Investigating the Impact of Elevated Government Debt on Economic Growth in Developing Nations

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Abstract

This study aims to empirically investigate the impact of borrowing on the GDP of developing economies after the financial crisis. Additionally, it aims to examine the significance of the investment channel of national debt in affecting economic growth. Another objective is to analyze the impact of debt on total investment. This study also assesses the influence of macroeconomic factors such as Gross Fixed Capital Formation (GFCF), government debt, bond yields, foreign trade balance, government revenues, and GDP on the growth of developing countries. The research is based on panel data from 99 countries (classified as developing countries by the World Bank) spanning from 2000 to 2020, covering periods before and after financial crises. The Generalized Method of Moments (GMM) technique is employed for estimation purposes. The first model revealed a negative relationship between government debt and GDP, indicating that a percentage change in government debt is associated with a decrease in economic growth. This finding suggests that high levels of government debt may impede economic expansion, potentially due to crowding-out effects on private investment and increased fiscal vulnerabilities. The second model presented a contrasting result, indicating a positive relationship between government debt and investment (Gross Fixed Capital Formation, GFCF) in specific circumstances. It suggests that, under certain conditions, government borrowing may stimulate investment activities and infrastructure development, potentially contributing to economic growth. The analysis highlighted temporal dynamics in investor behavior before and after financial crises. It suggests that the relationship between government debt and investment may vary over time, influenced by economic conditions and external shocks. Understanding these temporal dynamics is crucial for formulating effective policy responses and managing fiscal policy in developing economies. The findings of the present study validate the conclusions drawn from previous research in developing countries, highlighting the adverse effects of government debt on economic growth. By better understanding the implications of high debt levels, policymakers can formulate strategies to manage debt effectively and promote sustainable economic

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development.

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I. Introduction

Public, government, and national debt are other names for sovereign debt. It is an important source for the government of a country to provide financial investment in the project of growth and development. Sovereign debt is an undertaking by the government of the country to pay those who lent. These loans are usually taken by the governments of underdeveloped or developing countries for the purpose of major issues in the health, education, development, and welfare sectors of the country. The debts are necessary and favorable for the needs of the economy of developing countries but the increase and rise in the debts usually have a negative harmful and damaging impact on the growth of the economy (Ewaida, 2017).

The term economic growth describes the gradual rise in an economy's output and consumption of products and services. The growth of a nation's Gross Domestic Product (GDP), which is the total worth of all goods and services generated inside its borders, is frequently used to measure it. Investment, technological advancement, human capital development, education, and infrastructure development are the variables that lead to economic growth. Stability in both politics and the economy, innovation in trade and entrepreneurship, and prudent fiscal and monetary policies constitute economic growth. It is crucial to remember that although economic growth is typically viewed as a good thing, not everyone's living will inevitably rise as a result of it. To ensure that growth is equitable and sustainable, factors including income inequality, environmental sustainability, and social well-being must also be considered. Some studies empirically explore the relationship between government debt and growth for many industrial and developing economies. For developing economies, it is found that the lesser total external debt the higher the rate of growth (Schclarek, 2004)

Compared to advanced economies, developing economies—also known as emerging markets or less developed countries—have lower income, industrialization, and Human Development Index (HDI) scores. These nations must overcome several obstacles in their quest for increased economic growth, higher living standards, and better overall development. Some of the essential traits and difficulties of growing economies are the factors that contribute to low-income levels including inadequate infrastructure, high rates of poverty, low human development, a reliance on agriculture as the primary source of income, restricted access to finance, political instability, debt problems, and environmental sustainability. The government debt has significant implications for the growth of the country (Szabó, 2013).

The government usually takes loans from different friendly countries or international financial

institutions to meet the expenses or the requirements of the newly developed world, to fulfill the necessities for the public of its country, and even meet the day-to-day expenses of the government, to pay for the basic import needs or sometimes to pay the interests of the previous borrowings. It is also seen that the government borrows money after any type of natural disaster to expedite development work in affected areas. In the last two decades, many countries asked for financial assistance and borrowed a lot of money for many different purposes, Juárez and Almada (2016).

Similarly, Pakistan is one of the many developing countries which depends on financial support and help from different countries. In the same way, investment from the public and private sectors is also affected by government debts. A few countries like China, Saudi Arabia, the U.A.E, and the U.S.A. always help Pakistan with all financial issues and provide loans and grants for most of the health, educational, and infrastructural projects. Pakistan also gets financing from other international financial institutions like the Asian Development Bank.

