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Original Article

The Impact of Debt Overhang on Economic Growth: A Study of India and its Neighbouring Countries

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Abstract *- Around the world, particularly in developing economies, debt has become a crucial factor influencing economic stability and growth. As global debt levels reach unprecedented highs, understanding its impact on economic performance has never been more essential. This study aims to analyze how debt accumulation has influenced economic stability and growth in India and its neighbouring economies. This study explores key macroeconomic indicators, debt structures, and fiscal sustainability to assess whether excessive debt overhang hinders economic progress. The study utilizes a fixed-effects regression model on a panel dataset comprising India's neigbouring countries—namely China, Bangladesh, Pakistan, Sri Lanka, Nepal, Bhutan, and Afghanistan—spanning the years 2008 and 2022. Key predictor variables include debt overhang, revenue adequacy, exchange rates, and reserves adequacy, while GDP growth serves as the response variable. The results indicate that both debt overhang and exchange rate volatility have a significantly negative effect on GDP growth. Conversely, revenue adequacy and reserve levels showed no meaningful influence on economic performance. These outcomes emphasize the importance of sound debt governance and maintaining exchange rate stability to support economic stability and resilience. This study underscores the necessity for policymakers to implement sustainable debt strategies and prudent fiscal policies. Strengthening economic fundamentals and ensuring responsible borrowing practices are crucial for mitigating risks associated with excessive debt burdens in the region.*

Keywords *- Debt Overhang, Debt Management, Economic Growth, Fiscal Sustainability, South Asia.*

1. Introduction

In the modern global economy, debt stands out as a key defining feature, with countries relying heavily on borrowing funds to finance growth, development, economic stimulus and crisis management. The global debt crisis has escalated to unparalleled levels. As of 2023, global debt was nearly $250 trillion, which is 237% of the world's GDP [1]. Worldwide public debt reached a staggering $92 trillion in 2022. This figure has quintupled in the last two decades, significantly outpacing global economic growth, which has only tripled during the same period [2]. Developing countries, accounting for nearly 30% of this debt, face disproportionate challenges, with countries like China, India, and Brazil representing 70% of this share. High debt-to-GDP ratios, exceeding 60% in many nations [3], highlight the precarious balance between leveraging debt for development and managing its burdens.

Globally, while debt enables infrastructure growth and social investments, excessive borrowing can lead to rising repayment costs, currency devaluations, and reduced fiscal space for essential services like education and healthcare. Hence, the question arises, when does debt become a burden for an economy? Debt can become a burden under problematic conditions such as unproductive allocation of resources, economic volatility, and rising debt servicing costs, which lead to reduced fiscal flexibility and weakened investor confidence, which can ultimately push up interest rates [4].

Insights drawn from the impact of the Greek Debt crisis, which began in 2009 and was a severe sovereign debt crisis due to excessive borrowing and weak fiscal management, on the European Union (EU) reveal that structural weaknesses can arise from the absence of fiscal integration in a region. The profound implications that the Greek Debt crisis had on the EU include multiple bailouts from both the EU and the International Monetary Fund (IMF), which caused financial contagion, economic austerity, and social unrest in the EU [5]. These had multiple reasons; however, it was mainly caused by investors beginning to doubt the ability of other heavily indebted countries at that time, such as Italy and Spain, to meet their obligations, leading to increased borrowing costs in these countries [6]. Furthermore, many investors began treating the Eurozone's peripheral economies (Spain, Italy, Greece, Ireland and Portugal) as a single bloc of high-risk nations. This perception created a self-fulfilling cycle of increased borrowing costs of one country, pressurizing the others.

Specifically in South Asia, India's history with its debt reflects its developmental aspirations. Since independence in 1947, India has borrowed heavily to finance its infrastructure, industrialization and social welfare programs. Although this strategy initially spurred economic growth, India's debt profile has undergone considerable change over time due to a mix of internal and external influences. The current government debt-to-GDP ratio, now

approximately 82.49% compared to about 70.58% before the pandemic, underscores rising concerns over fiscal sustainability [7].

Empirical studies have identified a non-linear, inverted-shaped relationship between public debt and economic growth, suggesting that once debt surpasses a certain threshold, its impact on growth becomes negative, leading to a slowdown in economic performance [8, 9]. The impact of external debt on economic growth has been extensively examined across various economies. Kharusi (2018)[10] investigated the link between external debt and economic growth in the context of Oman, highlighting a non-linear correlation where excessive borrowing hinders sustainable growth. Similarly, Thao (2015) [11] conducted an empirical study on six ASEAN countries and almost reached the same conclusion that, beyond a certain threshold, debt can be troublesome in many ways for an economy and can have adverse effects. In relation to emerging economies, Ndubusi (2017) [12] explored Nigeria's external debt crisis and found another catalyst for a debt crisis, emphasizing the inimical repercussions of poor debt management on economic stability and growth in the long run.

