Original Paper

The Relationship between the Debt-to-GDP Ratio and the GDP in Developed (US, Japan), Developing Countries (of Asia and Europe) and African Sub-Saharan Countries with Emphasis on Indian Scenario: A Comparative Study

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Abstract

There is no simple relationship between debt and growth [...]. There are many factors that matter for a country's growth and debt performance. Moreover, there is no single threshold for debt ratios that can delineate the "bad" from the "good" (International Monetary Fund, 2012, p. 9).

Keywords

Debt-to-GDP, debt threshold, economic growth

Gross Domestic Product (GDP) is often used as an indicator of the size of the economy and the debt-to-GDP ratio works as an indicator of the financial leverage for an economy. A low ratio points that an economy's goods and services production is adequate to pay off its debts without letting further debts be incurred. The borrowing pattern of a nation and the election to opt to incur further debt depends on economic and geopolitical considerations which include recession, war, interest rates, etc. On the other hand, a high ratio would imply that the economy is not producing sufficiently to pay off its debts. Just like any bank would be interested in providing a bigger amount of loan only when an individual makes more money; likewise, in an economy's scenario, investors would be more interested in taking on a country's debt if it could produce more. And if at any time investors happen to worry about the repayment, and then they start to ask for higher interest rate returns to secure themselves against the risk of default. This way, it increases the cost of debt and the economy might fall into the trap of debt crisis.

This paper investigates the impact of India's public debt on its economic growth through an econometric analysis using data from the Reserve Bank of India, the International Monetary Funds, and the World Development Indicators for the period 1989-2014. The data is regressed in basic time series analysis taking into account the different variables that influence economic growth. The regression results show an inverted U-shape relationship between the public debt to GDP and its square. The results illustrate the theoretical findings of Reinhart and Rogoff's (2010) changing relationship between real GDP growth and government debt based on a debt threshold.

1. Introduction

The debt-to-GDP ratio is an indicator of the economic health of a country compared to its government debt to GDP. In developed countries, the high debt-to-GDP ratio may indicate the ability of advanced economies to manage and repay debt. In contrast, in developing countries, it could indicate challenges to economic stability and repayment capacity. For countries in the sub-Saharan region with low incomes, a high ratio of debt to GDP often reflects problems with income generation and excessive debt burdens that can hinder economic growth and increase the risk of default. Inflation may affect debt-to-GDP ratios by reducing the actual value of debt and making management easier, especially if GDP growth exceeds debt growth. However, due to the unique economic structure and policy of the country, this relationship varies between different classifications of countries. In developed countries, there is typically a positive relationship between the debt-to-GDP ratio and GDP. As the debt-to-GDP ratio increases, it can indicate that the country is borrowing more money to stimulate economic growth. In developing countries, the relationship between the debt-to-GDP ratio and GDP is more complicated. There may be instances where a higher debt-to-GDP ratio is associated with slower economic growth, indicating that the country is facing challenges in managing its debt. In low-income debt-to-GDP sub-Saharan countries, the relationship between the debt-to-GDP ratio and GDP is also complex. A higher debt-to-GDP ratio in these countries may be indicative of limited access to credit and the need for external financing, which can hinder economic growth. Additionally, the debt-to-GDP ratio can have an impact on inflation. Inflation is typically positively correlated with the debt-to-GDP ratio. As the debt-to-GDP ratio increases, it can put pressure on the government to increase borrowing or print money, which can lead to inflationary pressures. The relationship between the debt-to-GDP ratio, GDP, and inflation can vary depending on the country's development status and economic conditions. The tipping point for sovereign debt turning bad can vary depending on a country's economic conditions and development status. There is no specific tipping point that applies universally to all countries, as it depends on various factors such as the country's debt sustainability, economic growth prospects, inflation levels, interest rates, and the ability to service and repay debt. However, in general, a high debt-to-GDP ratio combined with low economic growth and high inflation can increase the risk of a sovereign debt crisis. Therefore, it is essential for countries to carefully manage their debt levels and implement effective fiscal policies to maintain debt sustainability and avoid reaching the tipping point where sovereign debt turns bad. When examining the relationship between the debt-to-GDP ratio, GDP, and inflation in various country categories, it is crucial to consider the unique economic circumstances and challenges each group faces. Developed countries often have more established financial systems and access to global capital markets, which can influence the relationship between the debt-to-GDP ratio and economic indicators. Developing countries may experience greater volatility in these relationships due to political instability, external shocks, and limited access to international financing. Low-income debt-to-GDP sub-Saharan countries may grapple with additional hurdles, including limited infrastructure and dependency on primary commodity exports.

The global burden of debt experienced a consecutive retreat for the second year, although it still surpasses the already high levels seen before the pandemic, as indicated by the latest update of the IMF's Global Debt Database (2023). In the previous year, total debt reached 238 per cent of global gross domestic product, marking a 9-percentage point increase compared to 2019. In terms of US dollars, the debt amounted to $235 trillion, surpassing the 2021 level by $200 billion. To ensure debt sustainability, policymakers must maintain an unwavering commitment in the coming years. Despite

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the rebound in economic growth since 2020 and significantly higher-than-anticipated inflation, public debt remained persistently high. Fiscal deficits contributed to elevated levels of public debt, as several governments increased spending to stimulate growth and address spikes in food and energy prices, even as they phased out fiscal support related to the pandemic.

