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MEASURING THE CONNOTATIONS OF ECONOMIC VARIABLES WITH EXTERNAL DEBTS OF BANGLADESH

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ABSTRACT

This study ascertains the associations of the macroeconomic variables with external debts, the impacts of external debts on annual GDP, GDP growth, and per capita income, and the timing effects on the economic variables of Bangladesh. The analysis is inferential and eight hypotheses have been set and tested with the regression analysis. To complete the study, the chi-squared test and Durbin-Watson test have been used along with trends and growth analysis. The results of the study reveal that the budget deficit, current account deficit, and defense budget have a positive association with external debts. Furthermore, foreign direct investment, foreign exchange reserve, foreign remittance, and trade of balance have a negative association with external debts. The external debts have no negative impact on annual GDP, GDP growth, and per capita income. Finally, there is a significant timing effect on the economic variables of Bangladesh during the study period.

Contribution/ Originality: This study identifies the risk of external debts and suggests sources for foreign direct investment, exchange reserve, remittance, and trade balance, and advises to reduce the budget deficit, current account deficit, and defense budget for sustainable growth and development which is first time attempt in context of Bangladesh. This study's findings can be used to take fruitful measures by the concerned authority in response to external debts.

1. INTRODUCTION

Recently, Bangladesh's neighboring country Sri Lanka has faced a severe financial crisis. Due to a severe shortage of foreign currency, Sri Lanka is now unable to pay for essential goods imports, including fuels and daily essentials, leading to severe suffering for the general public, such as power cuts, and a peaked inflation rate (The Indian Express, 2022). Experts state that the budget deficit and current account deficit are considered the root causes of this crisis along with financial mismanagement (CNN, 2022). In 2019, the Asian Development Bank indicated that its total expenditures are greater than its national income, and tradable goods and services produced are insufficient, leading Sri Lanka to produce a twin deficit budget (Weerakoon, Kumar, & Dime, 2019). Another

reason for this situation is the reduction of the internal fund generation of the government by cutting tax (Bala, 2022). Decreasing tourism and foreign workers' remittance also played a part in this situation by raising public debts to unsustainable levels and insufficient foreign exchange reserve for debt payment (The Indian Express, 2022). Many critics have asked the government of Bangladesh to learn from the situation in Sri Lanka. There are many similarities between the economies of Bangladesh and Sri Lanka (The Daily Star, 2022; The Financial Express, 2022). Although the Bangladesh economy is doing well, it must be remembered that the economy largely depends on readymade garments, and foreign remittance, which is very volatile (The Daily Star, 2022). For these reasons, policy makers in Bangladesh need to be more cautious about the future course of action regarding foreign debts. This study has been carried out to obtain a better understanding of foreign external debts in association with economic variables.

The objectives of this study are to:

i. Measure the association of budget deficit, foreign direct investment, current account deficit, foreign exchange reserve, foreign remittance, defense budget, and trade of balance with the external debts of Bangladesh.
ii. Assess the impacts of external debts on the annual GDP, GDP growth, and per capita income of Bangladesh.
iii. Illustrate the growth and trends of economic variables of Bangladesh from 1972 to 2021.
iv. Evaluate the timing effects on economic variables during the given period.

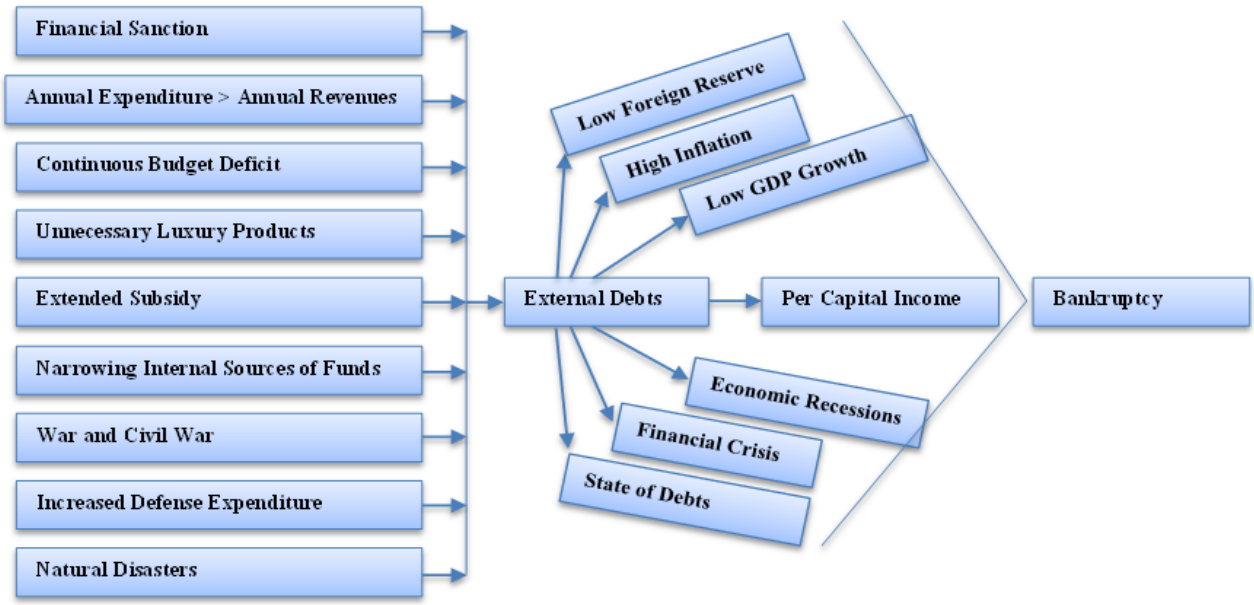

Figure 1. Reasons and consequences of external debts.

