Public Debt Dynamics in Nepal: Balancing Economic Growth and Institutional Governance

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Abstract

Background: Nepal faces complex public debt management challenges amid its transition to federalism, post-earthquake reconstruction, and pandemic recovery. With public debt reaching 41.5 percent of GDP by 2021/22 from 25 percent in 2015/16, understanding the interplay between institutional governance and debt dynamics is crucial for fiscal sustainability.

Methods: This study employs the Autoregressive Distributed Lag (ARDL) approach on time series data spanning 1996-2023 to analyze relationships between governance indicators, economic growth, remittances, trade balance, and Nepal's debt-to-GDP ratio. The model incorporates bounds testing to establish cointegration and error correction mechanisms to capture adjustment dynamics.

Results: Governance indicators demonstrate a significant positive relationship with debt levels (coefficient = 49.61, p = 0.0195), suggesting initial institutional reforms may require increased borrowing but yield long-term fiscal benefits through improved administrative capacity and reduced corruption. Remittances exhibit a highly significant negative relationship with public debt (coefficient = -1.029, p = 0.0000), while trade balance shows a significant negative relationship (coefficient = -5.904, p = 0.0356), indicating their roles as alternative financing sources and debt reduction pathways. The error correction model confirms rapid adjustment to equilibrium (coefficient = -1.288, p = 0.0004), validating relationship stability.

Conclusion: While institutional governance improvements may initially necessitate higher debt levels due to donor-financed reform programs and capacity building investments, strategic management of remittances and trade balance presents viable debt reduction pathways. Policy implications emphasize establishing clear fiscal rules linking debt accumulation to expected investment returns, developing comprehensive remittance optimization strategies including diaspora bonds, implementing export diversification programs, and creating institutional frameworks for coordinated debt management across federal levels.

Novelty: This research uniquely integrates institutional governance metrics with remittance flows and trade dynamics to provide a comprehensive analysis of debt determinants in Nepal's specific federal transition context, offering empirically-grounded policy pathways for balancing development with fiscal sustainability.

Keywords: Fiscal sustainability, Institutional governance, Remittances, ARDL model, Federal transition

Introduction

Public debt management has emerged as a critical challenge for developing economies like Nepal, requiring a delicate balance between fiscal sustainability and developmental objectives (Asian Development Bank [ADB], 2020). As Nepal continues its complex transition to federalism following the adoption of its 2015 constitution, the interplay between institutional governance and public debt dynamics demands increasingly sophisticated analysis (ADB, 2019). This transition period has been further complicated by the need for post-disaster reconstruction following the devastating 2015 earthquake and the economic disruptions caused by the COVID-19 pandemic (Khatiwada, 2022).

Recent macroeconomic indicators provide context for Nepal's current situation. While Nepal's economy demonstrated resilience with growth of 4.9 percent in the first half of fiscal year 2025, up from 4.3 percent in the same period of fiscal year 2024, significant challenges in fiscal management persist (World Bank, 2025). According to the Public Debt Management Office

(PDMO), Nepal's public debt has risen substantially, reaching 41.5 percent of GDP at the end of the 2021/22 fiscal year, split approximately evenly between external and domestic sources (PDMO, 2023). This represents a dramatic increase from 25 percent of GDP in FY2015/16, highlighting the fiscal pressures associated with federalism implementation, infrastructure development, and pandemic response measures (International Monetary Fund [IMF], 2024).

The debt trajectory of Nepal presents a compelling case for research, with public debt exhibiting a compound annual growth rate (CAGR) of approximately 7 percent between fiscal years 2011/12 and 2020/21 (Nepal Economic Forum, 2022). The sharpest single-year increase occurred in FY2019/20, when public debt jumped by 35.5 percent amid mounting COVID-19 mitigation expenditures and diminishing tax revenues (World Bank, 2021). These trends raise important questions about debt sustainability and the relationship between public debt, economic growth, and institutional governance in the Nepalese context.

Although previous research has explored various aspects of Nepal's debt dynamics, the specific role of institutional governance in debt management remains understudied. Gautam (2021) investigated the relationship between public debt and economic growth in Nepal, while Pattanaik (2023) provided a comparative analysis of public debt impacts across developing economies. Particularly relevant is the work of Nepal Rastra Bank (2021), which identified a debt threshold level of approximately 33 percent of GDP for Nepal, beyond which the relationship between debt and growth becomes negative. This "tipping point" concept provides a critical benchmark for evaluating Nepal's current debt levels and trajectories.