Consequently, over the past two years, public debt only decreased by 8 percentage points of GDP, counteracting merely half of the increase caused by the pandemic. This phenomenon, the "pandemic blip" is illustrated in the following Figure-1 below.
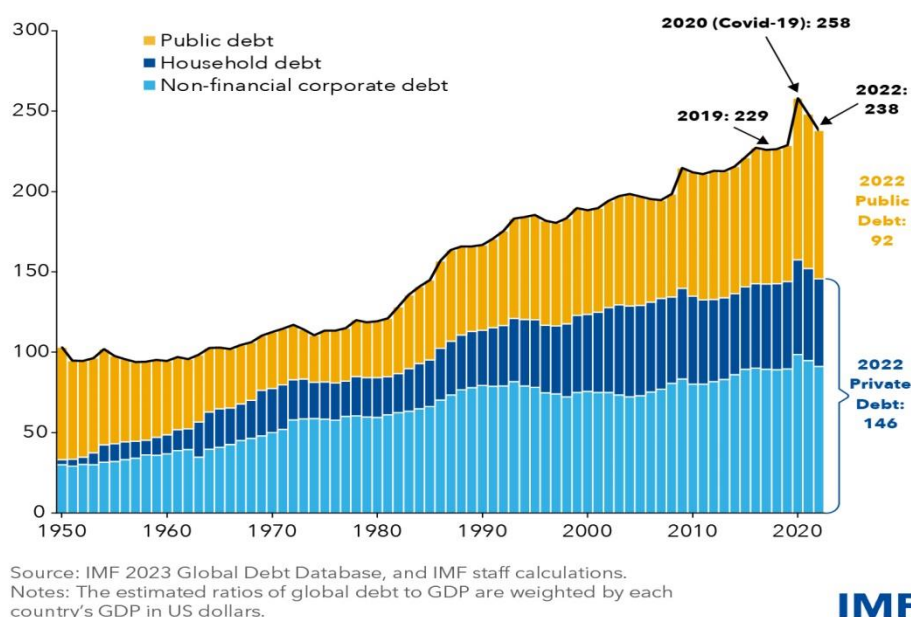

Figure 1. Estimated Ratios of Global Debt to GDP (weighted) in US$

2. Literature Review

Understanding how the debt-to-GDP ratio relates to GDP and inflation is essential for policymakers, economists, and investors seeking to comprehend the economic health of a country or region. By analysing these relationships, it is possible to gain insights into the potential risks and challenges facing economies and develop strategies to maintain debt sustainability and promote economic stability. In this analysis, we will explore the connections between the debt-to-GDP ratio, GDP, and inflation across different country categories, including developed countries, developing countries, and low-income debt-to-GDP sub-Saharan countries. By delving into these distinctions, we can unearth valuable insights into the complex interplay of debt, economic growth, and inflation within diverse global contexts. There is a tipping point at which high levels of sovereign debt can have detrimental effects on economic growth (Bandura, 1997). Therefore, it is crucial for countries to proactively manage their debt levels, implement effective fiscal policies, and prioritise debt sustainability to avoid reaching this tipping point where sovereign debt turns bad (Cipollina et al., 2012). Furthermore, our analysis

highlights the importance of considering the unique economic circumstances and challenges faced by different country categories when assessing the relationship between the debt-to-GDP ratio, GDP, and inflation (Bandura, 1997). This understanding can inform policy decisions and strategies tailored to each country's specific situation, promoting sustainable economic growth and mitigating the risks associated with excessive sovereign debt.

The analysis contributes to the literature by providing an econometrically rigorous analysis of the impact of long-run average public debt to GDP ratios on long-run average per capita GDP growth. It differs from the literature in three significant ways. First, the literature focuses primarily on the nexus between external debt and growth (see, for example, Cordella, Ricci & Ruiz-Arranz 2010; Pattillo, Poirson & Ricci, 2002, 2004). In contrast, this article analyses the nexus between total public debt and growth. Second, other studies (Cordella, Ricci & Ruiz-Arranz, 2010; Pattillo, Poirson & Ricci, 2002, 2004; Reinhart & Rogoff, 2010) investigate the short-run effect of external debt on growth. In contrast, this analysis emphasises the long-run relationship.

3. The Cases of the Developed Countries: US, Japan, EU; Developing Countries of Asia and Europe and Sub-Saharan Africa

Public debt has increased significantly globally due to the current economic crisis. Historical evidence suggests that debt levels persist for years post-financial crises. Projections indicate that debt levels are unsustainable for many countries, especially when considering implicit social security and medical care debts. A 90% central government debt to GDP threshold has been identified as a point where real growth rates decline. This threshold is crucial as many countries, including the United States, have reached or are projected to reach it soon. The impact of debt thresholds may vary based on country income levels and other factors like financial market development and institutions. Low-income countries may experience debt implications differently due to less developed financial markets and other structural differences. Monetising government debt in countries without well-developed bond markets can lead to connections between fiscal deficits and inflation. Debt levels in low-income countries may impact growth through the inflation channel differently than in high-income countries. Low-income countries may experience debt implications differently due to less developed financial markets and other structural differences.

3.1 Developed Economies

Developed Economies encompass a diverse array of nations with advanced economic infrastructures. The correlation analysis reveals a robust positive relationship between GDP and the debt-to-GDP ratio, indicating a tendency for economic growth to coincide with increased levels of debt (Correlation coefficient: 0.946). This alignment underscores the role of borrowing in stimulating economic activity within these nations. Moreover, the moderate positive correlation between GDP and inflation (Correlation coefficient: 0.362) suggests that as economic output expands, so do inflationary pressures, albeit to a moderate extent. However, the correlation between the debt-to-GDP ratio and inflation remains relatively weak (Correlation coefficient: 0.134), indicating a less direct influence of debt levels on inflation. The disparities in correlation patterns observed in Developed Economies can be attributed to variations in fiscal policies, monetary interventions, and structural economic factors among member nations.