Figure 1 illustrates the overall reasons and consequences of the external debts of a country toward bankruptcy by directly impacting macroeconomic issues. Macroeconomic issues of a country can be impacted positively and negatively by foreign external debts.

2. LITERATURE REVIEW

2.1. Impacts of Foreign Debts on Economic Variables

The fiscal gap derived from being highly indebted creates uncertainty and blocks growth and development for developing countries. To overcome this situation, debt relief measures need to be initiated and implemented (Bacha, 1990). An increase in the backlog of government and government-guaranteed foreign debt has created an obstinate

response from the private sector. An increase in foreign debt leads to a reduction in savings and investment, but the reduction in savings is greater than the reduction in investment (Fry, 1989). Unprecedented destruction of a country's economic systems can be followed by a devaluation of the exchange rate, and a considerable drop in foreign reserve leads to the repayment of foreign debts being suspended (Diamond & Naszewski, 2019). Foreign debt is directly connected with the current account deficit. Increasing foreign debt lead to a worse current account deficit (Fry, 1989). Domestic savings are negatively impacted by foreign debt, particularly in the long run (Okafor & Tyrowicz, 2009). Public sector external debt and domestic debt have bidirectional causality and unidirectional causality with economic growth, respectively (Hossain & Shirin, 2016). Defense expenditure is one of the prominent reasons for foreign debt in Turkey (Baris, 2018).

2.2. Impacts of External Debt on Annual GDP, GDP Growth Rate, and Per Capita Income

The considerable reductions in the stock of external debts are likely to increase the per capita income growth of highly indebted countries. Furthermore, a reduction in external debts leads to a boost in the growth of highly indebted countries (Clements, Bhattacharya, & Nguyen, 2003). The burden of external debt has an adverse association with national income and per capita income along with the devaluation of the national currency, an increase in the economizing of workers, continuous industrial strikes, and poor educational systems (Ajayi & Oke, 2012). There is a substantial negative effect of the external debt ratio on annual per capita growth (Pattillo, Poirson, & Ricci, 2002). However, there is no long-run relationship between external debts and GDP (Kasidi & Said, 2013). External debt has substantial negative impacts on economic growth, but countries' categorization based on per capita income do not show a relationship between external debt and economic growth (Senadza, Fiagbe, & Quartey, 2017). There is no causal relationship between external debt and economic growth (Ogunmuyiwa, 2011). For highly indebted poor countries, external debt has a positive impact on economic growth up to a point, but in the long run, it causes some adverse effects (Siddique, Selvanathan, & Selvanathan, 2016).

2.3. Measures Taken

Sufficiency of foreign exchange reserve, liquidity risk management, reserve management, government debt management, disclosure requirements, regulations for companies, and developing a domestic bonds market as an alternative to foreign borrowings can be used to minimize the crisis of foreign debt in the short and long terms (Hawkins & Turner, 2000).

2.4. Methodology Used

A panel vector autoregression model (PVAM) and the traditional model of reserve demand were applied to investigate the relationship between the effect of capital control on foreign exchange reserve and external debts (Zehri, 2020). The ARDL model was applied to investigate the effects of different types of debts on economic growth in Bangladesh (Hossain & Shirin, 2016). Toda-Yamamoto and Dolado Lütkepohl (TYDL) tests were used to identify the connection between the increase in foreign debt and defense expenditure (Baris, 2018). The generalized method of moments (GMM) estimation technique was used to study the effects of external debt on economic growth (Senadza et al., 2017). A regression equation, the augmented Dickey Fuller (ADF) test, the Granger causality test, the Johansen co-integration test and the vector error correction method (VECM) were used to examine the association of external debts with economic growth in developing countries (Ogunmuyiwa, 2011). The ADF and Phillips-Perron (PP) tests were used to examine the causal relationship among external debt, foreign exchange reserve and economic growth in Bangladesh (Islam, Chowdhury, & Khanam, 2018).

Several studies have investigated the relationship of economic variables with external debts and domestic debts. Studies showed the economic impacts and consequences of foreign debt in the short-run and long-run for developing countries, developed countries, and poor countries. Many researchers used several methods and

approaches to draw their conclusions. In response to the recent financial crisis experienced by Sri Lanka, what measures should be taken by developing countries such as Bangladesh? In this study, the gap in addressing the measures that should be adopted based on the leanings from Sri Lanka's financial crisis will be filled.