Nepal faces unique challenges in debt management due to its landlocked geography, limited industrial development, and ongoing political transitions. Implementing federalism has fundamentally restructured Nepal's fiscal architecture, creating new institutional complexities in debt management (Conflict Sensitivity Collective, 2023). As noted by governance researchers, "unclear, uncoordinated and often overlapping responsibilities and jurisdictions between power holding authorities within the same or different layers of governments are creating hinderances in achieving effective governance in Nepal" (GMC Nepal, 2023). These institutional challenges directly affect fiscal management and public debt dynamics.

This research makes several contributions to the existing literature. First, it provides much-needed analysis of the relationship between institutional governance indicators and debt dynamics in Nepal. Second, it incorporates additional variables, including remittances and trade balance, which are particularly significant for Nepal's economy. Third, by employing the Autoregressive Distributed Lag (ARDL) bound testing approach, we capture both short-run and long-run relationships between debt and its determinants. Finally, the study offers timely insights for policymakers as Nepal navigates the challenges of federalism, post-disaster reconstruction, and post-pandemic economic recovery.

Nepal's debt composition reflects its development profile, with external debt highly concessional in nature. Multilateral creditors—primarily the World Bank's International Development Association (IDA) and the Asian Development Bank (ADB)—account for approximately 87 percent of Nepal's external debt, generally offering favorable terms with low

interest rates (around 1 percent) and extended maturities (approximately 36 years) (IMF, 2024). Bilateral loans, predominantly from Japan, India, China, and Korea, have also typically been provided on concessional terms. Understanding these structural characteristics is essential for developing appropriate debt management strategies.

By examining the complex interplay between public debt, economic growth, and institutional governance in Nepal, this study aims to provide valuable insights for policymakers, international financial institutions, and researchers. The findings will contribute to more effective debt management strategies and institutional reforms, which are critical as Nepal works to achieve sustainable economic development within its evolving federal structure.

Research Objective

This research endeavors to analyze the multifaceted interrelationship between public debt dynamics, economic growth trajectories, and institutional governance frameworks in Nepal's evolving federal context.

Review of Literature

The interrelationship between public debt, institutional governance, and macroeconomic stability constitutes a critical domain for scholarly inquiry, particularly within developing economies navigating complex transitions. This section synthesizes contemporary empirical and theoretical contributions to establish the analytical framework for examining Nepal's debt dynamics.

Theoretical Frameworks of Public Debt Management

Contemporary scholarly discourse on debt management has evolved toward integrating institutional dimensions with traditional fiscal metrics. Sadik-Zada and Gatto (2021) advanced the theoretical understanding of debt overhang by demonstrating that institutional quality functions as a critical moderating variable between debt accumulation and investment efficiency. Their analysis established that governance parameters significantly determine the threshold at which debt begins to constrain economic performance. Similarly, Kose et al. (2020) developed a comprehensive analytical framework that positions institutional capacity as the foundational determinant of debt sustainability thresholds, challenging conventional approaches that rely primarily on quantitative fiscal indicators.

Empirical Evidence on Debt-Growth Relationships in Developing Economies

Recent empirical investigations have illuminated the complex, non-linear relationships between public debt and economic trajectories. Ramzan and Ahmad (2022) conducted panel analysis across 25 emerging economies during 2010-2020, establishing a statistically significant interaction between governance effectiveness and debt thresholds. Their findings indicated that economies with robust institutional frameworks could sustain substantially higher debt-to-GDP ratios before experiencing adverse growth effects. Complementing this perspective, Chudik et al. (2020) employed advanced econometric methodologies to analyze long-run debt effects across 40 developing economies, demonstrating that institutional quality accounts for approximately 37 percent of variation in debt-growth outcomes.

Within Nepal's specific context, Sharma and Adhikari (2022) conducted rigorous time-series analysis between 2000-2021, identifying a non-linear relationship between debt ratios and economic performance. Their econometric models established a threshold effect at approximately 34 percent debt-to-GDP ratio, beyond which negative growth implications manifest—a finding with substantial policy implications given Nepal's current fiscal position. This research extends Gautam's (2021) longitudinal analysis, which documented both immediate and persistent relationships between debt accumulation and growth trajectories, with particular emphasis on how federalism's institutional architecture mediates these relationships.

Governance Frameworks and Fiscal Sustainability

Institutional quality has emerged as the predominant determinant of fiscal outcomes across diverse economic contexts. Cooray et al. (2017) conducted comprehensive cross-sectional analysis across 120 countries, establishing statistically significant correlations between governance indicators and debt accumulation patterns. Their findings demonstrated that corruption control and regulatory quality exhibited the strongest statistical relationship with sustainable debt trajectories, with coefficients of -0.67 and -0.72 respectively. Jalles (2021) extended this analysis by examining institutional quality's impact on fiscal sustainability metrics across 72 developing economies, establishing that governance variables explained 40.3 percent of variance in debt sustainability indicators—substantially exceeding the explanatory power of traditional macroeconomic variables.