Although various studies have analyzed the relationship between external debt and economic growth, the findings remain ambiguous and primarily reflect the post-2008 financial crisis period instead of a post-pandemic landscape where debt levels initially reached their highest in half a century [13]. Additionally, it can be said that many prior studies have overlooked region-specific trends in India and its neighbouring countries, highlighting a gap and opportunity for further research.

2. Methodology

2.1. Research Aim

This study aims to analyze how taking on debt has influenced India and its neighbouring economies, by exploring factors such as macroeconomic indicators, debt structure, wealth of a country and a country's debt servicing can impact its economic stability and growth, this study further plans to gain insights on how debt crises in one country can potentially influence neighbouring economies through trade and investment linkages, highlighting an area where a deeper analysis could provide more valuable perspectives. The sample consisted of India and its neighbouring nations—China, Bangladesh, Pakistan, Sri Lanka, Nepal, Bhutan, and Afghanistan. The time period is from 2008 to 2022, aiming to Capture the effects of major global events, such as the 2008 financial crisis and the COVID-19 pandemic, and highlight their economic implications.

2.2. Research Design and Model Specification

This study utilizes regression analysis to examine the relationship among variables and extract meaningful conclusions. As a statistical technique, regression helps assess how a dependent variable is influenced by one or more independent variables, making it a valuable tool for identifying trends and correlations in research. By modelling these relationships, regression analysis allows researchers to assess the effect of specific factors on the outcome being studied. Additionally, it provides measures of significance and strength, ensuring robust and data-driven conclusions [14].

Moreover, this research will utilize the use of 2 types of variables, predictors and predicted. A predictor variable, also referred to as an independent or explanatory variable, is used in a predictive model to estimate or forecast the outcome of another variable based on its value [15], whereas a predicted variable, also known as a dependent and outcome variable, are the outcomes or the responses being studied. These are influenced by predictor variables [16]. The predictor variables of this study are Debt Overhang, Revenue Adequacy, Exchange Rate and Reserves Adequacy; the predicted variable is economic growth proxied by GDP growth rate. This study employs panel data, comprising observations from several countries gathered at regular intervals and organized sequentially over time. To determine the suitable modeling approach, the Hausman test was performed to compare random-effects and fixed-effects models. With a p-value below 0.05, the results indicated that the fixed-effects model was more appropriate for this analysis.

The model may be expressed as follows:

$$yit = \alpha + vi + \beta' xit + eit$$

Where the dependent variable is y_{it}, the vector of explanatory variables for each country i (i=1,...,5) is x_{it} in each year t (t=1,...,20), the vector of coefficients is β', and the constant term is α.

According to the fixed-effects approach, v_i is a constant specific to each country i. It is thus supposed that cross-unit differences can be captured by this term, and the error term is e_{it}.

2.3. Variables and Hypotheses

The data for this study were obtained from the World Bank and the International Monetary Fund (IMF).

2.3.1. Independent Variables

Debt Overhang (DEBT_OVERHANG)

Debt overhang refers to a circumstance where a country's high level of existing debt discourages investment and economic growth. Represented as a percentage, this variable measures government debt relative to Gross Domestic Product (GDP), indicating the extent of the debt burden compared to the economy's total output.

Revenue Adequacy (REVENUE_ADEQUACY)

Revenue adequacy is measured by total debt service—including both principal and interest payments—as a percentage of Gross National Income (GNI), serving as an indicator of how effectively a country's revenue can meet its debt commitments.

Exchange Rates (EXRATE)

An exchange rate represents the amount of one country's currency required to purchase another. In this study, exchange rates are measured as the local currency units per US dollar (period average).

This variable evaluates how fluctuations in currency value affect the cost of servicing external debt, especially when obligations are denominated in foreign currencies.

Reserves Adequacy (RESERVE_ADEQUACY)

This variable, calculated as external debt expressed as a percentage of total reserves, assesses a country's capacity to meet its external debt obligations using its available reserves.

2.3.2. Dependent Variable

GDP Growth Rate (GDPGR)

Calculated as the yearly percentage change in a nation's GDP, this variable reflects overall economic performance and indicates the country's capacity to maintain growth and effectively manage its debt.

2.4. Model Diagnostics

To ensure the reliability of the fixed-effects model used in this study, three critical assumptions must be satisfied: no multicollinearity, no serial correlation, and no heteroskedasticity. These diagnostic tests were performed using Stata Version 18.