3.2 Japan

Japan's economic landscape presents a distinct set of correlations, reflective of its unique socioeconomic context. While a positive correlation between GDP and the debt-to-GDP ratio persists, albeit less pronounced than in Developed Economies (Correlation coefficient: 0.567), the relationship between these variables is notably weaker. This suggests a more cautious approach towards debt accumulation within the Japanese economy. Intriguingly, both the debt-to-GDP ratio and inflation exhibit negligible correlations with GDP, hinting at complexities inherent in Japan's economic environment. The negative correlation between inflation and economic indicators, though statistically insignificant, underscores Japan's struggle with deflationary pressures in recent years. The observed differences in correlation patterns can be attributed to Japan's unique demographic challenges, prolonged deflationary environment, and policy responses aimed at revitalising economic growth.

3.3 United States

As a global economic powerhouse, the United States presents a correlation profile characterised by robust linkages between GDP and the debt-to-GDP ratio (Correlation coefficient: 0.899). This suggests a strong inclination towards debt-driven economic expansion, albeit to a slightly lesser extent than in Developed Economies. Additionally, the moderate positive correlation between GDP and inflation (Correlation coefficient: 0.439) underscores the country's susceptibility to inflationary pressures amidst economic growth. However, similar to other regions, the correlation between the debt-to-GDP ratio and inflation remains relatively weak (Correlation coefficient: 0.142), indicative of nuanced relationships between debt dynamics and inflation within the US economy. Disparities in correlation patterns can be attributed to the intricacies of US fiscal policies, monetary interventions, and structural economic factors, coupled with its position as a leading global economic player.

3.4 West Africa

In West Africa, we observe strong positive correlations between GDP and the debt-to-GDP ratio (0.996) as well as the debt-to-GDP ratio and inflation in sub-Saharan Africa (0.996). This indicates a robust relationship between economic output and debt levels, which might suggest that increased GDP corresponds with higher levels of debt. However, the negative correlation (-0.287) between West Africa's GDP and inflation in sub-Saharan Africa implies a slight inverse relationship between economic growth and inflation rates. Nevertheless, the correlations are not statistically significant at the 0.05 level.

3.5 Asia

In the Asian context, significant positive correlations are evident between GDP and the debt-to-GDP ratio (0.964) as well as the debt-to-GDP ratio and inflation (0.964). This suggests that as GDP increases, so does the debt burden, and inflation tends to rise alongside debt levels. However, there is a notable negative correlation (-0.488) between GDP and inflation in Asia, indicating that higher economic output might suppress inflation. The correlations between GDP and debt, and debt and inflation, are statistically significant at the 0.01 level, while the correlation between GDP and inflation is significant at the 0.05 level.

3.6 European Union (EU)

Within the EU, a positive correlation between GDP and the debt-to-GDP ratio (0.855) suggests that economic growth is associated with higher debt levels. However, this correlation is weaker compared to West Africa and Asia. Surprisingly, the correlation between debt-to-GDP ratio and inflation is negligible (-0.024), indicating no significant relationship between these variables. The correlation

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between GDP and inflation (0.386) is positive but moderate, suggesting a modest association between economic growth and inflation in the EU. The correlations between GDP and debt, and GDP and inflation, are statistically significant at the 0.01 level, while the correlation between debt and inflation is not statistically significant.

3.7 West Africa vs. Sub-Saharan Africa

In the correlation analysis between West Africa and sub-Saharan Africa, we observe strong positive correlations between GDP and the debt-to-GDP ratio (0.996), indicating a robust relationship between economic output and debt levels. However, there is a slight inverse relationship between West Africa's GDP and inflation in sub-Saharan Africa (-0.287), suggesting that higher economic growth may suppress inflation. These correlations provide insights into the economic dynamics within the region.

3.8 Asia vs. European Union

The correlation analysis between Asia and the European Union reveals significant positive correlations between GDP and the debt-to-GDP ratio (0.964), indicating a strong association between economic output and debt levels. However, there is a notable negative correlation between GDP and inflation in Asia (-0.488), suggesting that higher economic output may suppress inflationary pressures. These correlations shed light on the economic dynamics between the two regions.
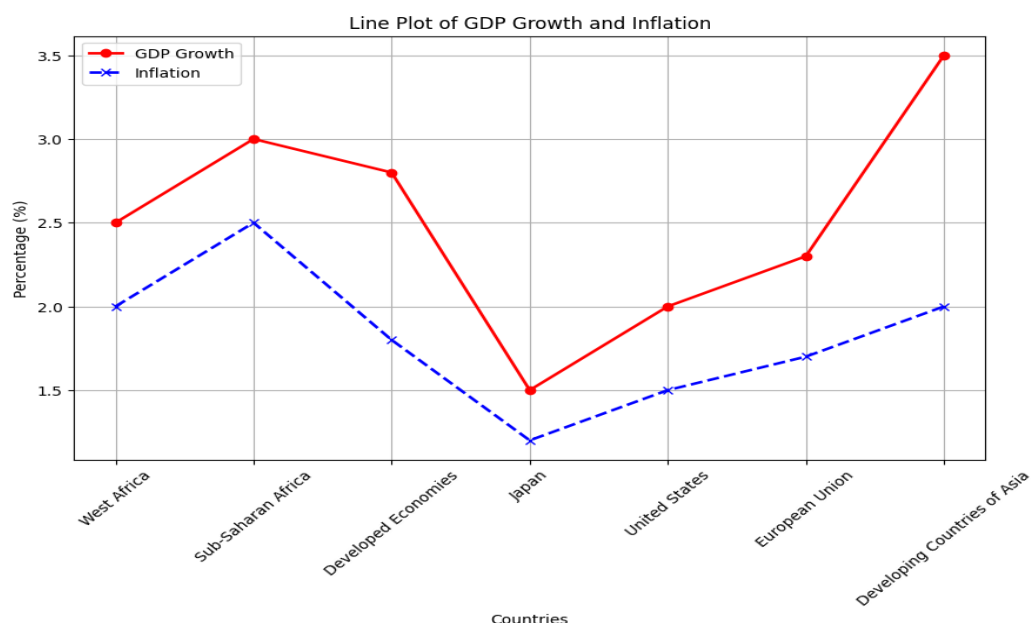