The implications of governance quality for fiscal management have particular relevance for Nepal's evolving federal structure. Paudel and Khanal (2023) conducted institutional analysis of Nepal's federalism implementation, documenting significant governance challenges in intergovernmental fiscal coordination that directly impact debt management capacity. Their assessment identified persistent deficiencies in fiscal transparency, revenue attribution mechanisms, and expenditure accountability that substantially influence borrowing patterns and debt sustainability.

Remittances, External Sector Performance, and Debt Dynamics

Remittance flows constitute a critical but underexamined variable in fiscal sustainability frameworks. Alcidi et al. (2022) analyzed panel data across 45 remittance-dependent economies, establishing robust statistical evidence that higher remittance-to-GDP ratios correlate with reduced public borrowing requirements. Their econometric models demonstrated that a one percentage point increase in remittance-to-GDP ratio associated with a 0.37 percentage point reduction in debt accumulation, though this relationship exhibited substantial heterogeneity based on institutional quality measures. Akram and Mahmood (2021) focused specifically on South Asian economies, demonstrating significant relationships between remittance patterns and external debt sustainability metrics.

Nepal's position as one of the world's highest remittance-receiving economies relative to GDP renders these relationships particularly consequential. Wagle and Devkota (2022) examined Nepal's remittance flows during 2015-2021, documenting countercyclical patterns that

mitigated external borrowing requirements despite pandemic-induced economic disruptions. Kumar (2019) investigated the complex interaction between remittances and trade balance in Nepal, establishing statistical evidence for both positive foreign exchange effects and potentially adverse currency appreciation impacts that influence external competitiveness and debt sustainability.

The synthesis of contemporary literature demonstrates that while significant advances have been made in understanding individual components affecting debt dynamics, integrated analytical frameworks incorporating institutional governance, remittance flows, and trade balance within Nepal's specific context remain underdeveloped. This study addresses this analytical gap through rigorous econometric investigation of these multidimensional relationships.

Research Methodology

Data Sources and Variable Definition

This study employs a comprehensive methodological framework utilizing annual time series data spanning 1996-2023, encompassing Nepal's critical transition to federalism and significant macroeconomic events. The selection of this time period captures key structural changes including the 2015 constitution adoption, the 2015 earthquake, and the COVID-19 pandemic, providing comprehensive coverage of institutional and economic transitions.

Data were collected from multiple authoritative sources to ensure reliability and consistency:

- **Ministry of Finance, Nepal:** Public debt statistics and fiscal indicators
- **Nepal Rastra Bank:** Macroeconomic indicators, remittance data, and trade statistics
- **World Bank's Worldwide Governance Indicators database:** Institutional quality measures
- **IMF databases:** External sector and comparative economic indicators

Variable Selection Rationale:

The study incorporates the following carefully selected variables based on theoretical foundations and Nepal's specific economic characteristics:

- **Debt-to-GDP Ratio (DEBT_GDP):** The dependent variable representing total public debt as percentage of GDP, encompassing both external and domestic obligations. This comprehensive measure captures the overall fiscal burden on the economy.
- **Governance Indicator (GI):** A composite index reflecting institutional quality and governance effectiveness, incorporating dimensions of regulatory quality, government effectiveness, and rule of law. This variable specifically captures the institutional transition challenges highlighted in Nepal's federalism implementation.
- **Real GDP Growth Rate (GDPG):** Annual percentage change in real GDP, capturing macroeconomic growth trajectory and its interaction with debt dynamics.
- **Remittances as percentage of GDP (REMIT_GDP):** Measuring remittance inflows relative to economic size, this variable captures the significance of foreign transfers in Nepal's economy. **Given Nepal's status as one of the world's largest remittance**

recipients relative to GDP (approximately 25%), this variable is crucial for understanding alternative financing mechanisms.

- **Natural Logarithm of Trade Balance (lnTRADEBAL):** A normalized measure of Nepal's external trade performance, capturing the potential impact of trade dynamics on debt accumulation while addressing potential non-linearities in the relationship.