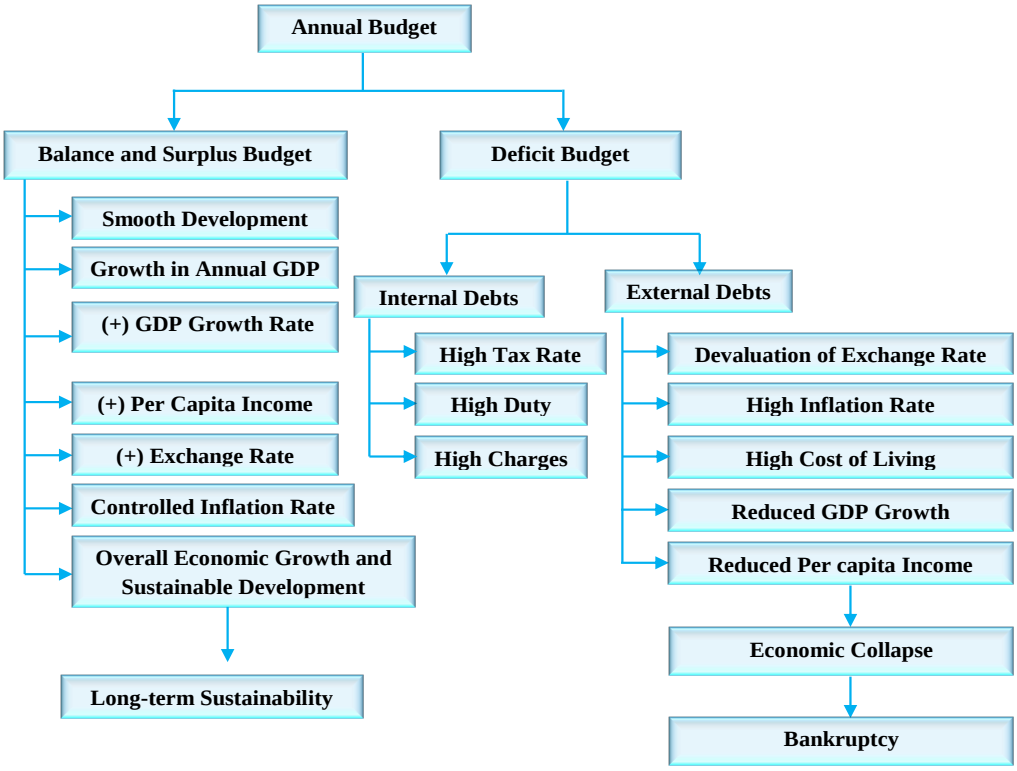

Figure 2. Association of external debt with sustainability and bankruptcy.

Figure 2 demonstrates how foreign external debts are associated with long-term sustainability and bankruptcy. From Figure 2; it is very much clear that a balanced budget and surplus budget leads to low or no foreign debts pose to the economy flourish of the economy by a positive influence on the country's macroeconomic variables. On other hand, a deficit budget leads to raising foreign debts and creates negative impacts on macroeconomic variables. Finally; external debts is gearing the economy to be collapsed or bankrupt. A recent example is Sri Lanka.

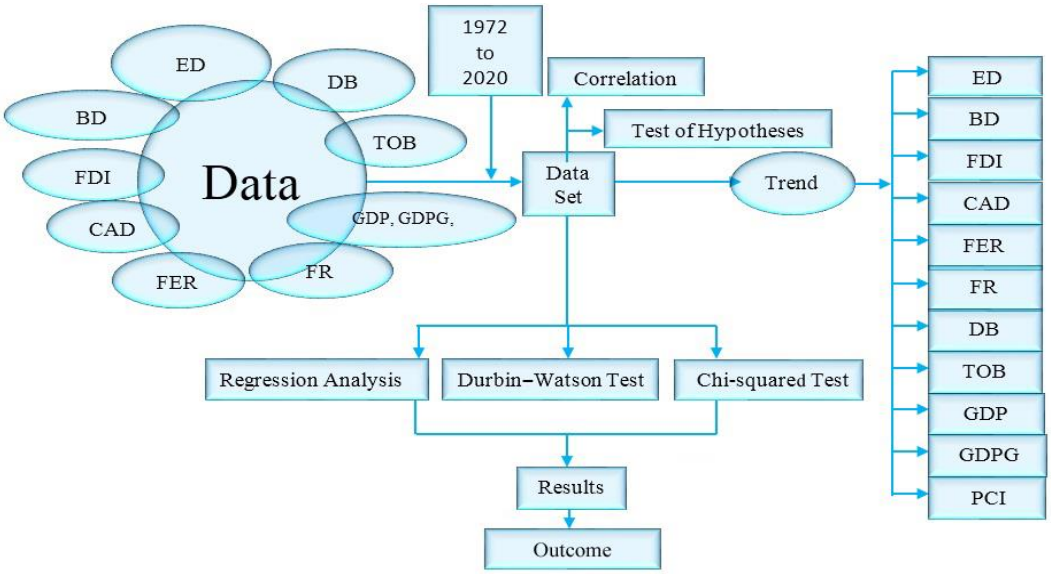

Figure 3. Methodological flowchart.

Figure 3 depicts the methodological flowchart of the study from data collection and dataset preparation to the outcome of the study.

3. METHODOLOGY

A brief methodological overview of this study is as follows:

3.1. Dataset

The dataset constitutes the data of external debts, budget deficit, foreign direct investment, current account deficit, foreign exchange reserve, foreign remittance, defense budget, and trade of balance, GDP, GDP growth, and the per capita income of Bangladesh from the fiscal years 1972–1973 to 2019–2020, which were collected from the World Bank. All values are taken in billions of US dollars.

3.2. Analysis Type

This study involves an inferential analysis, which is associated with deep mathematical results.