Figure 2. Line Plot of GDP Growth and Inflation of Developed, Developing and Low-Income Countries

3.9 Japan vs. United States

In comparing Japan with the United States, we observe moderate positive correlations between GDP and the debt-to-GDP ratio in both countries. However, the correlation coefficients are slightly stronger in the United States, indicating a higher reliance on debt-driven economic expansion. Additionally, while Japan exhibits a negligible correlation between GDP and inflation, the United States demonstrates a moderate positive correlation, suggesting differing inflationary dynamics between the two countries.

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3.10 Correlation Heat Map

The generalized overall correlation heat map shown below indicates that at the global level, GDP growth and debt-to-GDP are moderately positively correlated (0.093). Similarly, debt-to-GDP and inflation (-0.35) and inflation to GDP growth (0.8).
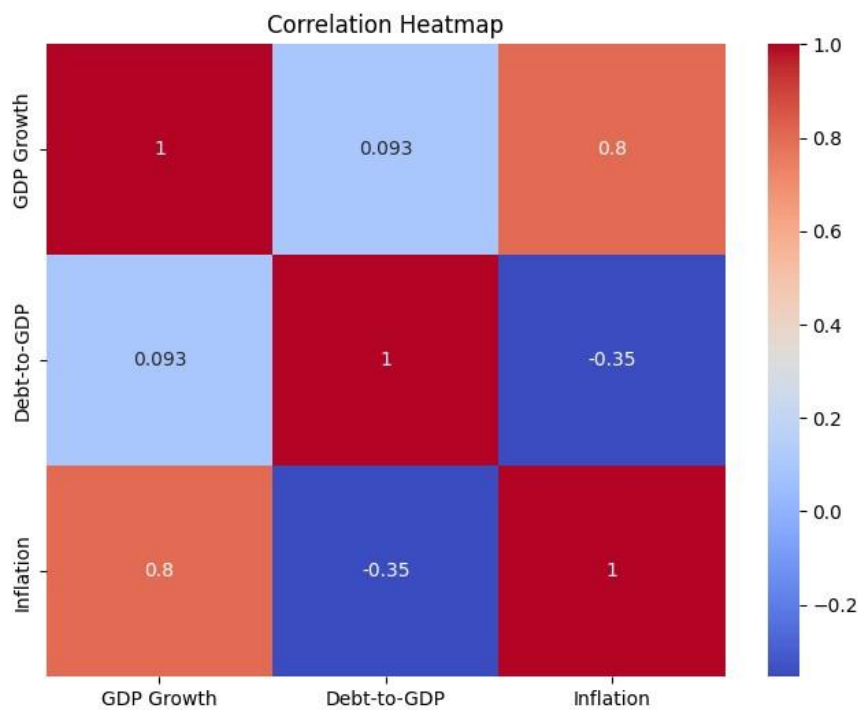

Figure 3. Generalized Overall Correlation Heatmap

3.11 Factors Influencing Disparities

Several real-world factors contribute to the observed disparities in correlation patterns across these economies. Variations in economic structures, including the composition of GDP, reliance on exports, and industrial specialization, play a crucial role. Additionally, differences in monetary policies, fiscal strategies, and regulatory frameworks shape the relationship between economic indicators. Socio-economic factors such as demographic trends, labour market dynamics, and technological advancements further contribute to variations in correlation patterns. Furthermore, historical legacies, geopolitical influences, and global economic interdependencies exert significant impacts on each region's economic trajectory.

4. The Indian Scenario: Methodology and Data

The accumulation of the Indian public debt since 1980 is becoming the most critical and serious risk, especially after the financial downturn of 2008-09 and the pandemic. This paper investigates the impact of the Indian government debt on its economic growth through an econometric analysis using data for about 24 years starting in 1991. The research data is from the Reserve Bank of India, the International Monetary Funds and the World Development Indicators then it is regressed in basic time series analysis taking into consideration the different variables that influence economic growth.

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The objective of this study is to test the impact of Indian public debt on Indian economic growth and its threshold that turns its effect negative. Accordingly, the study used time series data to test the impact of Indian public debt and real economic growth rate for the period 1991-2023. The study was conducted within a period of increased public debt rate to GDP in India. The research's main independent variable is the public debt to GDP and its square to check the threshold beside other economic control variables. After we check the model robustness mainly through the ARMAX model, we test the public debt threshold that starts affecting the Indian economic growth. We start the study by introducing the subject and then by analysing the economic situation in India. The third section presents the literature review of the relationship between public debt and economic growth before presenting the research methodology. We end up with the main conclusions of the study.