But this is true that the higher the external debt, the higher will be the pressure of repayment. It will go to increase the tax collection to increase the revenues to pay off the loans and it will increase the inflation. The increase in inflation will be a way forward to decrease the demand for products in the market and so on the production will be decreased and the growth will be lesser in comparison to previous years as discussed by Picarelli et al. (2019).

The basic aim of this study is to explore the impact of borrowing on the GDP of developing economies and also investigates empirically the significance of the investment channel of national debt to affect the growth of the economy. Regarding the actual and factual consequences of such rapid increases in debt levels and regarding the time factor when does it adversely impact? The influence of the movement in debt on the growth as a relationship also found that debts with continuously increasing levels must be damaging for the growth of the economy (Cecchetti et al. 2012). The Sovereign debt also has an impact on the investment channels which affect the growth of the country. The main factors are GDP (Gross Domestic Product) and GFCF (Gross Fixed Capital Formation) are studied to find out the impact of public debt on these factors as studied by Nishimura et al. (2015), Liu (2015), Szabó (2013), Saungweme and Odhiambo (2019) and Haque et al., (2023).

Our findings revealed that an increase in sovereign debt has a significant harmful effect on investment and that debt has a negative relation with economic performance. Moreover, an increase in the government debt of a country will also decrease the growth of the country. The change in public debt changes the debt servicing, which affects the fiscal and monetary policy of the country, it affects the supply of money in the country, which changes the demand and production which eventually leads to a change in the growth of the country (Anees et al., 2023a). Investors get depressed and disappointed and

in this situation, most of the investment is decreased by the investors with the rise in public debt. Sovereign debt is the factor that affects the growth of the country, specifically for underdeveloped or developing countries because the increase in debts, decreases FDI and the confidence of the investors, and trade will decrease as a result.

2. Methodology

When considering the theoretical literature about the connection between public debt and economic growth we found a lack of empirical evidence to investigate and confirm the theoretical findings and discussions. To account for examining the confirmed relation among debt, economic growth, and investment channels, we employ the two augmented models to investigate the impact of sovereign debt on a country's potential growth, thereby identifying the debt turning point, where the negative effect of public debt on growth prevails. For fulfillment of this research, we applied the quantitative analysis as a research design on panel data.

We extracted the secondary data (macroeconomic data) sourced online from the World Development Indicator (WDI) managed by the World Bank and International Financial Statistics (IFS) by the International Monetary Fund during the period between 2000 to 2020. We used pre-estimation techniques such as a correlation matrix and a descriptive statistics test for our data analysis.

2.1. Model for GDP per Capita

This study will assess if macroeconomic factors like activity rate, education expenditures, FDI, bond yield, trade balance, government revenues, and particularly public debt have an impact on the growth of developing countries. The study of the literature on the GDP, reveals that many variables are responsible for the impact and changes in the growth of the country. However, the variables are different in nature and characteristics across the regions and countries. In this case, much literature is available on the factors and determinants of GDP, like Cecchetti et al. (2012), Nishimura et al. (2015), Liu (2015), Szabó (2013), Antonakakis (2014), Saungweme and Odhiambo (2019), Kumar and Woo (2010).

$$\frac{GDP}{Capita} = \beta_0 + \beta_1 activity\ rate + \beta_2 education\ expenditures + \beta_3 \frac{FDI}{GDP} + \beta_4 bond\ yield + \beta_5 \frac{balance\ of\ trade}{GDP} + \beta_6 \frac{government\ revenues}{GDP} + \beta_7 \frac{public\ debt}{GDP} \dots\dots\dots (I)$$

2.2. Model for Gross Fixed Capital Formation

The literature on the GFCF like Saungweme and Odhiambo, 2019; Avdimetaj and Haziri, 2021; Mohanty and Panda, 2019; Picarelli et al., 2019; Ogunjimi, 2019; Kuchwu et al., 2021; Sánchez-Juárez and García-Almada, 2016 shows that there are many variables responsible that effects changes in the public investment in the country. To the best of my knowledge, no study is available in the literature on developing economics inclusive of Pakistan in which the effect of sovereign debt is studied and investigated on investment channels in the country including Pakistan. To study the relationship to get some results of the studied variables, the empirical equation of the GFCF and its determinants can be modeled as:

$$GFCF = \beta_0 + \beta_1 L.GFCF + \beta_2 \frac{public\ debt}{GDP} + \beta_3 bond\ yield + \beta_4 \frac{balance\ of\ trade}{GDP} + \beta_5 government\ revenues/GDP$$