3.3. Hypotheses and Study Variables

3.3.1. Foreign Debt

Liberalization and globalization tendencies have created a path for developing countries to access external sources, leading to an increase in the country's foreign debt burden (Baris, 2018). National savings and domestic investment behavior can be affected by foreign debt. An increase in foreign debt leads to a reduction in both national savings and domestic investment, but the reduction is more severe in the case of investment (Fry, 1989). In emerging market economics, the management of foreign debts and liquidity arises as the foremost fragility in sense of poor management of foreign debts. Managing risk in the broader national balance sheet and reforms in asset and liabilities management practices are possible responses to the crisis (Hawkins & Turner, 2000). Variation in foreign indebtedness has influenced government borrowing and investment decisions. Autocratic governments collect more foreign debt than democratic governments (Oatley, 2010). Public sector external debts have bidirectional causality with economic growth, but domestic debts have unidirectional causality with economic growth (Hossain & Shirin, 2016). To meet the ever-increasing expenditures for development projects, the government needs to deploy huge amounts of funds and rely on internal and external debts, resulting in a severe debt burden (Mohajan, 2013).

3.3.2. Budget Deficiency

The fiscal gap has been considered an important and uncertain block for growth in highly indebted developing countries. Availability of savings and foreign exchange are considered idiosyncratic physiognomies for comparing fiscally constrained countries with fiscally balanced countries. Debts relief measures need to be derived for interim implications from external debt (Bacha, 1990). As the budget deficit has been increasing over time, the internal and external government debt burdens are also increasing rapidly (Mohajan, 2013). The budget deficit can be treated as the mother of public debts, and the budget deficit has a positive association with external public debts (Alam & Taib, 2013).

Hence, this study proposes the following hypothesis:

H1: The budget deficit has a positive association with external debts.

3.3.3. Foreign Direct Investment

The inflation rate, real exchange rate, index of economic activity, and the share of domestic capital market in the world stock market have been statistically significant determinants of foreign portfolio investment. The inflation rate has a negative coefficient, while the real exchange rate, index of economic activity, and the share of

domestic capital market possess a positive coefficient (Agarwal, 1997). Therefore, this study suggests the following hypothesis:

H_2: There is a negative association between foreign direct investment and external debts.

3.3.4. Current Account Deficit

With the accumulation of foreign debt, the current account deficit will worsen, but the exchange rate can play a role in increasing exports, reducing imports and creating a current account surplus (Fry, 1989). There is a significant positive association between external public debts and current account deficits (Alam & Taib, 2013). Furthermore, this study suggests a positive association between the current account deficit and external debts in the following hypothesis:

H_3: There is a positive association between the current account deficit and external debt.

3.3.5. Foreign Exchange Reserve

Foreign exchange reserve has a negative association with foreign borrowings (Zehri, 2020). There is only a unidirectional causality between foreign exchange reserve and foreign debt. Furthermore, the foreign exchange reserve has a strong role in the growth process of Bangladesh (Islam et al., 2018). An increase in foreign exchange reserve is likely to increase the outstanding external debt and reduce debt maturity as well as enhance investment and economic growth (Fukuda & Kon, 2010). External public debts have a significant positive association with exchange rate depreciation (Alam & Taib, 2013). Accordingly, the study suggests a negative association between foreign exchange reserve and external debt.

H_4: There is a negative association between foreign exchange reserve and external debt.

3.3.6. Foreign Remittance

Funds transferred by foreign workers is referred to as foreign remittance, which plays a vital role in the economic development of Bangladesh (Rahim & Alam, 2013). In the long and short runs, there is a causality relationship between external debt, foreign direct investment and remittances on domestic investment (Ali, 2013). Remittances and external debt have a significant positive association with economic growth (Jawaid & Saleem, 2017). Therefore, this study proposes the following hypothesis:

H_5: There is a negative association between the amount of foreign remittance and external debt.

3.3.7. Defense Budget

Military spending has been considered a significant causal factor in the stock of external debts, and military spending has a strong positive association with external debts (Pempetzoglou, 2021). Defense spending has a positive association with external debts and escalated the external debts of India and Pakistan (Sheikh, Chaudhry, & Faridi, 2013). Defense spending has a positive association with external debts in Turkey, Kazakhstan, Kyrgyzstan, and Azerbaijan (Karagöz, 2018). Accordingly, this study suggests the following hypothesis:

H_6: There is a positive association between the defense budget and external debt.

3.3.8. Trade of Balance

There is a statically important and negative influence of trade deficit and external debt on GDP (Safdar, Liaquat, & Bibi, 2021). Fiscal deficit, nominal exchange rate, and trade openness have a positive and statistically significant association with external debt (Awan, Anjum, & Rahim, 2015). Therefore, this study suggests the following hypothesis:

H_7: There is a negative association between the trade of balance and external debt.

3.3.9. Annual GDP, GDP Growth, and Per Capita Income

The growth in low-income countries has been affected by external debts (Clements et al., 2003). High debt lowers the efficiency of investment and ultimately reduces the growth of a country (Pattillo et al., 2002). In Tanzania, GDP growth has been significantly affected by external debt and debt services (Kasidi & Said, 2013). Ajayi & Oke (2012) stated that external burden leads to a depressed economy, and Senadza et al. (2017) found a negative association between external debt and economic growth. Furthermore, this study suggests the following hypotheses:

$H_{8(a)}$: External debt has a negative impact on annual GDP.

$H_{8(b)}$: External debt has a negative impact on the GDP growth rate.

$H_{8(c)}$: External debt has a negative impact on per capita income.