5. The Analysis

After independence, the government of India used to cover its budget deficit by issuing treasury bonds as the main source of financing its deficit. The heavy Indian government expenditures mainly in the social sector, infrastructure building and the weak tax collections till recently, led to an increase in the debt. By 2023, the debt-to-GDP ratio increased to 86.6%, as shown below in Figure 1. After the introduction of GST and lowering the rates of direct tax like income tax, the tax-collection has increased which has improved the government's revenue to meet various liabilities. The inflation rate registered its highest levels in 2022 in the recent past breaching the mark of 6.6 per cent due to the pandemic and the Russia-Ukraine war, and then it came down. From 2008 to 2013 inflation reached beyond 8% reaching the highest in 2010 to 11.98%.
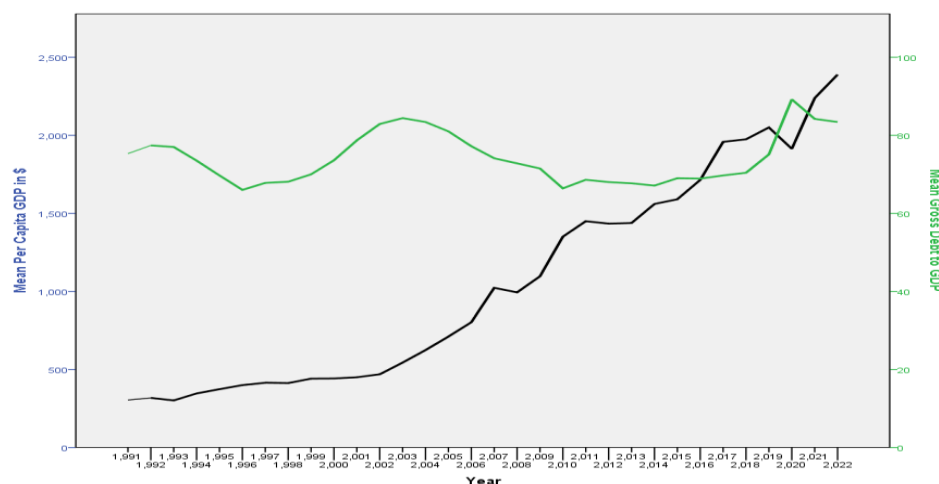

Figure 4. Mean Per Capita GDP and Mean Gross Debt to GDP Ratio from 1981 to 2022

The trend of export of goods and services, which is a measure of trade openness, has been shown in Figure 5.
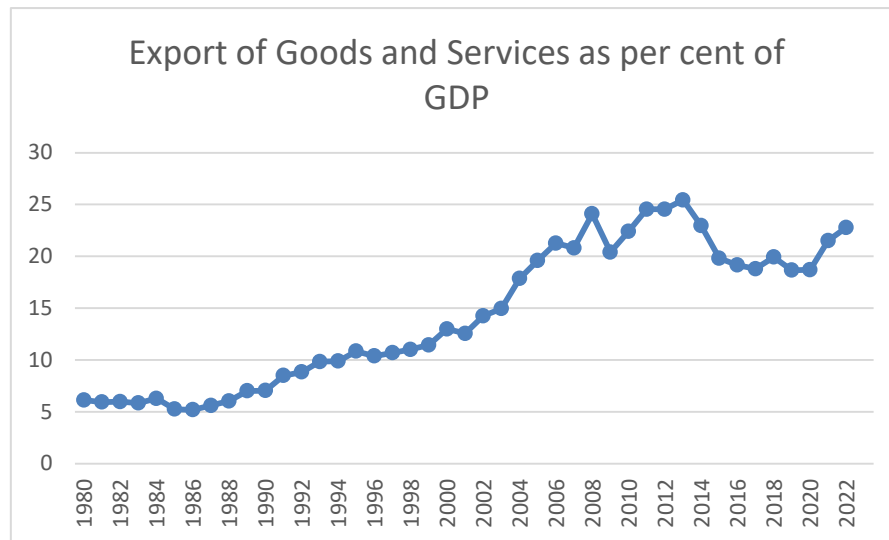

Figure 5. Export of Goods and Services as Per cent of GDP (Trade Openness)-1980-2022

The population of India has grown at a high rate due to various reasons like poverty, lack of adequate health facilities and lack of education, literacy rate of women being the lowest. The following Figure-6 shows the trend.
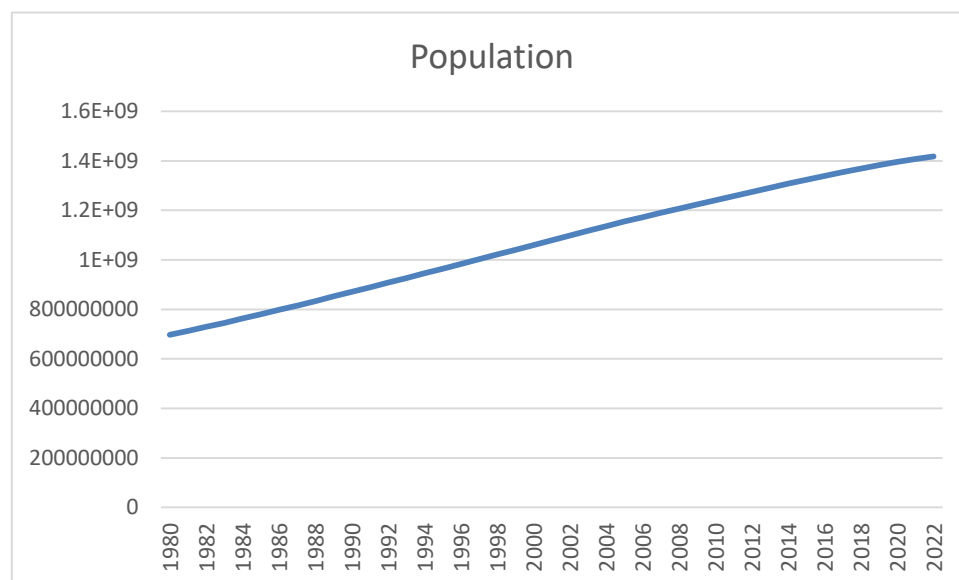