3.2 Econometric Specification and Methodology Selection

The study employs the **Autoregressive Distributed Lag (ARDL) bound testing approach** developed by Pesaran et al. (2001). **This methodological choice is particularly appropriate for several reasons:**

1. **Mixed Integration Orders:** Accommodates variables with different orders of integration (I(0) or I(1)) without requiring pre-testing for unit roots
2. **Small Sample Properties:** Provides robust results for small sample sizes typical in developing country studies
3. **Endogeneity Concerns:** Addresses potential endogeneity through appropriate lag structure
4. **Short and Long-run Dynamics:** Enables simultaneous estimation of both short-run and long-run relationships
5. **Structural Breaks:** More robust to structural breaks compared to traditional cointegration methods

Econometric Specification

The study employs the Autoregressive Distributed Lag (ARDL) bound testing approach developed by Pesaran et al. (2001). This methodological framework is particularly appropriate for the research objectives as it: (1) accommodates variables with different orders of integration, whether I(0) or I(1); (2) enables simultaneous estimation of both short-run and long-run relationships; (3) provides robust results for small sample sizes; and (4) addresses potential endogeneity concerns through appropriate lag structure.The ARDL model specification is formulated as follows:

$$\Delta(DEBT\_GDP)_t$$
$$= \alpha_0 + \beta_1 DEBT\_GDP_{t-1} + \beta_2 GI_{t-1} + \beta_3 GDPG_{t-1} + \beta_4 REMIT\_GDP_{t-1}$$
$$+ \beta_5 lnTRADEBAL_{t-1} + \sum_{i=1}^{p} \Upsilon_i \Delta DEBT\_GDP_{t-i} + \sum_{i=0}^{q_1} \delta_i \Delta GI_{t-i} + \sum_{i=0}^{q_2} \theta_i \Delta GDPG_{t-i}$$
$$+ \sum_{i=0}^{q_3} \lambda_i \Delta REMIT\_GDP_{t-i} + \sum_{i=0}^{q_4} \mu_i \Delta lnTRADEBAL_{t-i} + \varepsilon_t$$

Where:

- Δ represents the first difference operator
- DEBT_GDP is the ratio of public debt to GDP, our dependent variable
- GI represents government investment as a percentage of GDP
- GDPG is the annual GDP growth rate
- REMIT_GDP is the ratio of remittances to GDP

- lnTRADEBAL is the natural logarithm of the trade balance
- α_0 is the drift component (constant term)
- β_1, β_2, β_3, β_4, and β_5 are the long-run multipliers that represent the long-run relationships between the variables
- γ_i, δ_i, θ_i, λ_i, and μ_i are the short-run dynamic coefficients capturing the short-run adjustments in the model
- p, q_1, q_2, q_3, and q_4 represent the optimal lag lengths for each variable, determined using information criteria such as AIC or SBC
- ε_t is the white noise error term (random disturbance term with zero mean and constant variance)

Estimation Procedure

The empirical analysis follows a systematic four-stage procedure:

Stage 1: Unit Root Testing

Prior to implementing the ARDL model, we examine the stationarity properties of all variables using the Augmented Dickey-Fuller (ADF) test. The ADF test is conducted under two specifications—with constant only, and with constant and linear trend—to ensure robustness. This preliminary analysis establishes the order of integration for each variable and confirms the appropriateness of the ARDL approach.

Stage 2: Optimal Lag Selection

Lag length selection employs multiple information criteria to ensure robustness:

- **Akaike Information Criterion (AIC):** Balances model fit with parsimony
- **Schwarz Bayesian Criterion (SBC):** Provides more conservative lag selection
- **Final lag selection considers both statistical criteria and economic interpretation** to avoid over-parameterization while capturing essential dynamics

Table A1

Lag Length Selection Criteria

Model	Lag	AIC	SBC	HQ	Adj. R^2	F-statistic
ARDL(1,1,1,1,1)	1	4.2847	4.6913	4.4102	0.7234	8.45***
ARDL(2,1,1,1,1)	1-2	4.1623	4.6854	4.3401	0.7891	9.72***
ARDL(2,2,1,1,1)	1-2	4.0945	4.7341	4.3186	0.8156	10.34***
ARDL(2,2,1,2,2)	1-2	3.9876	4.8245	4.2987	0.8423	11.67***
ARDL(3,2,1,2,2)	1-3	4.0234	5.0127	4.3854	0.8398	10.89***
ARDL(2,2,2,2,2)	1-2	4.0567	4.9876	4.4123	0.8356	10.23***

*Note: ***, *, * denote significance at 1%, 5%, and 10% levels respectively. Bold indicates selected model based on optimal AIC value and economic interpretation.*

The optimal lag structure ARDL(2,2,1,2,2) was selected based on the minimum AIC value (3.9876) combined with economic interpretation and diagnostic test performance. This specification captures sufficient dynamics while maintaining parsimony, with the model demonstrating strong explanatory power (Adjusted R^2 = 0.8423) and overall significance (F-statistic = 11.67).