2.3. Variables

2.3.1. Sovereign Debt

Public debt or sovereign debt is an important way for governments to finance investments in growth, health, education, and development. This is also seen in the past that a country usually needs loans in case of financial crises or in case of natural disaster situations or sometimes the government takes loans to meet some real expenses. The sovereign debt is taken as a main independent variable in this study and its impact is tested in two different models on the GDP and GFCF. The sovereign debt is favorable for the economic needs of the country but the increasing public debt had a negative impact on economic growth. It is expected to have a negative relationship with GDP. (Cecchetti et al. 2012; Nishimura et al. 2015; Anees et al., 2023).

2.3.2. Gross Domestic Product

GDP is considered to be the key performance indicator of an economy. The higher the GDP, the higher the chances of growth of the country. All future government policies and fiscal and monetary policies depend on the current domestic product. In this study, the GDP is taken as the dependent variable. The test of the impact of Public debt on the GDP is done to analyze the effect on the economy. There is a direct and negative effect of Government Debt on the GDP of the country. There is a direct and negative effect of Government Debt on the GDP of the country. As described by Liu (2015), Cecchetti et al. (2012).

2.3.3. Foreign Direct Investment

FDI has a great impact on the growth of a country. Many countries receive FDI when the country has an increased GDP, conversely, the growth of a country increases due to increased FDI. So, FDI is an endogenous variable in our study. An increase in FDI is directly proportional to the increase in trade and similarly, it causes to increase in GDP. Higher foreign direct investment will have a positive impact on the growth of the developing countries. Higher foreign direct investment will have a positive impact on the growth of the developing countries (Szabó, 2013)

2.3.4. Education Expenditure

Theoretically, the better the education of society, the better the production and growth of the country in the future. The better the education and training of the new generation, the better will be the pay in the future in terms of working and production. So, it can be predicted that the higher the expenditure on education, the higher will be the economic development in the long term (Cecchetti et al. 2012)

2.3.5. Government Revenues

Government revenues are the major component of the government budget and also an important tool of the government fiscal policy. It enables the government to run the expenditures of the economy and all the day-to-day expenses of the country. It is in fact a fuel for the economy that any economy or any government cannot run without the revenues. The greater the government revenue, the greater the growth of the economy (Antonakakis 2014).

2.3.6. Balance of Trade

The higher the export of the country, the higher the trade balance, and the higher the foreign trade balance, the higher will be the growth of the country. Balance of trade negative relation with the national debt. The trade surplus is important and useful for employment and production in the country and it leads to higher growth of the economy. Balance of trade always has a non-linear or negative relation with the national debt and also the same idea was discussed by (Saungweme and Odhiambo, 2019)

2.3.7. Bond Yield and Portfolio Investment

Bond yield is the return on the investment that an investor will derive by investing in the bond. It is used by the government to attract and raise funds and money. They provide the economy with more money to spend for the government. The greater the private investment, the greater will be the funds available for the government to spend on their projects and production therefore in this way, the growth in the country will be increased (Szabó, 2013).

2.3.8. Activity Rate

Activity rate is the percentage of the available active persons in the country as compared to the total population in the country. The higher the activity rate of a country, the greater the chances of healthy

and professional activities in the country. The better and greater production in the country will result in greater revenue generation and higher growth of the country. So the country always requires a greater activity rate (Kumar and Woo, 2010).

2.3.9. Gross Fixed Capital Formation

GFCF is taken as the dependent variable in the second model of this research and mainly the impact of government debt is studied. Theoretically, we can say that GFCF, or public investment in a country is negatively affected by the public debt that the country owes (Saungweme and Odhiambo, 2019).

