepening domestic capital markets and employing macro prudential tools to limit speculative, short-term inflows.

Additionally, the significant positive effect of financial development on PNG debt highlights the dual-edged nature of financial deepening. While it facilitates capital access, it may also encourage risky external borrowing if left unchecked. Regulatory frameworks must therefore be strengthened to ensure that expanding financial markets promote sustainable investment rather than speculative debt accumulation. This includes promoting green lending practices and better monitoring the external exposure of domestic financial institutions and corporates.

The negative and statistically significant effect of remittance inflows on private external debt implies that remittances can substitute for external borrowing by easing liquidity constraints for households and small firms. Governments should capitalize on this by enhancing financial inclusion and formal remittance channels. Designing instruments such as diaspora bonds, remittance-backed securities, or matching grant schemes can further channel remittances into productive and sustainable uses, reducing the private sector's dependence on costly foreign borrowing.

Trade openness also demonstrates a negative relationship with private external debt, suggesting that greater integration into global markets provides alternative financing through export earnings and foreign investment. Policymakers should continue to foster trade liberalization and diversification strategies to build resilience. Supporting exporters through access to trade finance and reducing trade-related frictions can improve firms' liquidity positions and reduce their reliance on external credit markets. The inverse relationship between foreign reserves and private external debt further emphasizes the importance of maintaining adequate reserve buffers. These reserves not only provide a cushion against external shocks but may also reduce the private sector's incentive to borrow externally, particularly in economies where reserves signal macroeconomic stability. Authorities should aim to build and maintain reserves through sound monetary and exchange rate policies, while also considering private sector external exposures in reserve adequacy assessments.

Lastly, the positive association between GDP growth and PNG external debt reinforces the procyclical nature of external borrowing. While economic expansion is desirable, unchecked borrowing during growth phases can result in excessive risk accumulation. Policymakers must remain vigilant, ensuring that borrowed funds are directed toward productive and sustainable uses. Establishing mechanisms to track and regulate private sector external liabilities during growth cycles is crucial to mitigate future financial stress.

In sum, the study calls for an integrated macroeconomic and financial policy response that balances the benefits of financial development and external openness with the need to ensure debt sustainability. Effective debt management, combined with efforts to channel remittances into investment, deepen trade relationships and strengthen financial oversight, is essential for maintaining macro-financial stability and supporting long-term development in low and emerging economies.

6. Conclusion

This study set out to investigate the macroeconomic determinants of private non-guaranteed (PNG) external debt across low and emerging economies, focusing on key variables such as short-term external debt share, exchange rates, trade openness, remittances, GDP growth, foreign reserves and financial development. Using robust panel estimation techniques—specifically the Driscoll–Kraay standard error model and the Feasible Generalized Least Squares (FGLS) estimator—the findings reveal a consistent and statistically significant pattern in the way these variables influence PNG debt accumulation.

The results demonstrate that a higher share of short-term external debt, greater domestic financial development and stronger economic growth are associated with increases in private external debt stocks. Conversely, remittance inflows, greater trade openness and higher foreign reserves reduce the reliance on private foreign borrowing, suggesting that these factors enhance financial stability and reduce the need for risky external financing. The exchange rate was found to be negatively associated with PNG debt in the main model, although this effect was statistically insignificant in the robustness check.

These findings underscore the complex and multifaceted drivers of private external borrowing in the developing world. They highlight the need for sound macroeconomic management, prudent debt and financial regulation and policies that enhance domestic resource mobilization while reducing external vulnerabilities. The consistency across models also reinforces the reliability of the conclusions drawn.

In conclusion, this study contributes to the literature by shedding light on the determinants of an increasingly important component of external finance—private non-guaranteed debt. It provides timely insights for policymakers aiming to strengthen external debt sustainability in the face of evolving financial globalization and growing private sector participation in international capital markets. Future research could expand on this by exploring the sectoral composition of PNG debt or examining how institutional quality and global financial conditions mediate these relationships.

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