Figure 6. Population Trend from 1980 to 2022

The inflation rate registered its highest levels from 2008 to 2013, as shown below in Figure 7.
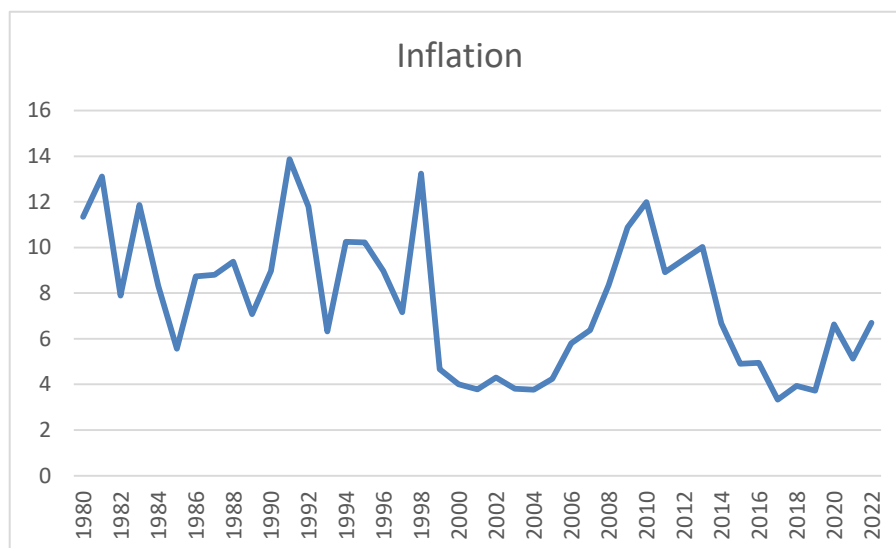
Figure 7. Variation of Inflation from 1980 to 2022

This research model is based on a multiple linear regression equation, it is composed of one dependent and six independent variables during the period t equivalent to 24 periods.

The IMF recently concluded its **Article IV** consultation with India and published its executive board's report. The team notes: "India's economy showed robust growth over the past year. Headline inflation has, on average, moderated although it remains volatile. Employment has surpassed the pre-pandemic level and, while the informal sector continues to dominate, formalisation has progressed".

The report further highlights growing debt, accompanied by a "volatile inflation" spell, lower employment (dominated by the informal sector), and a potential disruption of the global supply chain resulting in "increasing fiscal pressures for India".

The Indian government's response to the IMF report, particularly concerns about debt, was unsurprisingly aimed at refuting the institution's word of caution. While the IMF highlighted a need for substantial investment—especially from India's private sector—to enhance the nation's capacity to withstand climate stresses and natural disasters, the GOI's response stressed that its sovereign debt risks are limited as it is primarily denominated in domestic currency.

KV Subramanian, India's executive director at the IMF, challenged its claim, stating that despite historical shocks, India's public debt-to-GDP ratio has shown minimal fluctuations. The disagreement centres on the IMF's reclassification of India's exchange rate regime to a "stabilised arrangement".

Growth has remained relatively weak in India's 2016-2020 timeline. The macro growth rate crashed during the lockdown of 2020 and then rose nominally after Covid restrictions were lifted. On average, the real growth rate remains suboptimal. However, the macro government debt to GDP levels, already rising since 2015, has ballooned since 2018. With a lower denominator (GDP level), one can expect the net debt effect to rise even if borrowings remained the same, which isn't the case. The IMF data indicates how government debt has increased to alarming levels of 82.4% (anything over 80% of GDP is a red risk marker, in economic crisis terminology). Rising external debt requires a greater robustness of dollar/reserve currency *balance* for a given country, which has been a concern for India's balance of payment position in recent times. The RBI has done everything possible to exercise dollar selloffs to maintain exchange rate stability in the currency market for a depreciating rupee.

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Gross Capital Formation to GDP and Debt-to-GDP ratio

The capex-fuelled government spending spree in the last three years hasn't allowed for greater capital formation (to attract private capital investment for growth). The weak Gross Fixed Capital Formation numbers reflect this. For me, that's an even bigger concern. The government is spending big and doing so by borrowing more to attract/progressively push for growth via private investment. None of that is happening (private investment remains woefully weak), the government is accruing more debt at the cost of spending to waste and endangering the possibility of future usefully borrowing for crisis or large-scale credit needs.
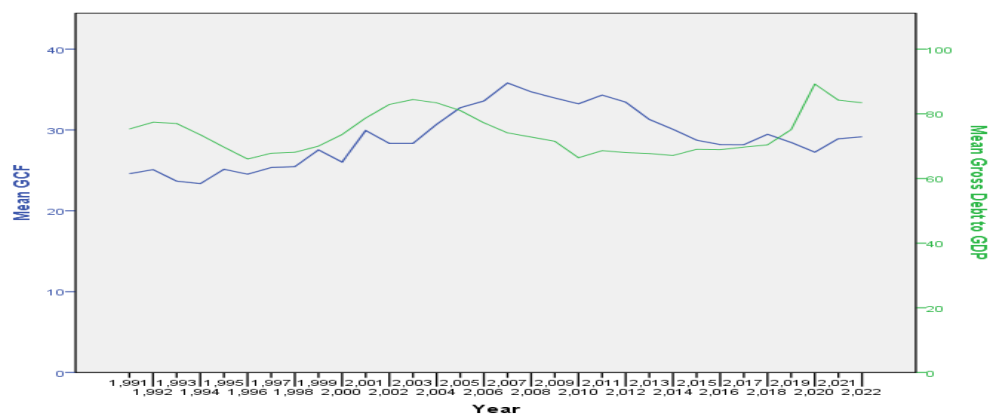