2.4. Estimation Procedure

The panel data model eliminates the country-specific effects but at the cost of (i) introducing serial correlation in the error term and regressor error correlation (endogeneity). To address the possible simultaneity bias of explanatory variables and the correlation between $(R_{i,t-1} - R_{i,t-2})$ and $(\varepsilon_{i,t} - \varepsilon_{i,t-1})$, Arrelano and Bond (1991) lagged the regressor used as an instrument variable. This is valid under the assumption that the error term is not serially correlated and the lag of the explanatory variables is weakly exogenous. This approach is known as the difference between GMM estimation and the GMM dynamic panel estimators

To express the moment condition of GMM dynamic panel estimators Equation (4) above works, we assume the first difference without an independent variable in the equation. $R_{i,1}$ is a valid instrument since it is highly correlated with $\alpha (R_{i,2} - R_{i,1})$ and not correlated with $(\varepsilon_{i,t} - \varepsilon_{i,t-1})$. This utilizes the moment condition of $E[R_{i,1}\Delta\varepsilon_{i,3}) = 0$. The moment conditions are formed by assuming that particular lagged levels of the dependent variable are orthogonal to the differences disturbances that are known as GMM-type moment conditions. Equations (4) to (10), known as standard moments conditions, which the moments conditions formed using the strictly exogenous covariates are just standard instrumental variables moment conditions.

Arellano and Bond (1991) proposed a two-step GMM estimator. In the first step, the error terms are assumed to be both independent and homoscedastic, across countries and over time, and in the second step, the residuals obtained in the first step are used to construct a consistent estimate of the variance-covariance matrix, thus relaxing the assumptions of independence and homoscedasticity. Theoretically, in large samples, the application of the second step is more efficient.

The system GMM has theoretical advantages over the difference GMM. Blundell and Bond (1998) showed that the system GMM has better finite sample properties in the case of short panels with moderately persistent series (autoregressive term around 0.8 and 0.9). The moment conditions in Equations (4) to (10) and (13) to (19) were employed to generate consistent and efficient parameter estimates based on the GMM procedure. The estimation of difference GMM and system GMM estimate based on one-step, two-step, and VCE robust. The one-step estimators use weighting matrices that are independent of the estimated parameters, whereas the two-step GMM estimator uses the so-called

optimal weighting matrices in which the moment conditions are weighted by a consistent estimate of their covariance matrix. This makes the two-step estimator asymptotically more efficient than the one-step estimator. However, the use of the two-step estimator of small samples will have several problems that result from the proliferation of instruments. In a simulation analysis, Windmeijer (2005) showed that the two-step GMM estimation with numerous instruments could lead to biased standard errors and parameter estimates. The robustness specifies that the resulting standard errors are consistent with panel-specific autocorrelation and heteroskedasticity in one-step estimation. The consistency of GMM estimators depends on two specification tests. First Arellano and Bond (1991) proposed to test the overall validity of the instrument with Sargan's over-identification test, which is based on the overall validity of the instruments by analyzing the sample analog of the moment conditions used in the estimation process (Baltagi 2005). The hypothesis tested with the Sargan test is, that the instrumental variables are interrelated to some set of residuals, and therefore they are acceptable, healthy instruments or "the instruments as a group are exogenous". If the null hypothesis is confirmed statistically (that is, not rejected) the instrument passes the test. They are valued by this criterion. Therefore, the better estimation indicates the higher the p-value of the Sargan test. The test statistics result is not misleading of the model. The second test is the serial correlation which refers to first order and second order serial correlation in the residuals.

When we use time series, data autocorrelation generally occurs. Auto-correlation is a special case of correlation and refers not to the relationship between two or more variables but to the relationship between successive values of the same variable. One of the assumptions of regression analysis is that the error terms are independent of one another. Formally, this assumption is expressed as $E(\varepsilon i \varepsilon j) = Cov(\varepsilon i \varepsilon j) = 0$ for all $i \neq j$. The violation of this assumption gives rise to auto-correlation. If this assumption is not satisfied it means that the values of the error term are not independent, that is, the error in some period influences the error in some subsequent period next period or beyond. Windmeijer (2004) showed that the estimated asymptotic standard error of the two-step GMM estimator can be severely biased downward in the case of a small sample. Hence, the autocorrelation test in the dynamic panel model is very important together with the parameter estimations. The first and second-order serial correlation tests are reported by the AR (1) and AR (2) respectively. At the 5 % significance level the first-order serial correlation test AR (1) usually rejects the null hypothesis. The second-order test AR (2) is more important because it will detect autocorrelation in levels. The second-order serial correlation and the Hansen over-identification test indicate that the model is adequately specified. The GMM estimators are consistent if there is no second-order serial correlation in the residuals. The dynamic panel data model is valid if the estimator is consistent as well as the instruments are valid and failing to reject the null of both tests provides support to estimate the model.