3.4. Model Specification

The following linear multiple regression model has been applied to determine the explanatory variables on external debt:

$$ED = \beta_0 + \beta_1 BD + e_0 \quad (1)$$

$$ED = \beta_0 + \beta_1 FDI + e_0 \quad (2)$$

$$ED = \beta_0 + \beta_1 CAD + e_0 \quad (3)$$

$$ED = \beta 0 + \beta 1 FER + e_0 \quad (4)$$

$$ED = \beta_0 + \beta_1 FR + e_0 \quad (5)$$

$$ED = \beta_0 + \beta_1 DB + e_0 \quad (6)$$

$$ED = \beta_0 + \beta_1 TOB + e_0 \quad (7)$$

$$EDi = \beta_0 + GDP_i\ \beta_1 + GDPG_i\ \beta_2 + PCI_i\ \beta_2 + \varepsilon \quad (8)$$

Where:

ED:	External Debt (dependent variable)	GDP:	Gross Domestic Product
BD:	Budget Deficit	GDPG:	GDP Growth
FDI:	Foreign Direct Investment	PCI:	Per Capita Income
CAD:	Current Account Deficit	β_0:	Constant/Intercept
FER:	Foreign Exchange Reserve	β_1:	Regression Coefficient
FR:	Foreign Remittance	e_0:	Error Term
DB:	Defense Budget	ε:	Error Term
TOB:	Trade of Balance		

3.5. The Applied Test in this Study

To confirm the validity of the results, the following tests were applied:

3.5.1. Chi-Squared Test

To analyze group differences when the dependent variable is measured at a nominal level, a non-parametric tool, the Chi-*squared* test, was designed (McHugh, 2013), and it has been used for more than a hundred years (Sharpe, 2015). To answer the questions regarding the associations and differences between categorical variables, one of the most utilized statistical analyses in research is Karl Pearson's chi-squared test, which examines cross-classified category data (Franke, Ho, & Christie, 2012). This study uses the chi-squared test in order to achieve valid results.

$$\chi^2 = \sum \frac{(O-E)^2}{E}$$

Where, O = observed value (actual value) and E = expected value.

3.5.2. Durbin–Watson Test

The Durbin–Watson statistic test has been widely used for first-order autocorrelation in non-linear models. (White, 1992). This test can be used to achieve better results for the normal distribution of a large data sample (Akter, 2014). Against first-order autocorrelation, the Durbin–Watson test is considered one of the most powerful yet simple tests (Bartels & Goodhew, 1981). In this study, one of the objectives is to determine the timing effects of the variables, and as this study deals with data of more than 50 years to find the autocorrelation among the variables, the Durbin–Watson test is the most appropriate.

$$d = \frac{\sum_{i=2}^{n}(e_i - e_{i-1})^2}{\sum_{i=1}^{n} e_i^2}$$

Where i is the number of observations.

3.5.3. Model Specification (For Trends Analysis)

Average growth of ED:

$$G_{ED} = (\sum \frac{Y_t^{ED} - Y_{t-1}^{ED}}{Y_{t-1}^{ED}})/n$$

Average growth of BD:

$$G_{BD} = (\sum \frac{Y_t^{BD} - Y_{t-1}^{BD}}{Y_{t-1}^{BD}})/n$$

Average growth of FDI:

$$G_{FDI} = (\sum \frac{Y_t^{FDI} - Y_{t-1}^{FDI}}{Y_{t-1}^{FDI}})/n$$

Average growth of CAD:

$$G_{CAD} = (\sum \frac{Y_t^{CAD} - Y_{t-1}^{CAD}}{Y_{t-1}^{CAD}})/n$$

Average growth of FER:

$$G_{FER} = (\sum \frac{Y_t^{FER} - Y_{t-1}^{FER}}{Y_{t-1}^{FER}})/n$$

Average growth of FR:

$$G_{FR} = (\sum \frac{Y_t^{FR} - Y_{t-1}^{FR}}{Y_{t-1}^{FR}})/n$$

Average growth of DB:

$$G_{DB} = (\sum \frac{Y_t^{DB} - Y_{t-1}^{DB}}{Y_{t-1}^{DB}})/n$$

Average growth of TOB:

$$G_{TOB} = (\sum \frac{Y_t^{TOB} - Y_{t-1}^{TOB}}{Y_{t-1}^{TOB}})/n$$

Average growth of GDP:

$$G_{GDP} = (\sum \frac{Y_t^{GDP} - Y_{t-1}^{GDP}}{Y_{t-1}^{GDP}})/n$$

Average growth of PCI:

$$G_{PCI} = (\sum \frac{Y_t^{PCI} - Y_{t-1}^{PCI}}{Y_{t-1}^{PCI}})/n$$

Average growth of GDPG:

$$G_{GDPG} = (\sum \frac{Y_t^{GDPG} - Y_{t-1}^{GDPG}}{Y_{t-1}^{GDPG}})/n$$

4. RESULTS AND DISCUSSION

Eight equations (models) have been set in the methodology section.

4.1. Model 1

Here, the adjusted R2 is .841, which indicates its capability of perfectly explaining all variables.

Table 1. Model 1 Summary.

Model	R	R-squared	Adjusted R-squared	Std. Error of the Estimate
1	0.919[a]	0.844	0.841	6.137

Note: a = Predictors: (Constant), BD.

Table 2. The impact of the explanatory variable (BD) on the dependent variable (ED).