Stage 3: Bounds Testing for Cointegration

The ARDL bounds test determines the existence of long-run relationships among variables. The approach involves computing the F-statistic through the Wald test and comparing it against critical values provided by Pesaran et al. (2001). The null hypothesis of no long-run relationship ($H_0: \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = 0$) is tested against the alternative hypothesis (H_1: at least one $\beta_i \neq 0$).

Stage 4: Long-Run and Short-Run Estimation

Upon establishing cointegration, we estimate long-run coefficients and short-run dynamics using the **Error Correction Model (ECM)** based on the ARDL approach. The error correction term coefficient captures the speed of adjustment toward long-run equilibrium following short-term deviations.

3.4 Diagnostic Testing and Robustness Checks

To ensure the robustness and validity of empirical results, we conduct comprehensive diagnostic tests:

- **Breusch-Godfrey Serial Correlation LM Test:** Detects potential autocorrelation in residuals
- **Breusch-Pagan-Godfrey Heteroskedasticity Test:** Verifies the homoskedasticity assumption
- **CUSUM and CUSUM of Squares Tests:** Examine parameter stability over the sample period
- **Normality tests:** Ensure residuals follow normal distribution

These diagnostic tests provide critical validation of the model's statistical properties and ensure the reliability of estimated relationships for policy inference.

Methodological Limitations and Considerations

While the ARDL approach provides robust results, certain limitations should be acknowledged:

- **Composite governance indicator may not capture all dimensions of institutional quality** relevant to debt management, though it provides a comprehensive measure of overall governance effectiveness
- **External factors such as global economic conditions** are not explicitly modeled as separate variables, though their effects are partially captured through trade and remittance channels
- **Sample size limitations** typical of developing country studies, though the ARDL approach is specifically designed to handle small samples effectively.

Results and Discussion

This section presents the empirical findings from our ARDL analysis, including unit root tests, bounds tests for cointegration, and estimation of long-run and short-run relationships between public debt and its determinants in Nepal. We also provide diagnostic checks to validate the robustness of our model.

Table 1

Unit Root Test Results

Variable	Exogenous	I(0)	I(1)
		t-Statistic	t-Statistic
Debt _GDP	Constant	-1.7563	-7.4549***
	Constant, Linear Trend	-2.5478	-5.1869***
GI	Constant	-3.0782**	-5.8744***
	Constant, Linear Trend	-3.1428	-5.8182***
rgdpg	Constant	-7.163211***	-8.363870***
	Constant, Linear Trend	-7.061130***	-8.363994***
Remit_ GDP	Constant	-1.51022	-4.5698***
	Constant, Linear Trend	-1.2060	-4.6670***
lntradebal	Constant	-4.3929***	-3.4238**
	Constant, Linear Trend	-4.1135**	-3.5161*

Note. ***, **, * denote significance at 1%, 5%, and 10% levels respectively.

Table 1 presents the results of the Augmented Dickey-Fuller unit root tests for all variables in the model. The test statistics reveal that DEBT_GDP (Debt as percentage of GDP) is non-stationary at the level but becomes stationary after first differencing at a 1 percent significance level, indicating it is integrated of order one I(1). GI (Governance Indicator) is stationary at level with constant only at 5 percent significance level, suggesting it is integrated of order zero I(0). However, with a constant and linear trend, it becomes stationary after first differencing. RGDPG (Real GDP Growth) is stationary at the level at a 1 percent significance level for both specifications, indicating it is integrated of order zero I(0). REMIT_GDP (Remittances as percentage of GDP) is non-stationary at the level but becomes stationary after first differencing at a 1 percent significance level, indicating it is integrated of order one I(1). lntradebal (Natural Logarithm of Trade Balance) is stationary at the level at a 1 percent significance level with constant and 5 percent with constant and trend, indicating it is integrated of order zero I(0). Given the mixed order of integration of the variables (some I(0) and some I(1)), the ARDL bounds testing approach is appropriate for our analysis.

Table 2

ARDL Long Run Form and Bounds Test

Test Statistic	Value	Significance	I(0)	I(1)
F-statistic	5.747942	10%	2.2	3.09
k	4	5%	2.56	3.49
		2.5%	2.88	3.87
		1%	3.29	4.37

Note. Selected Model: ARDL(2, 2, 1, 2, 2); Case 2: Restricted Constant and No Trend; Sample: 1996 2023; Included observations: 26

Table 2 shows the ARDL bounds test results, which are used to determine whether a long-run relationship exists among the variables. The calculated F-statistic (5.747942) exceeds the upper

bound critical value (I(1)) at the 5 percent significance level (3.49), rejecting the null hypothesis of no long-run relationship. This confirms that a meaningful long-run relationship exists between the debt-to-GDP ratio and its determinants (governance indicators, GDP growth, remittances, and trade balance).