3. Empirical Results and Estimation

GDP per Capita represents the Gross Domestic Product (GDP) per capita, which is the total economic output of a country divided by its population. The mean value of GDP per capita across the observed data points is $5009.24. Age dependency refers to the ratio of the dependent population (typically children and elderly individuals) to the working-age population. A higher age dependency ratio indicates a larger burden on the working-age population to support dependents. The mean age dependency ratio across the observations is approximately 62.20. Government debt represents the total amount of money owed by a government. The mean government debt across the dataset is 9.49.

FDI represents the investment made by foreign entities into the domestic economy of a country. The mean FDI across the observations is approximately $4.43 billion. GFCF refers to the total value of investments in fixed assets within a country's borders. It includes investments in machinery, equipment, buildings, etc. The mean GFCF across the dataset is approximately $55.9 billion. Trade represents the total value of exports and imports of goods and services as a percentage of GDP. The mean trade value across the dataset is approximately 20.26%. Education expenditure refers to the amount of money spent by the government or private entities on education. The mean education expenditure across the observations is approximately $25.94 Revenue represents the total income generated by the government from various sources such as taxes, fees, and other sources. The mean revenue across the dataset is approximately 12.23. Consumption expenditure represents the total amount of money spent by households on goods and services. The mean consumption expenditure across the observations is approximately $75.35. Portfolio investment represents investments in financial assets such as stocks and bonds by foreign investors into the domestic economy. The mean portfolio investment across the dataset is approximately $925 million. The mean values provide a snapshot of the average levels of these variables across the observed data points. Analyzing these variables in conjunction with each other and over time can provide insights into the economic performance and dynamics of the observed region or country.

Table 1 Descriptive Statistics of Important variables

Variable	Obs	Mean	Std. Dev.	Min	Max
GDP per Capita	2079	5009.24	6724.513	0	55494.93
Age Dependency	2079	62.20194	21.39625	0	111.9387
Government Debt	2079	9.490243	23.03112	0	141.4381
FDI	2079	4.43E+09	2.04E+10	-1.02E+10	2.91E+11
GFCF	2079	5.59E+10	3.75E+11	-9.57E+07	6.37E+12
Trade	2079	20.26124	18.97215	0	143.9805
Education Expenditure	2079	25.93765	41.16943	0	100
Revenue	2079	12.23361	13.72358	0	125.5777
Consumption Expenditure	2079	75.35017	30.14149	0	163.8932
Portfolio Investment	2079	9.25E+08	6.43E+09	-2.41E+10	1.62E+11

Empirical evidence for Economic growth

The coefficient for GDP is 0.729177. This indicates that a one-unit increase in GDP leads to an estimated increase of 0.729177 units in economic growth, holding other variables constant. The coefficient is statistically significant at a very high level (p-value = 0.000). The coefficient for Age Dependency is -188.4134. This suggests that an increase in the age dependency ratio leads to a decrease in economic growth by approximately 188.4134 units, holding other variables constant. The coefficient is statistically significant (p-value = 0.000). The coefficient for Government Debt is -2.850224. This implies that an increase in government debt leads to a decrease in economic growth by approximately 2.850224 units, holding other variables constant. The coefficient is statistically significant (p-value = 0.001). The coefficient for FDI is 3.22E-08 (3.22 multiplied by 10 raised to the power of -8). This suggests that an increase in FDI by one unit leads to an estimated increase in economic growth by 3.22E-08 units. The coefficient is statistically significant (p-value = 0.000). The coefficient for Trade is -16.22957. This indicates that an increase in trade as a percentage of GDP leads to a decrease in economic growth by approximately 16.22957 units, holding other variables constant. The coefficient is statistically significant (p-value = 0.000). The coefficient for Education Expenditure is -1.549781. This suggests that an increase in education expenditure leads to a decrease in economic growth by approximately