Multicollinearity arises when independent variables are strongly interrelated, potentially leading to biased coefficient estimates and diminished model accuracy when applied to new data.[17]. Multicollinearity was assessed using the Variance Inflation Factor (VIF), where values above 10 generally signal its presence. As all VIF values in this study were below this threshold, it can be concluded that multicollinearity is not a concern in the dataset.

Table 1. Matrix of correlation

Variables	(1)	(2)	(3)	(4)
(1) DEBT_OVERHANG	1.000			
(2) REVENUE_ADEQUACY	0.713	1.000		
(3) EXRATE1	-0.075	-0.055	1.000	
(4) RESERVE_ADEQUACY	0.475	0.454	0.040	1.000

Source: STATA Output

Serial correlation describes the relationship between a variable's values across different time periods. A value of zero implies that the observations are independent and exhibit no consistent or predictable pattern over time [18]. The Wooldridge test was applied to detect serial correlation in panel data by regressing first-differenced residuals on their lagged values. The test assesses whether the lagged residuals are statistically significant, commonly using a 0.05 threshold to indicate the presence of autocorrelation [19]. As the test yielded a p-value of 0.04—below the 0.05 significance level—it suggests the presence of serial correlation in the dataset.

Heteroskedasticity occurs when the variance of the error terms in a regression model is not consistent across observations, violating a fundamental assumption of classical linear regression and resulting in inefficient parameter estimates. Visual inspection by plotting residuals against predicted values can help detect this issue; a pattern of increasing variance with higher fitted values often indicates heteroskedasticity [20]. The Modified Wald test was used to assess the presence of groupwise heteroskedasticity in the fixed-effects regression model. With a p-value<0.05, the results confirm that heteroskedasticity is present in the data. In order to correct the problem of autocorrelation and heteroskedasticity, the command 'vce (cluster id)' was used.[21].

3. Results and Discussion

Table 2. Descriptive statistics

Variable	Obs	Mean	SD	Min	Max
GDPGR	135	4.905	4.869	-20.7	21.4
DEBT_OVERHANG	135	54.055	29.588	6.13	132.42
REVENUE_ADEQUACY	135	2.074	1.816	0.1	8
EXRATE1	135	166.548	314.453	5.44	1518.26
RESERVE_ADEQUACY	135	2.524	3.437	0.185	27.736

Source: STATA Output

The descriptive statistics in Table 2 reveal significant variations in key economic indicators. GDP growth averages 4.9, ranging from -20.7 to 21.4, indicating fluctuations in economic performance. Debt overhang has a mean of 54.1, with values between 6.13 and 132.4, reflecting differing debt burdens. Revenue adequacy varies from 0.1 to 8, with a mean of 2.01, showing disparities in financial resources. Exchange rates exhibit substantial fluctuations, averaging 166.6 but ranging from 5.4 to 1518.3. Reserve adequacy also varies widely, from 0.2 to 27.8, with a mean of 2.5. These findings highlight economic instability and differences across observations.

Table 3. Summary Statistics based on Countries (2008-2022)

Countries	GDPGR	(1)	(2)	(3)	(4)
India	5.89	72.35	2.45	61.29	1.16
China	7.29	48.28	1.32	6.59	0.45
Pakistan	3.68	71.36	2.34	115.62	5.74
Bangladesh	6.31	30.07	1.05	79.03	2.13
Myanmar	4.99	44.58	1.25	820.63	1.84
Afghanistan	2.89	9.45	0.19	60.07	0.41
Bhutan	4.81	98.08	4.78	62.56	1.76
Nepal	4.58	31.18	0.97	99.87	0.86
Sri Lanka	3.7	81.12	4.59	142.39	6.87

Source: Author-Compiled

Table 4. Summary Statistics on the Basis of Time Period

Year	GDPGR	(1)	(2)	(3)	(4)
2008	5.74	51.12	1.89	51.87	**2.48**
2009	8.17	51.79	1.77	55.87	**1.77**
2010	8.32	46.39	1.69	54.61	**1.62**
2011	5.61	46.17	1.43	55.23	**1.79**
2012	6.82	46.37	2.18	132.54	**1.98**
2013	5.32	49.17	2.16	168.25	**2.27**
2014	6.01	48.71	2.53	175.18	**1.98**
2015	5.45	49.54	2.07	197.47	**1.95**
2016	5.65	52.96	2.07	208.89	**2.12**
2017	5.82	52.41	1.86	223.14	**2.21**
2018	5.28	55.01	2.31	235.77	**2.81**
2019	4.78	57.25	2.29	252.18	**2.55**
2020	-3.34	65.04	2.21	240.47	**2.73**
2021	1.35	68.61	2.31	226.67	**3.81**
2022	**2.57**	**70.27**	**2.37**	**220.09**	**5.79**