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	8.700	1.044		8.335	0.000
	BD	-3.258	0.204	-0.919	-15.968	0.000

Note: Explanatory variable: budget deficit (BD); Dependent variable = external debt (ED).

Table 2 displays the impact of the explanatory variable (BD) on the dependent variable (ED).

Here, the p-value is less than of 0.05; therefore, hypothesis H_1 is accepted, confirming that the budget deficit has a positive association with external debt.

Table 3. Measurement of the chi-squared value of Model 1.

Particulars	Value	Df	Asymptotic Significance (2-sided)
Pearson's chi-squared	1968.000[a]	1927	0.253
Likelihood ratio	355.000	1927	1.000
No. of valid cases	48		

Note: a, explains how the expected count less than 5.

Table 3 indicates that the calculated value is less than the tabulated value at a 5% level of significance at one degree of freedom, meaning that hypothesis H1 is accepted, confirming that the budget deficit has a positive association with external debt.

Table 4. Model 2 Summary.

Model	R	R-squared	Adjusted R-squared	Std. Error of the Estimate
2	0.868[a]	0.754	0.749	7.719

Note: a. Predictors: (Constant), FDI.

4.2. Model 2

Here, the adjusted R^2 is 0.749, which indicates its capability of perfectly explaining the variable.

Table 5. The impact of the explanatory variable (FDI) on the dependent variable (ED).

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
2	(Constant)	8.980	1.323		6.788	0.000
	FDI	14.831	1.236	0.868	11.996	0.000

Note: Explanatory variable: foreign direct investment (FDI); Dependent variable: external debt (ED).

Table 5 shows the impact of the explanatory variable (FDI) on the dependent variable (ED).

Here, the p-value is less than 0.05, leading to the acceptance of hypothesis H_2 and confirming that there is a negative association between foreign direct investment and external debt.

Table 6. Measurement of the chi-squared value of Model 2.

Particulars	Value	df	Asymptotic Significance (2-sided)
Pearson's chi-squared	1225.000[a]	1200	0.301
Likelihood ratio	262.410	1200	1.000
No. of valid cases	49		

Note: a, explains how the expected count less than 5.

Table 6 indicates that the calculated value is less than the tabulated value at a 5% level of significance at one degree of freedom, which leads to the acceptance of hypothesis H_2, confirming that there is a negative association between foreign direct investment and external debt.

Table 7. Model 3 Summary.

Model	R	R-squared	Adjusted R-squared	Std. Error of the Estimate
3	0.159[a]	0.025	0.005	15.358

Note: a. Predictors: (Constant), current account deficit (CAD).

4.3. Model 3

Here, the adjusted R^2 is .005, which indicates its incapability of perfectly explaining the variable.

Table 8. The impact of the explanatory variable (CAD) on the dependent variable (ED).

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
3	(Constant)	17.548	2.201		7.971	0.000
	CAD	-1.427	1.289	-0.159	-1.106	0.274

Note: Explanatory variable: current account deficit (CAD); Dependent variable: external debt (ED).

Table 8 describes the impacts of the explanatory variable (CAD) on the dependent variable (ED).

Here, the p-value is less than 0.05, leading to the acceptance of hypothesis H_3, and confirming that there is a positive association between the current account deficit and external debt.

Table 9. Measurement of the chi-squared value of Model 3.

Particulars	Value	df	Asymptotic Significance (2-sided)
Pearson's chi-squared	2205.000[a]	2160	0.245
Likelihood ratio	370.308	2160	1.000
No. of valid cases	49		

Note: a, explains how the expected count less than 5.

Table 9 describes the measurement of the chi-squared value of Model 3. It indicates that the calculated value is less than the tabulated value at a 5% level of significance at one degree of freedom, which leads to the acceptance of hypothesis H_3, confirming that there is a positive association between the current account deficit and external debt.

Table 10. Model 4 Summary.

Model	R	R-squared	Adjusted R-squared	Std. Error of the Estimate
4	0.747[a]	0.558	0.549	10.341

Note: a. Predictors: (Constant), foreign exchange reserve (FER).

4.4. Model 4

Here, the adjusted R^2 is .549, which indicates its capability of explaining the variable.

Table 11. The impact of the explanatory variable (FER) on the dependent variable (ED).

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
4	(Constant)	10.713	1.737		6.168	0.000
	FER	1.165	0.151	0.747	7.705	0.000

Note: Explanatory variable: foreign exchange reserve (FER); Dependent variable: external debt (ED).

Table 11 outlines the impact of the explanatory variable (FER) on the dependent variable (ED).

Here, the p-value is less than 0.05, leading to the acceptance of hypothesis H_4, confirming that there is a negative association between the foreign exchange reserve and external debt.

Table 12. Measurement of the chi-squared value of Model 4.

Particulars	Value	df	Asymptotic Significance (2-sided)
Pearson's chi-squared	2303.000[a]	2256	0.240
Likelihood ratio	378.626	2256	1.000
No. of valid cases	49		

Note: a, explains how the expected count less than 5.

Table 12 indicates that the calculated value is less than the tabulated value at a 5% level of significance at one degree of freedom, which leads to the acceptance of hypothesis H_4, confirming that there is a negative association between the foreign exchange reserve and external debt.

Table 13. Model 5 Summary.

Model	R	R-squared	Adjusted R-squared	Std. Error of the Estimate
5	0.918[a]	0.842	0.839	6.175

Note: a. Predictors: (Constant), foreign remittance (FR).