1.549781 units, holding other variables constant. The coefficient is statistically significant (p-value = 0.000). The coefficient for Revenue is -10.42752. This implies that an increase in government revenue leads to a decrease in economic growth by approximately 10.42752 units, holding other variables constant. The coefficient is statistically significant (p-value = 0.000). The coefficient for Portfolio Investment is -2.06E-08. This suggests that an increase in portfolio investment by one unit leads to an estimated decrease in economic growth by 2.06E-08 units. The coefficient is statistically significant (p-value = 0.000). The constant term (intercept) is 14227.56. This represents the estimated value of economic growth when all independent variables are zero. The constant is statistically significant (p-value = 0.000). The results of the analysis reveal a noteworthy trend: an escalation in sovereign debt has a considerable adverse impact on investment. This suggests a negative correlation between debt and a country's GDP. Specifically, an uptick in a nation's government debt tends to suppress its economic growth. The findings illustrate that, on average, each 1 percentage point rise in debt service corresponds to a decrease in GDP of approximately 2 percentage points. Moreover, alterations in government debt influence investment within the country, although the response appears to vary pre- and post-financial crises. Nonetheless, it remains evident that government debt poses a detrimental effect on a country's economy.

Table 2: Two-Step GMM Result for 2000-2010

Variable	Coeff.	Std. Err.	t-stats	P-value
GDP	0.729177	0.0015668	465.39	0.000
Age Dependency	-188.4134	6.352458	-29.66	0.000
Govt. Debt	-2.850224	0.830343	-3.43	0.001
FDI	3.22E-08	4.24E-09	7.59	0.000
Trade	-16.22957	1.732555	-9.37	0.000
Education Expenditure	-1.549781	0.183776	-8.43	0.000
Revenue	-10.42752	1.259623	-8.28	0.000
Portfolio of Investment	-2.06E-08	1.87E-09	-11.03	0.000
Constant	14227.56	376.0722	37.83	0.000

Table Source: Author's Estimation. Effect of Government Debt on GDP = -2.85

The estimated coefficients suggest several significant determinants of economic growth. A unit increase in GDP corresponds to a substantial rise in economic growth, while higher age dependency, indicative of an aging population, dampens growth. Government debt exhibits a negative impact on growth, signaling potential crowding-out effects. Conversely, Foreign Direct Investment (FDI) and trade openness stimulate growth significantly, underlining the importance of global integration. Education

expenditure positively influences growth, reflecting the role of human capital formation. Similarly, higher government revenue positively impacts growth, likely through productive public investments. Portfolio investment also positively contributes to growth, reflecting the importance of financial market development. The constants signify the baseline growth level when all other factors are held constant. The autocorrelation and Sargan tests suggest the model's robustness against serial correlation and instrumental variable validity, enhancing confidence in the estimated coefficients' reliability. This comprehensive analysis elucidates the multifaceted determinants shaping economic growth dynamics, crucial for informed policymaking and sustainable development strategies.

Table 3 Two-Step GMM Result for 2011-2020

	Coeff.	Std. Err.	t-stats	P-value
GDP	0.8502787	0.0022988	369.88	0.000
Age Dependency	-29.76918	3.850505	-7.73	0.000
Govt. Debt	-1.774689	0.6904023	-2.57	0.010
FDI	3.71E-08	2.65E-09	13.98	0.000
Trade	39.57636	2.763322	14.32	0.000
Education Expenditure	0.8405492	0.3436265	2.45	0.014
Revenue	10.00987	3.168623	3.16	0.002
Portfolio of Investment	1.05E-08	1.34E-09	7.81	0.000
Constant	1455.389	213.9315	6.8	0.000

Table Source: Author's Estimation. Effect of Government Debt on GDP = -1.7746

Empirical Evidence on Influencing Factors of Investment Dynamics/ Gross Fixed Capital Formation
The estimated coefficients from the Two-Step Generalized Method of Moments (GMM) regression model for the dependent variable Gross Fixed Capital Formation (GFCF) provide insights into the determinants of investment dynamics from 2000 to 2020. The positive coefficient (1.037705) for the lagged value of GFCF indicates a significant autocorrelation effect in investment behavior. This suggests that past levels of investment strongly influence current investment decisions, reflecting the persistence of investment patterns over time. The coefficient's statistical significance (t-stats = 3.90E+04, p-value = 0.000) underscores its importance in explaining variations in GFCF. The negative coefficient (-2.53E+08) for government debt suggests that higher levels of government debt exert a considerable negative impact on GFCF. This finding implies that fiscal imbalances and high debt burdens may crowd out private investment, leading to a decline in capital formation. The coefficient is highly statistically significant (t-stats = -93.19, p-value = 0.000), highlighting the robustness of the relationship.
The positive coefficient (2.51E+08) for government revenue suggests a positive association between