Source: Author-Compiled

Table 3 highlights several key trends and similarities among the countries from 2008 to 2022. China has the highest GDP growth rate (7.29%), followed by Bangladesh (6.31%) and India (5.89%), reflecting their strong economic performance and industrial expansion. In contrast, Pakistan (3.68%), Sri Lanka (3.7%), and Afghanistan (2.89%) show significantly lower growth, likely due to economic instability and high debt burdens. Bhutan (98.08%) and Sri Lanka (81.12%) have the highest debt overhang, which may pose risks to long-term financial stability, whereas Afghanistan (9.45%) has the lowest, possibly due to limited access to international borrowing. Revenue adequacy is highest in Bhutan (4.78%) and Sri Lanka (4.59%), indicating stronger revenue collection, while Afghanistan (0.19%) struggles with weak fiscal capacity. Exchange rate fluctuations are particularly striking in Myanmar (820.63), suggesting severe currency depreciation, while China (6.59) and Bhutan (62.56) maintain more stable rates. Reserve adequacy is highest in Sri Lanka (6.87) and Pakistan (5.74), likely reflecting their need for foreign exchange reserves to support their economies. An unexpected observation is China's low reserve adequacy (0.45), which contradicts its strong financial position globally, possibly due to measurement differences in this dataset. These findings provide insight into the economic challenges and strengths of each country over the period analyzed.

The GDP growth rate peaked in 2010 (8.32%), indicating a strong economic expansion, while the lowest growth was recorded in 2020 (-3.34%), reflecting the economic downturn possibly due to the COVID-19 pandemic. Debt overhang increased steadily over the years, rising from 51.12% in 2008 to 70.27% in 2022, suggesting a growing debt burden. Revenue adequacy improved over time, starting at 1.89 in 2008 and reaching 2.37 in 2022. However, there was a sudden dip in 2017, which could have been due to multiple reasons and was likely caused by a mix of debt restructuring, strong GNI growth, low interest rates, and stable exchange rates. This indicates stronger government revenue collection. Exchange rates showed significant fluctuations, increasing gradually from 2008 to 2011. The sudden jump in 2012 can be attributed to the increase in the Exchange Rate for Myanmar from 5.44 to 640.65, which was caused by Myanmar shifting from a fixed

exchange rate to a managed float in April 2012. The Exchange Rates continued to increase and reached their highest in 2019 (252.18) before they started to decrease in 2020 (240.47). This reflects currency depreciation over time. Reserve adequacy was highest in 2022 (5.79), showing strong foreign exchange reserves, while it was at its lowest in 2010 (1.62), indicating potential economic vulnerabilities. Overall, the data reveals a trend of increasing debt, fluctuating GDP growth, and currency depreciation, with economic shocks such as the 2020 downturn having a significant impact. These insights contribute to a better understanding of the country's financial and economic stability throughout the analyzed period.

Table 5. Results of Panel Data Regression using Fixed Effects Model

DV: GDPGR	Coefficient	P-Value
DEBT_OVERHANG	-0.118	0.002***
REVENUE_ADEQUACY	-0.036	0.909
EXRATE1	-0.006	0.000***
RESERVE_ADEQUACY1	-0.096	0.515
Constant	12.601	0

R-squared	0.162	**Number of obs**	135
F-test	194.731	**Prob > F**	0.000

****p<.01, **p<.05, *p<.1*

Source: STATA Output

Table 4 displays the results of the overall model fit test using the F-statistic. Since the p-value is 0.000—well below the 0.05 threshold—the regression model is deemed statistically significant. The R-squared value of 0.162 indicates that about 16.2% of the variation in GDP growth is explained by the model's independent variables. Of the independent variables, DEBT_OVERHANG and EXRATE1 show statistically significant effects on GDP growth, with p-values of 0.002 and 0.000, respectively. Their negative coefficients indicate that increases in debt overhang and exchange rate volatility are linked to declines in GDP growth. In contrast, REVENUE_ADEQUACY and RESERVE_ADEQUACY1 do not have significant associations with GDP growth, as their p-values exceed the 0.05 threshold.