4.5. Model 5

Here, the adjusted R^2 is .005, which indicates the incapability of perfectly explaining the variable.

Table 14. The impact of the explanatory variable (FR) on the dependent variable (ED).

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
5	(Constant)	7.246	1.103		6.568	0.000
	FR	2.421	0.153	0.918	15.852	0.000

Note: Explanatory variable: foreign remittance (FR); Dependent variable: external debt (ED).

Here, the p-value is less than 0.05, leading to the acceptance of hypothesis H_5, confirming that there is a negative association between the amount of foreign remittance and external debt.

Table 15. Measurement of the chi-squared value of Model 5.

Particulars	Value	df	Asymptotic Significance (2-sided)
Pearson's chi-squared	1470.000[a]	1440	0.285
Likelihood ratio	269.510	1440	1.000
No. of valid cases	49		

Note: a, explains how the expected count less than 5.

Table 15 indicates that the calculated value is less than the tabulated value at a 5% level of significance at one degree of freedom, which leads to the acceptance of hypothesis H_5, confirming that there is a negative association between the amount of foreign remittance and external debt.

Table 16. Model 6 Summary.

Model	R	R-squared	Adjusted R-squared	Std. Error of the Estimate
6	0.972[a]	0.945	0.944	3.629

Note: a. Predictors: (Constant), DB.

4.6. Model 6

Here, the adjusted R^2 is .944, which indicates the incapability of perfectly explaining the variable.

Table 17. The impact of the explanatory variable (DB) on the dependent variable (ED).

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
6	(Constant)	4.957	0.702		7.064	0.000
	DB	13.003	0.461	0.972	28.175	0.000

Note: Explanatory variable: defense budget (DB); Dependent variable: external debt (ED).

Here, the p-value is less than 0.05, leading to the acceptance of hypothesis H_6, confirming that there is a positive association between the amount of the defense budget and external debt.

Table 18. Measurement of the chi-squared value of Model 6.

Particulars	Value	df	Asymptotic Significance (2-sided)
Pearson's chi-squared	1968.000[a]	1927	0.253
Likelihood ratio	355.000	1927	1.000
No. of valid cases	48		

Note: a, explains how the expected count less than 5.

Table 18 indicates that the calculated value is less than the tabulated value at a 5% level of significance at one degree of freedom, which leads to the acceptance of hypothesis H_6, confirming that there is a positive association between the amount of the defense budget and external debt.

Table 19. Model 7 Summary.

Model	R	R-squared	Adjusted R-squared	Std. Error of the Estimate
7	0.938[a]	0.881	0.878	5.372

Note: a. Predictors: (Constant), TOB.

4.7. Model 7

Here, the adjusted R^2 is .878, which indicates the incapability of perfectly explaining the variable.

Table 20. The impact of the explanatory variable (TOB) on the dependent variable (ED).

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
7	(Constant)	5.059	1.026		4.930	0.000
	TOB	-2.636	0.141	-0.938	-18.631	0.000

Note: Explanatory variable: trade of balance (TOB); Dependent variable: external debt (ED).

Table 20 shows the impact of the explanatory variable (TOB) on the dependent variable (ED).
Here, the p-value is less than 0.05, leading to the acceptance of hypothesis H_7, confirming that there is a negative association between the trade of balance and external debt.

Table 21. Measurement of the chi-squared value of Model 7.

Particulars	Value	df	Asymptotic Significance (2-sided)
Pearson's chi-squared	2303.000[a]	2256	0.240
Likelihood ratio	378.626	2256	1.000
No. of valid cases	49		

Note: a, explains how the expected count less than 5.

Table 21 indicates that the calculated value is less than the tabulated value at a 5% level of significance at one degree of freedom, which leads to the acceptance of hypothesis H_7, confirming that there is a negative association between the trade of balance and external debt.

Table 22. Model 8 Summary.

Model	R	R-squared	Adjusted R-squared	Std. Error of the Estimate
8	0.977a	0.954	0.951	3.407

Note: a. Predictors: (Constant), GDPG, GDP, PCI.

4.8. Model 8

Here, the adjusted R^2 is .951, which indicates the incapability of perfectly explaining the variable.

Table 23. The impact of the explanatory variables (GDP, PCI, GDPG) on the dependent variable (ED).

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
8	(Constant)	5.126	3.330		1.539	0.131
	GDP	0.279	0.179	1.480	1.558	0.126
	PCI	-0.017	0.031	-0.517	-0.543	0.590
	GDPG	0.173	0.153	0.039	1.131	0.264

Note: Explanatory variables: gross domestic product (GDP), per capita income (PCI), gross domestic product growth (GDPG); Dependent variable: external debt (ED).

In Table 23, the unstandardized beta and standardized beta for PCI are negative, which means that per capita income has no impact on total ED, whereas the p-values for total GDP and GDPG are greater than 0.05, meaning that GDP and GDPG have no statistically significant impact on ED.

Table 24. Measurement of the chi-squared value of Model 8.

Particulars	Value	df	Asymptotic Significance (2-sided)
Pearson's chi-squared	2352.000[a]	2304	0.238
Likelihood ratio	381.398	2304	1.000
No. of valid cases	49		

Note: a, explains how the expected count less than 5.