Table 3

Conditional Error Correction Regression (Short-run Dynamics)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	95.62223	39.14121	2.443007	0.0310
DEBT_GDP(-1)*	-1.287683	0.267055	-4.821797	0.0004
GI(-1)	63.88168	24.60366	2.596430	0.0234
GDPG(-1)	-0.981252	0.793335	-1.236869	0.2398
REMIT_GDP(-1)	-1.325041	0.301331	-4.397296	0.0009
LNTRADEBAL(-1)	-7.601927	3.958809	-1.920256	0.0789
D(DEBT_GDP(-1))	0.311363	0.205493	1.515202	0.1556
D(GI)	-4.702345	20.06301	-0.234379	0.8186
D(GI(-1))	-83.58705	24.44257	-3.419732	0.0051
D(GDPG)	-0.177046	0.452545	-0.391223	0.7025
D(REMIT_GDP)	-0.436572	0.489613	-0.891668	0.3901
D(REMIT_GDP(-1))	1.456157	0.473895	3.072743	0.0097
D(LNTRADEBAL)	-1.976451	2.032721	-0.972318	0.3501
D(LNTRADEBAL(-1))	4.246600	1.927887	2.202722	0.0479

Note. p-value incompatible with t-Bounds distribution.

Table 3 presents the short-run dynamics of the ARDL model, showing how changes in the independent variables affect changes in the debt-to-GDP ratio. The error correction term coefficient (DEBT_GDP(-1)* = -1.287683) is negative and statistically significant (p-value = 0.0004), confirming the stability of the long-run relationship and indicating a relatively rapid adjustment to equilibrium. This suggests that any deviation from the long-run equilibrium is corrected relatively quickly, validating the model's specification. Notably, the lagged first difference of governance indicator (D(GI(-1))) has a significant negative impact on debt-to-GDP ratio (coefficient = -83.58705, p-value = 0.0051), while the lagged first difference of remittances (D(REMIT_GDP(-1))) has a significant positive effect (coefficient = 1.456157, p-value = 0.0097). The lagged first difference of trade balance (D(LNTRADEBAL(-1))) also has a significant positive effect (coefficient = 4.246600, p-value = 0.0479).

Table 4

Levels Equation (Long-run Coefficients)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GI	49.60979	18.41070	2.694617	0.0195
GDPG	-0.762029	0.562296	-1.355208	0.2003
REMIT_GDP	-1.029012	0.119205	-8.632271	0.0000
LNTRADEBAL	-5.903570	2.493763	-2.367334	0.0356

C	74.25914	19.54315	3.799752	0.0025

Note. EC = DEBT_GDP - (49.6098GI - 0.7620GDPG - 1.0290REMIT_GDP - 5.9036LNTRADEBAL + 74.2591)

The positive governance coefficient (49.61, p = 0.0195) requires nuanced interpretation within Nepal's institutional context. This relationship suggests that improvements in governance quality are initially associated with higher debt levels. This finding aligns with the theoretical expectation that institutional reforms require substantial upfront investments in capacity building, administrative systems, and infrastructure development.

In Nepal's specific context, this positive relationship likely reflects several mechanisms. First, donor-financed reform programs from international development partners often provide loans and grants for governance improvements, initially increasing debt levels. Second, capacity building investments for establishing effective institutions require significant expenditure on training, systems, and infrastructure. Third, federal transition costs associated with Nepal's ongoing federalism implementation have required substantial borrowing to establish new institutional structures at subnational levels. Finally, transparency improvements resulting from better governance may reveal previously hidden debts, leading to apparent increases in reported debt levels.

The long-term benefits of these governance investments include enhanced fiscal management capacity leading to more efficient resource allocation, reduced corruption and leakages improving the effectiveness of public spending, improved creditworthiness potentially reducing future borrowing costs, and better project implementation increasing returns on public investments.

The highly significant negative coefficient for remittances (-1.029, p = 0.0000) demonstrates their crucial role in reducing public borrowing needs. This relationship indicates that a one percentage point increase in remittances relative to GDP is associated with approximately a one percentage point reduction in debt-to-GDP ratio. Given that Nepal receives remittances equivalent to approximately 25% of GDP, this represents a substantial alternative financing mechanism. This relationship operates through multiple channels including foreign exchange earnings reducing external borrowing requirements, increased domestic savings providing alternative sources of government financing through the banking system, reduced social spending pressures as remittances provide private social safety nets, and improved balance of payments reducing external financing constraints.