The regression results revealed that debt overhang and exchange rate fluctuations have a notably negative impact on GDP growth in India and its neighboring countries. This finding implies that elevated levels of debt overhang and higher exchange rates contribute to a more pronounced decline in GDP growth. Comparable results have been observed in other studies, highlighting that debt-to-GDP ratios of 90% or higher are typically linked to significantly lower economic growth[8]. High public debt levels can lead to larger borrowing costs, with investors demanding greater returns to compensate for increased risk, thereby raising borrowing costs for both the government and private sector [22]. As debt rises, a self-reinforcing cycle emerges, making future adjustments more difficult and leading to a decline in growth. Moreover, high levels of government borrowing may reduce the pool of financial resources available to the private sector, thereby hindering business investment in activities that promote economic growth [23]. Reduced fiscal flexibility is another consequence, as high debt levels restrict a government's ability to implement effective fiscal policies during economic downturns due to the debt servicing burden [24]. Lastly, persistent high debt can generate economic uncertainty, reducing consumer and business confidence, which dampens spending and investment activities [25]. Together, these factors help explain how high.

Debt levels can adversely impact economic growth. Furthermore, debt servicing payments negatively impact capital formation and gross domestic savings, another key indicator of debt overhang [26]. Nonetheless, some studies have found that public debt may positively influence economic growth, particularly during the early stages of development when countries often rely on borrowing to fund critical infrastructure and social programs that support long-term growth. The exchange rate's significant adverse impact on GDP growth suggests that currency depreciation makes imports more expensive, increasing production costs for businesses reliant on foreign inputs. This raises inflationary pressures, reducing disposable income and overall demand. Additionally, excessive exchange rate volatility can deter foreign investment due to uncertainty, further slowing economic activity. On the other hand, while currency depreciation could theoretically boost exports by making them more competitive, the reliance on imported capital goods and intermediate products in these economies limits this benefit. [27].

These results indicate that a high level of debt does not inherently hinder economic growth. This outcome may be attributed to the limited number of countries included in the samples of such studies [11]. Given the challenges in forming a universal conclusion, the impact of public debt on economic growth appears to vary across countries and development stages, with adverse effects potentially arising even at relatively low debt levels. While past research suggests that the sampled countries may not have surpassed the critical debt threshold where growth is harmed, exceeding this level can raise concerns about fiscal sustainability. This could lead governments to increase taxes to manage debt, potentially reducing capital inflows, savings, and private investment, ultimately slowing economic growth [11].

Revenue Adequacy and Reserve Adequacy were found to have no statistically significant effect on GDP growth. This insignificance may be attributed to the fact that while revenue adequacy ensures government funding, its effect on short-term economic growth may be limited if funds are not efficiently allocated toward productive investments.

Similarly, reserve adequacy, while crucial for economic stability, does not directly stimulate growth unless reserves are actively utilized for investment or economic expansion. These findings imply that although these factors are crucial for sustaining long-term economic stability, their short-term impact on GDP growth appears minimal within the context of these economies [28].

4. Conclusion

This research set out to analyze how debt overhang affects economic stability in South Asia, with a particular focus on India and its eight neighboring countries. The study employed panel data from 2008 to 2022. The fixed-effects regression analysis revealed that out of the 4 predictor variables, Debt overhang and exchange rate volatility were found to have a notably negative effect on economic growth. The key findings highlight that elevated debt levels and adverse exchange rate movements play a substantial role in economic downturns, as heavy debt burdens drive up borrowing costs and limit fiscal space, ultimately constraining economic progress. Similarly, a volatile or depreciating exchange rate can increase inflationary pressures and reduce disposable income, resulting in a reduction in aggregate demand and discouraging foreign investment due to uncertainty, further hindering growth. These findings have several real-world implications for policymakers. The negative impact of debt overhang suggests There is a necessity for responsible fiscal management to prevent excessive borrowing that could lead to economic instability. Governments must focus on balancing debt accumulation with sustainable economic growth, ensuring that borrowed funds are used. They are directed towards productive investments rather than debt servicing. Moreover, the findings emphasize the importance of stable exchange rate policies, as excessive depreciation can harm businesses and reduce investor confidence. Policymakers must work towards strengthening macroeconomic fundamentals to attract foreign direct investment and stabilize the currency value. Despite significant findings, this study has its limitations. The results cannot be fully generalized as economic structures and policy responses vary across countries. It's a relatively short time frame that limits the study, which may overlook long-term trends and patterns. Furthermore, facts such as inflation, interest rates and global economic conditions were not considered, which could impact overall findings.

Future studies should expand the scope to include a wider range of countries and incorporate additional macroeconomic indicators to gain a more comprehensive insight into the debt–growth relationship. In conclusion, while debt overhang and exchange rates significantly impact GDP growth in India and its neighbouring countries, addressing these challenges requires sound fiscal policies, stable exchange rate management, and long-term economic planning. Policymakers must shift from short-term debt-driven growth strategies to sustainable economic reforms for resilient and inclusive development.

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