Table 24 indicates that the calculated value is less than the tabulated value at a 5% level of significance at one degree of freedom, which leads to rejection of hypothesis H_8 ($H_{8(a)}$, $H_{8(b)}$, and $H_{8(c)}$), confirming that external debt has no statistically significant impact on annual GDP, GDPG or PCI.

Table 25. Durbin–Watson Test's value in Models 1-8.

Model	R	R-squared	Adjusted R-squared	Std. Error of the Estimate	Durbin–Watson
1	0.901[a]	0.811	0.807	6.757	0.135

Note: a. Predictors: (Constant), Fiscal Year (FY).
b. Dependent variable: external debt (ED).

Table 25 shows the Durbin–Watson test value.

4.9. Durbin–Watson Test Value in Models 1–8

Table 25 shows the R, R^2, adjusted R^2, and the value of the Durbin–Watson test values, which are 0.901, 0.811, 0.807, and 0.135 respectively. As the calculated value of the Durbin–Watson test is less than the tabulated value, there are timing impacts on the variables.

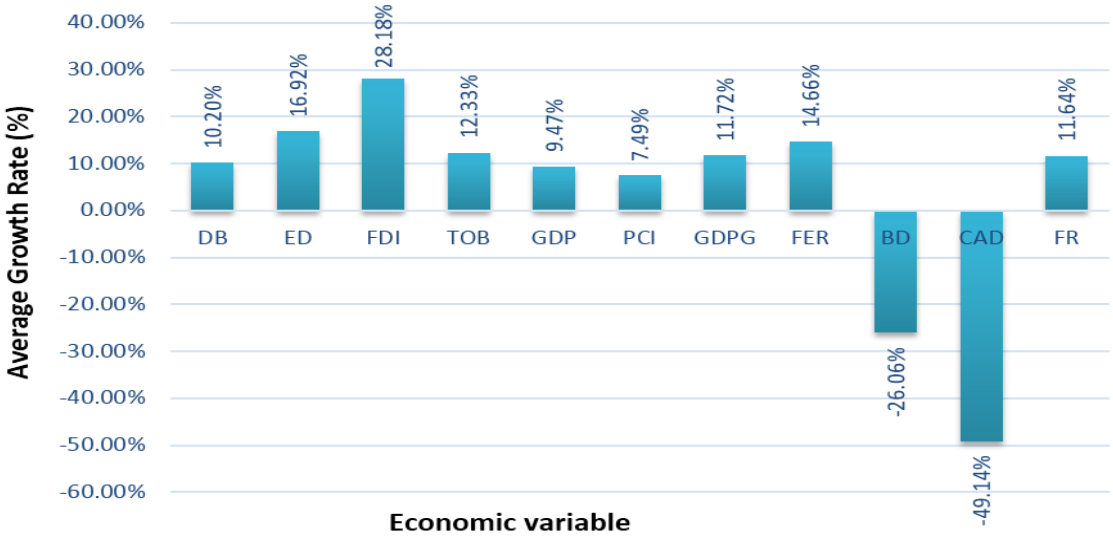

Figure 4. Trends of economic variables.

Figure 4 illustrates the trends of economic variables in average growth rate.

4.10. Trends of Economic Variables

The above figure shows the average growth percentages of the economic variables from 1972 to 2020. During this time frame, the average percentages of defense budget, external debt, foreign direct investment, trade of balance, gross domestic product, per capita income, GDP growth, foreign exchange reserve, budget deficit, current account deficit and foreign remittance were 10.20%, 16.92%, 28.18%, 12.33%, 9.47%, 7.49%, 11.72%, 14.66%, -26.06%, -49.14% and 11.64%, respectively. The highest average growth was attained by foreign direct investment, whereas the lowest was attained by the current account deficit.

5. CONCLUSION AND POLICY IMPLICATIONS

Financial crisis and bankruptcy have been closely associated with external debts and domestic debts. Developing countries, such as Bangladesh, are required to deploy a huge amount of money to development projects and, at the same time, Bangladesh is placing a deficit budget for most of the fiscal years. To meet the ever-increasing funds required to run the development projects and deficit budget, Bangladesh raised funds from domestic and foreign debts. For many countries, foreign debts may arise from trade sanctions, economic sanctions, civil war, wars, natural disasters, and a drastic reduction in internal revenue generation. In this study, we have examined the association of economic variables with the external debts of Bangladesh. It was found that, with the rise in the budget deficit, current account deficit, and defense budget, the external debts of Bangladesh have been

rising. Therefore, budget deficit, current account deficit, and defense budget have positive connotations with external debt. On the other hand, the increase in foreign direct investment, foreign exchange reserve, foreign remittance, and trade of balance is likely to reduce the external debt. Therefore, foreign direct investment, foreign exchange reserve, foreign remittance, and trade of balance have a negative association with external debt. Additionally, the annual GDP, GDP growth, and per capita income of Bangladesh were not negatively impacted by external debt during the period from 1972–2021.

Finally, this study found significant timing effects on the budget deficit, foreign direct investment, current account deficit, foreign exchange reserve, foreign remittance, defense budget, and trade of balance, on annual GDP, GDP growth, and per capita income with external debts of Bangladesh. In order to respond to this situation arising in Sri Lanka, as a developing country, Bangladesh is required to raise more internal revenue sources along with raising foreign direct investment, foreign exchange reserve, foreign remittance, and trade of balance. To mitigate the possible financial risks, Bangladesh is required to significantly reduce the budget deficit, current account deficit, and defense budget.

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