The significant negative trade balance coefficient (-5.904, p = 0.0356) highlights the importance of external sector performance for debt sustainability. Improvements in trade balance reduce debt accumulation by enhancing foreign exchange earnings and reducing external financing needs. For Nepal's landlocked economy, this relationship emphasizes the importance of export diversification beyond traditional agricultural products, import substitution potential particularly for goods that can be efficiently produced domestically, transit trade efficiency given Nepal's dependence on Indian and Chinese ports, and regional integration benefits through improved trade agreements and connectivity.

The negative but statistically insignificant growth coefficient (-0.762, p = 0.2003) suggests that while economic growth may help reduce debt burdens, other factors dominate Nepal's debt dynamics. This finding reflects the complex relationship between growth and debt in developing economies, where growth may be debt-financed through infrastructure and development spending, the quality of growth matters more than quantity for debt sustainability, and structural factors like remittances and governance may be more important than overall growth rates in determining debt trajectories.

Table 5

Diagnostic Tests: Serial Correlation and Heteroskedasticity

Test	Statistic	Value	Probability
Breusch-Godfrey Serial Correlation LM Test	F-statistic	0.178063	0.8395
	Obs*R-squared	0.894086	0.6395
Breusch-Pagan-Godfrey Heteroskedasticity Test	F-statistic	0.855556	0.6094
	Obs*R-squared	12.50649	0.4866
	Scaled explained SS	2.436416	0.9993

Table 5 presents the results of diagnostic tests conducted to validate the model's statistical properties. The Breusch-Godfrey Serial Correlation LM Test examines the null hypothesis of no serial correlation in the residuals. With a high p-value of 0.6395 for the ObsR-squared statistic, we fail to reject the null hypothesis, confirming that the model does not suffer from serial correlation problems. This ensures that our coefficient estimates are reliable and not biased due to autocorrelation in the error terms. Similarly, the Breusch-Pagan-Godfrey heteroskedasticity test evaluates the null hypothesis that residuals have constant variance. The p-value of 0.4866 for the ObsR-squared statistic indicates we cannot reject this null hypothesis, confirming that the model satisfies the homoskedasticity assumption. These diagnostic results collectively validate the statistical robustness of our ARDL model, providing a sound basis for reliable inference regarding the relationships between institutional governance, macroeconomic variables, and public debt in Nepal.

Additionally, the stability of the estimated parameters was assessed using the CUSUM and CUSUM of Squares tests. These plots (not shown in the tables) indicate that the parameters are stable over the sample period, as the test statistics remain within the critical bounds. This stability adds further credibility to our findings and supports the validity of the policy implications derived from the model.

Discussion

This study's empirical analysis provides valuable insights into the determinants of public debt in Nepal during the 1996-2023 period. The ARDL bounds test confirms the existence of a long-run relationship between the debt-to-GDP ratio and its determinants, with the F-statistic (5.747942) exceeding the upper bound critical value at the 5 percent significance level. This

finding validates the methodological approach employed in this research and confirms the appropriateness of the ARDL model for analyzing Nepal's debt dynamics (Pesaran et al., 2001). The positive relationship between governance indicators (GI) and debt-to-GDP ratio (coefficient = 49.60979, p-value = 0.0195) revealed in this study presents an interesting dynamic. This result aligns with ADB's (2020) assessment that developing economies like Nepal face a delicate balance between fiscal sustainability and developmental objectives during institutional transitions. As noted by Khatiwada (2022), Nepal's post-earthquake reconstruction and COVID-19 response measures have significantly shaped public debt trajectories, contributing to this governance-debt relationship identified in the analysis.

The highly significant negative relationship between remittances and public debt (coefficient = -1.029012, p-value = 0.0000) found in this study supports PDMO's (2023) report that remittances have risen substantially, reaching 41.5 percent of GDP by the end of fiscal year 2021/22. The magnitude of this coefficient underscores the IMF's (2024) observation regarding the critical role of remittances in Nepal's fiscal dynamics. This finding contributes to the literature by quantifying how remittance inflows effectively reduce government borrowing needs in Nepal's economic context.

This study's results show a significant negative relationship between trade balance and debt-to-GDP ratio (coefficient = -5.903570, p-value = 0.0356), which supports Nepal Economic Forum's (2022) assessment of the 7 percent compound annual growth rate in public debt between fiscal years 2011/12 and 2020/21. This relationship highlights the importance of trade management strategies in debt reduction efforts, as noted in the literature on Nepal's external sector constraints.

The negative but statistically insignificant relationship between GDP growth and public debt (coefficient = -0.762029, p-value = 0.2003) identified in this study aligns with the World Bank's (2025) recent macroeconomic indicators showing growth of 4.9 percent in the first half of fiscal year 2025. This suggests that while economic growth may help reduce debt burdens, other factors dominate Nepal's debt dynamics, reflecting the complex fiscal challenges documented by the World Bank (2021) following the sharp 35.5 percent increase in public debt during FY2019/20.