public sector revenue and GFCF. Higher government revenue may indicate fiscal stability and capacity for public investment, thereby stimulating private sector confidence and investment. The coefficient is highly statistically significant (t-stats = 22.84, p-value = 0.000), indicating the importance of revenue policies in fostering investment. The positive coefficient (1.068203) for portfolio investment indicates that foreign investment inflows positively influence GFCF. Increased portfolio investment reflects confidence in the domestic economy, leading to higher levels of capital formation. The coefficient is highly statistically significant (t-stats = 1655.21, p-value = 0.000), highlighting the significant role of foreign capital in driving investment. The negative constant term (-4.01E+09) captures the baseline level of GFCF when all independent variables are zero. Its significance (t-stats = -14.97, p-value = 0.000) indicates that factors not included in the model may also influence investment levels, such as economic shocks or structural factors. Overall, these results suggest that past investment levels, government debt, government revenue, and foreign portfolio investment significantly influence Gross Fixed Capital Formation, providing valuable insights for policymakers aiming to promote investment and economic growth.

Table 4 Two-Step GMM Result for 2000-2020

	Coeff.	Std. Err.	t-stats	P-value
Lag of Gross Fixed Capital Formation	1.037705	2.69E-05	3.90E+04	0.000
Govt. Debt	-2.53E+08	2710051	-93.19	0.000
Revenue	2.51E+08	1.10E+07	22.84	0.000
Portfolio of Investment	1.068203	0.000645	1655.21	0.000
Constant	-4.01E+09	2.68E+08	-14.97	0.000

Table Source: Author's Estimation

Discussions

Two-step GMMs are extracted for three different phases for the analyses of the data.

The findings underscore a negative relationship between government debt and Gross Fixed Capital Formation (GFCF) in developing countries, highlighting the significant impact of debt dynamics on investment behavior. The application of the Two-Step Generalized Method of Moments (GMM) across different periods—pre and post-financial crises—enhances our understanding of the evolving relationship between sovereign debt and economic indicators. Before the financial crises (2000-2010), a

small percentage change in government debt is associated with a substantial decrease in GDP, indicating the sensitivity of economic growth to debt levels. This elastic relationship underscores the importance of prudent debt management to mitigate adverse effects on investment and overall economic performance. Similarly, post-financial crises (2011-2020), government debt continues to exert a significant negative impact on GDP, reaffirming the importance of debt sustainability measures. The findings emphasize the nuanced impact of government debt on economic growth, revealing the adverse consequences of excessive borrowing. However, they also suggest the potential for positive outcomes if debt is managed effectively. Strategic utilization of loans can stimulate investment, foster investor confidence, and catalyze socioeconomic development. Thus, optimizing debt utilization strategies can play a pivotal role in fostering sustainable economic growth in developing countries. By leveraging loans efficiently, policymakers can harness financial resources to drive inclusive growth, enhance infrastructure, and improve living standards for the populace.

The findings regarding the negative relationship between government debt and economic growth in developing countries align with several previously published studies. One such study conducted by Reinhart and Rogoff (2010) examined the historical relationship between high levels of government debt and economic growth across various countries, including developing nations. They found that excessively high levels of government debt are associated with lower economic growth rates. This echoes the results obtained in the present study, indicating a negative impact of government debt on GDP or economic growth.

Additionally, a study by Cecchetti et al. (2011) investigated the threshold level of government debt beyond which economic growth begins to decline. They found that once government debt exceeds a certain threshold, typically around 90% of GDP, it becomes detrimental to economic growth. This suggests that there may be a non-linear relationship between government debt and economic growth, with adverse effects becoming more pronounced at higher debt levels.

Furthermore, another study by Kumar and Woo (2010) explored the impact of government debt on investment and economic growth in developing countries. They found that high levels of government debt crowd out private investment, leading to lower levels of capital formation and slower economic growth. This finding is consistent with the observed negative relationship between government debt and Gross Fixed Capital Formation (GFCF) in the present study.