Figure 8. Mean Gross Capital Formation and Mean Debt to GDP from 1981 to 2022

Government debt, employment and inflation

High debt accompanied by low employment and high food inflation (or more volatile headline inflation) is the worst possible scenario for an emerging market, particularly one that boasts of a demographic dividend in its working-age population composition. India's growth story is one of jobless growth anchored by higher informalisation and casualisation of work, in the absence of "good jobs".

Figure 9. Mean Inflation and Mean Gross Debt to GDP Ratio from 1981 to 2022

Manufacturing production is still weak and where the potential for jobs is higher, in services, the nature of competitiveness (in a worker-surplus economy) does not *yield* higher wages. Workers are settling for low-value service work, much of it at the intersection of "informal" and "formal" work.

The Model Equation

The model equation is as follows:

PerCapitaGDP = -3581.729 -3.391*ExportOfGoodsAndServices to GDP ratio + 38.669*Inflation + 4.766E-6*Population + 2.391*Debt-to-GDP ratio – 41.678*GrossCapitalFormation to GDP -26.860*GrossFinancialDeficit to GDP + et

According to the model equation, we consider the following: α is a constant variable; β is the regression coefficient; εt is the error term. The model-dependent variable is Per Capita GDP. The model-independent variables are the Annual General government gross debt to GDP ratio; population; and export of goods and services to GDP; the inflation rate as the percentage change in the annual CPI; Gross Capital Formation to GDP ratio and Gross Financial Deficit to GDP ratio. The main hypothesis is that the variability of the Per Capita GDP growth is explained by the variability of the government debt at different levels, which does not hold well as the values are statistically insignificant.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	
Df2 Df2 1	.981[a]	.962	.952	147.146874684386700	.962	104.111	6	.000

a. Predictors: (Constant), GFDeficit, Population, Gross Debt to GDP, GCF, Inflation, Exports of goods and services (% of GDP)

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	13525437.644	6	2254239.607	104.111	.000[b]
	Residual	541305.068	25	21652.203		
	Total	14066742.712	31			

a. Dependent Variable: Per Capita GDP

b. Predictors: (Constant), GFDeficit, Population, Gross Debt to GDP, GCF, Inflation, Exports of goods and services (% of GDP)

		Unstandardized Coefficients		Standardized Coefficients			Coefficients[a]
Model		B	Std. Error	Beta	t	Sig.	
1	(Constant)	-3581.729	730.622		-4.902	.000	
	Exports of goods and services (% of GDP)	-3.391	19.155	-.027	-.177	.861	
	Inflation	38.669	12.419	.179	3.114	.005	
	Population	4.766E-6	.000	1.160	10.544	.000	
	Gross Debt to GDP	2.391	5.373	.023	.445	.660	
	GCF	-41.678	17.672	-.219	-2.358	.026	
	GFDeficit	-26.860	26.290	-.053	-1.022	.317	

a. Dependent Variable: Per Capita GDP

The results suggest that inflation, population, and Gross Capital Formation are statistically significant and out of them, Gross Capital Formation is negatively impacting the Per Capita GDP growth rate. On the contrary, the export of goods and services as a percentage of GDP and Gross Financial Deficit as per cent of GDP are negatively correlated to Per Capita GDP growth. The regression baseline estimation besides robustness-checking results illustrates the inverted U shape for the public debt and its square coefficients with a positive coefficient of the public debt and a negative sign for its square.

6. Looking For Threshold

After we checked the robustness of the module, now we check whether there is a threshold, above which the Indian public debt hurts GDP growth. Reinhart and Rogoff, Cecchetti et al. (2011) find a clear correlation between different debt levels and GDP growth. In Figure 9, the relation between the Gross Capital Formation and Debt-to-GDP ratio is plotted. It shows that even when the debt was very high, the Gross Capital Formation did not rise correspondingly. Perhaps, the money went into removing poverty and several welfare schemes like MNREGA, Crop Insurance, Jan Dhan Yojana, ABHA medical facilities to poor netizens, etc. The remaining debt must be adversely affecting the growth rate of the GDP. The following **Figure 10 gives** the relation between the debt-to-GDP ratio and annualised per cent growth rate.
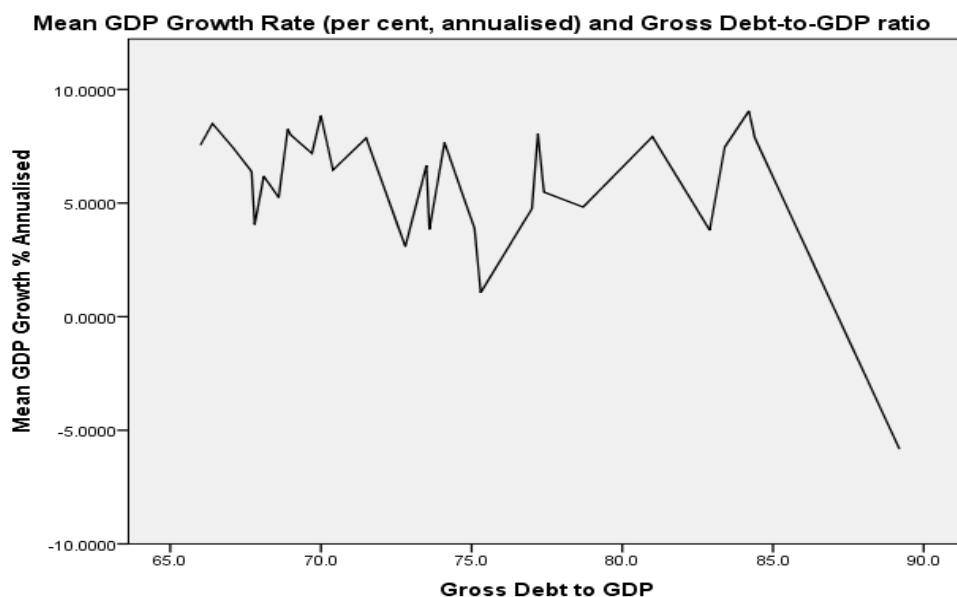
Figure 10. Relation between the Debt-to-GDP Ratio and Annualised Per cent Growth Rate