The rapid adjustment coefficient in the error correction model (DEBT_GDP(-1)* = -1.287683, p-value = 0.0004) found in this study indicates dynamic stability in Nepal's debt processes, suggesting that policy interventions can have timely effects. The diagnostic tests confirm the validity of the model, with no issues of serial correlation or heteroskedasticity detected, lending credibility to the study's findings.

These results collectively highlight the complex interplay between institutional governance and public debt dynamics in Nepal, as emphasized by ADB (2019). This study's findings suggest that while institutional reforms may initially require increased borrowing, strategic management of remittances and trade balance presents viable debt reduction pathways during Nepal's ongoing federal transition.

Conclusion

This study provides comprehensive empirical evidence on the complex relationships between institutional governance, remittances, trade balance, and public debt dynamics in Nepal during 1996-2023. Our findings offer nuanced insights that challenge conventional wisdom while providing practical policy guidance for Nepal's ongoing federal transition.

Key Empirical Findings

The ARDL analysis reveals several critical relationships with important policy implications. The **governance investment paradox** demonstrates that the positive relationship between governance indicators and debt levels (coefficient = 49.61, p = 0.0195) shows institutional improvements require substantial upfront investments. This finding suggests that initial increases in debt for governance reforms represent productive investments that yield long-term fiscal benefits through enhanced administrative capacity, reduced corruption, and improved project implementation efficiency. The role of **remittances as fiscal stabilizer** is evidenced by the highly significant negative relationship between remittances and debt (coefficient = -1.029, p = 0.0000), which quantifies remittances' role as a crucial alternative financing mechanism. With Nepal receiving approximately 25% of GDP in remittances, this relationship represents one of the most powerful debt reduction mechanisms available to policymakers. The **trade balance critical role** is highlighted by the significant negative relationship between trade balance and debt (coefficient = -5.904, p = 0.0356), emphasizing external sector performance as fundamental to debt sustainability and the importance of export promotion and import substitution strategies for long-term fiscal stability. Finally, the **rapid equilibrium adjustment** indicated by the error correction coefficient (-1.288, p = 0.0004) shows that policy interventions can have relatively quick effects on debt dynamics, providing encouragement for proactive policy implementation.

Strategic Policy Framework

Based on our empirical findings, we propose a comprehensive policy framework with three pillars. **Pillar 1: Strategic Governance Investment** involves establishing clear fiscal rules linking governance borrowing to measurable outcomes, developing performance-based borrowing mechanisms with loan tranches tied to institutional milestones, and strengthening federal coordination to address overlapping jurisdictions and improve efficiency. **Pillar 2: Remittance Optimization** focuses on reducing transfer costs through financial sector reforms and digital payment promotion, creating productive investment incentives including diaspora bonds and development funds, and implementing policies to mitigate Dutch Disease effects while maximizing remittance benefits. **Pillar 3: Trade-Led Growth Strategy** emphasizes diversifying the export base focusing on competitive sectors and niche markets, investing in trade facilitation infrastructure and regional connectivity, and negotiating improved transit arrangements to reduce landlocked economy constraints.

Policy Implications and Implementation Strategies

The positive governance-debt relationship necessitates a strategic approach to institutional investments through immediate actions including establishing clear fiscal rules linking

governance-related borrowing to measurable institutional outcomes, developing a "Governance Investment Framework" that prioritizes reforms with highest fiscal returns, creating debt sustainability thresholds specifically for governance-related borrowing (suggested maximum: 5% of total debt allocation), and implementing performance-based borrowing where loan tranches are linked to specific governance milestones. Medium-term strategies should strengthen the Public Debt Management Office (PDMO) capacity for coordinating federal, provincial, and local borrowing, develop integrated debt monitoring systems across all government levels to prevent overlap an

Author Contribution

Gyan Mani Adhikari: Conceptualized the research framework, provided theoretical guidance, supervised the overall study, and finalized the manuscript.

Santosh Chhetri: Designed the research methodology, conducted econometric analysis using the ARDL approach, performed data collection and statistical testing, and interpreted empirical findings.

Hemanta Rai: Contributed to literature review on institutional governance, analyzed governance indicators in Nepal, and contextualized findings within Nepal's evolving federal structure.

Padam Karki: Analyzed Nepal's macroeconomic indicators, focused on trade balance and economic growth variables, and contributed to policy recommendations for economic management.

Jamuna Shrestha: Examined remittance patterns and their fiscal implications, conducted comparative analysis of remittance-dependent economies, and developed remittance optimization strategies.

All authors reviewed and approved the final manuscript.

Conflict of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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