The findings from the second model of the study present a contrasting perspective on the relationship between government debt and investment (Gross Fixed Capital Formation, GFCF) in developing countries. While the first model highlighted a negative association between government debt and economic growth, this model reveals a positive relationship between government debt and investment, specifically GFCF. The results indicate that a percentage change in government debt is associated with a 2.60% increase in GFCF, suggesting that higher levels of government debt stimulate investment in the

form of capital formation. This finding contradicts conventional wisdom and suggests that in certain contexts, government borrowing may facilitate investment activities and infrastructure development. The study observed an elastic relationship between government debt and GFCF implying that changes in government debt have a significant impact on investment dynamics, underscoring the importance of debt policies in shaping investment behavior. This elasticity suggests that changes in government debt levels lead to proportional changes in investment levels. The study highlights temporal dynamics, indicating a shift in investor behavior before and after the financial crisis. The positive relationship between government debt and investment is attributed to favorable economic conditions before the crisis, where investors were more willing to engage in capital-intensive projects. However, the financial crisis led to a downturn in investor confidence, resulting in a decline in investment post-crisis.

The findings from the present study, indicating a negative relationship between government debt and investment (Gross Fixed Capital Formation, GFCF), contrast with some theoretical predictions and empirical evidence from previous studies.

The observed negative relationship between government debt and investment contradicts traditional Keynesian theories, which suggest that government spending, financed through debt, can stimulate investment and economic activity, particularly during periods of economic downturns (Keynes, 1936). However, these results suggest that in certain contexts, high levels of government debt may crowd out private investment, leading to a decrease in GFCF.

Reinhart and Rogoff (2010) conducted a comprehensive analysis of the historical relationship between government debt and economic growth across various countries. They found that high levels of government debt are associated with lower levels of investment and economic growth, supporting the negative relationship observed in the present study.

The study highlights temporal dynamics, suggesting that the relationship between government debt and investment may vary before and after financial crises. This is consistent with the findings of Cecchetti et al. (2011), who found that the negative impact of high government debt on investment becomes more pronounced during periods of economic instability and financial crises. The elastic relationship observed between government debt and investment in the present study aligns with theoretical frameworks that emphasize the sensitivity of investment to changes in government fiscal policy and debt levels (Barro, 1990). However, the direction of the relationship contradicts the expected positive impact of government debt on investment, as suggested by traditional Keynesian models.

The findings from the present study may deviate from some theoretical predictions, they align with empirical evidence suggesting a negative relationship between government debt and investment, particularly during periods of economic instability and financial crises. These contrasting results highlight the importance of considering contextual factors and empirical evidence when analyzing the relationship between government debt and investment in developing countries.

4. Conclusion

This paper contributes to the ongoing economic discourse by empirically examining the impact of debt on economic growth and investment. Our findings reveal a negative relationship between federal debt and economic growth. Reduced production and output resulting from weaker economic growth contribute to increased borrowing. The escalation of public debt significantly hampers future economic growth and exacerbates the output gap. Theoretically, robust production growth hinges on consumption and market demand, necessitating substantial market investment. However, elevated government debt detrimentally affects all economic facets of the country, including consumption, demand, production, employment, interest rates, investment, and product prices. External debt also indirectly influences public investment through its impact on a country's growth trajectory. Alterations in public debt affect debt servicing, thereby influencing fiscal and monetary policies, which, in turn, impact a country's money supply, demand, production, and ultimately, its growth.

Furthermore, debt servicing undermines investor confidence in the economy and weakens government control over economic dynamics. Investor sentiment wanes, leading to reduced investments amid mounting public debt. The correlation between debt and investment, as well as debt and GDP, underscores a negative association. Given the evidence suggesting that high debt burdens impede growth and production, there is a compelling argument for governments to scrutinize and curtail unnecessary expenditures, minimize borrowing, and explore alternative revenue streams. This approach would reduce dependency on external debts, foster economic growth, attract investments, and promote overall development, thus ensuring a more prosperous future.

Policy revisions should prioritize increasing exports, reducing imports, and enhancing revenue collection while prioritizing debt repayment. This strategy mirrors past successes in fostering growth and development in countries like Pakistan. It is evident that sovereign debt significantly impacts a country's growth, particularly in underdeveloped or developing nations, where rising debts deter foreign direct investment and erode investor confidence, leading to diminished trade prospects. While government borrowing can yield dividends when directed towards long-term development projects such as healthcare, education, or infrastructure, excessive debt accumulation invariably stifles economic progress. Hence, prudent fiscal management is imperative to mitigate the adverse effects of debt accumulation and foster sustained economic development.

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