In our case study, the regression results prove that there is an inverted U-shape relationship between the public debt to GDP and its square. The results show a positive coefficient for the debt/GDP ratio is, and a negative coefficient for its square.
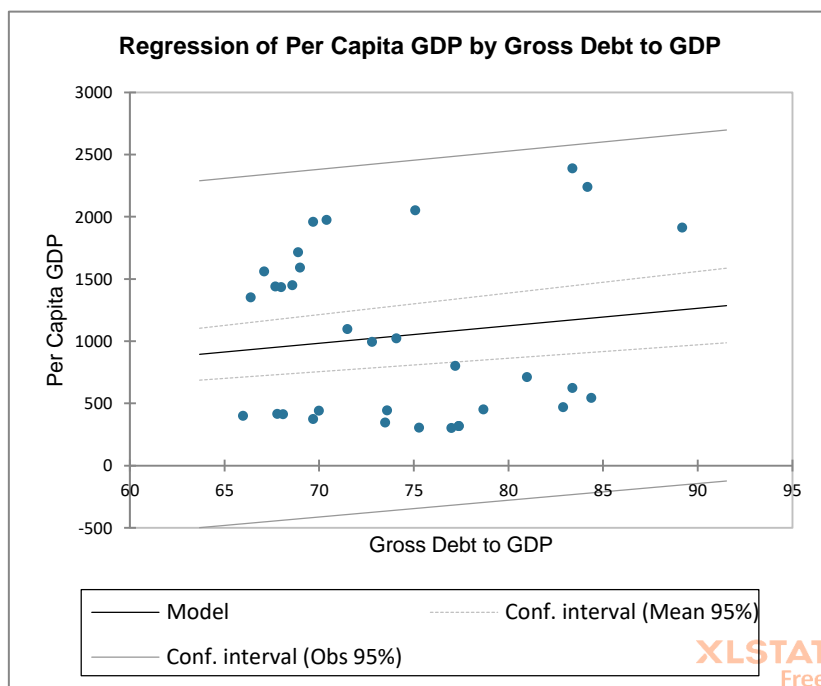

Figure 11. Regression of Per Capita GDP by Gross Debt to GDP

In a simplified way to find the threshold for the Indian economy's public debt to GDP where it starts to affect negatively its GDP growth, we refer to the first derivative of the quadratic equation and equalize it to 0. The threshold level therefore is $D = -\beta_1/2*\beta_2$, where D is the threshold level, while β_1 and β_2 are the debt and its square variable coefficients (Mkrtchyan, 2016). The results of the estimation are shown below: -

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	13661370.916	7	1951624.417	115.546	.000[b]
	Residual	405371.796	24	16890.492		
	Total	14066742.712	31			

a. Dependent Variable: Per Capita GDP

b. Predictors: (Constant), Debt-to-GDP square, GCF, Inflation, GFDeficit, Population, Exports of goods and services (% of GDP), Gross Debt to GDP

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-15923.177	4397.951		-3.621	.001
	Gross Debt to GDP	326.391	114.308	3.109	2.855	.009
	Exports of goods and services (% of GDP)	1.817	17.017	.015	.107	.916
	Inflation	41.638	11.018	.193	3.779	.001
	Population	4.946E-6	.000	1.203	12.235	.000
	GCF	-51.148	15.961	-.268	-3.205	.004
	GFDeficit	-8.840	24.073	-.017	-.367	.717
	Debt-to-GDP square	-2.134	.752	-3.099	-2.837	.009

According to the estimations and the above equation, the level of debt overhang comes to 76.47%. Both the debt-to-GDP ratio and its square are variables in the regression that affect the Per Capita GDP and are seen to be statistically significant and are of opposite sign.

7. Conclusion

This research's main objective was to study the impact of India's public debt on its economic growth. We tested the impact of Indian public debt on its economic growth using data for 26 years from 1991 to 2022. The lagged public debt coefficient of determination is positive, its lagged square coefficient of determination is negative, and both are statistically significant. The results show that most of the explanatory variables are statistically significant and have the expected sign. The public debt and its square inverted U shape coefficient results illustrate the theoretical findings of Reinhart and Rogoff's (2010) changing relationship between real GDP growth and government debt based on a debt threshold. In this case, the threshold debt comes to 76.474% of GDP.

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