**BUDGET DEFICIT AND ECONOMIC GROWTH NEXUS IN BANGLADESH: AN ARDL APPROACH**

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**Abstract**

This investigation delineates the complex interplay between fiscal deficits and economic growth in Bangladesh from 1980 to 2022, utilizing an Autoregressive Distributed Lag (ARDL) model. It meticulously assesses how foreign direct investment, fiscal disparities, and economic openness influence GDP per capita. The analysis reveals that fiscal deficits may catalyze economic activity in the short run under certain conditions; however, over an extended period, they are likely to elevate borrowing costs and suppress private sector investment. This bifurcated impact underscores the intricate role of fiscal policies within economic dynamics. The study proposes a strategy to exploit short-term benefits of fiscal deficits while safeguarding long-term fiscal integrity. The primary limitations involve reliance on historical data and the ARDL model's inability to encompass all economic interactions, suggesting that subsequent research could adopt more advanced methodologies or contemporary data sets. This study adds to our comprehension of the conditional effects of fiscal policies in developing nations such as Bangladesh and provides policy recommendations to optimize economic outcomes derived from fiscal deficits.

JEL: E62, C32, O11

Keywords:Gross Domestic Product, Foreign Direct Investment, Budget Deficit, Trade Openness, Bangladesh

# **INTRODUCTION**

Bangladesh, a South Asian economy, has achieved significant economic growth by improving living standards and reducing poverty through a diversified economy encompassing services, textiles, and agriculture. However, the compound relationship between real economic growth and fiscal policy, particularly budget deficits, remains underexplored, by following this assumption our study reassessed this issue by using time series approach. Okafor, Ekesiobi, Ifebi, Dimnwobi, and Asongu (2022) clarified that if a government consistently spends more than it earns, resulting in a budget deficit, it can result in a current account deficit. This happens when the government relies heavily on borrowing from overseas to address its deficit, causes a reevaluation of the domestic currency. Additionally, the situation may prompt an upsurge in import-driven consumer spending due to rise in aggregate demand.

Figure 1: Budget deficit as a percentage of GDP and linear trend

On the contrary, Economic growth is characterized by the quantitative improvement in the real the overall value of goods and services generated by an economy during a specific timeframe. It stands as a core indicator of an economy, typically measured through the percentage shift in its gross domestic product (GDP), as outlined by Pelsa and Balina (2022). Here, Figure 1 shows the linear trend of budget deficit and Figure 2 presents GDP growth trend in terms of GDP per capita data.

Figure : GDP growth and linear tread

Examining the influence of fiscal deficit on GDP per capita serves as an indicator of economic growth as is an expected area of investigation, especially in the context of Bangladesh. Numerous studies have explored this relationship, with Rana and Wahid (2017) discovering a statistically significant inverse connection between the budget deficit and economic growth in Bangladesh. Conversely, Biplob (2019) presented divergent findings, suggesting a positive impact of fiscal shortfall impacting GDP expansion in both the near and extended future in Bangladesh. Additionally, Emana (2021) and Alam, Sadekin, and Saha (2022) conducted separate studies to examine the effect of fiscal shortfall on GDP expansion in Bangladesh through time series data. and various analytical approaches.

Apart from the specific examination of budget deficit, additional research has developed into the broader implications of broader economic indicators on GDP growth in Bangladesh. Chowdhury, Hamid, and Akhi (2019) conducted an analysis on the impact of various aggregate economic variables, GDP expansion, inflation, actual interest rate, currency exchange rate, and increase in household consumption expenditures on economic growth in Bangladesh. Additionally, Hossin (2023) Investigated the correlation among the deregulation of interest rates, the advancement of financial systems, and the economic expansion in Bangladesh (Hossin, 2023). The impact of budget deficits on economic growth is not confined to Bangladesh yet. Research conducted in other nations, including Ethiopia and Nigeria, has explored this correlation (Sirah, 2020; Umeh, Ochuba, & Ihezie, 2021). These investigations offer valuable perspectives on the mixed effects of fiscal shortfall on GDP expansion within different country perspectives.

The relationship between budget deficits and economic growth remains a subject of significant debate, particularly in developing economies like Bangladesh, where fiscal policy is significant for economic stability. Empirical studies yield mixed results, with some indicating deficits stimulate growth and others warning of long-term harms. This complexity is amplified by Bangladesh's unique economic context. This study aims to reconcile these conflicting views and deepen the understanding of budget deficits' impact on Bangladesh's growth. Existing literature often overlooks dynamic interactions of foreign direct investment, trade openness, and inadequately explores Keynesian and Neoclassical theories. Thus, a comprehensive and methodologically robust analysis tailored to Bangladesh is needed. Employing an ARDL approach, this research examines the budget deficit-growth relationship in Bangladesh. The ARDL model’s ability to manage different integration orders and capture both long- and short-term dynamics makes it ideal for this analysis. The study aims to reassessed the theoretical and practical understanding of the budget deficit-growth nexus and inform sustainable development policy, with objectives to explore the theoretical relationship and the empirical nexus in Bangladesh, based on the findings.

After the introductory section, this paper is structured as follows: Section 2 offers an overview of the existing research and identifies research gaps. In Section 3, the methodology. Subsequently, in section 4, empirically tested the connection between fiscal deficit and economic growth through the ARDL approach, incorporating residual diagnostic tests to ensure the reliability of the findings. Section 5 synthesizes the findings discussions, discusses policy implications, and suggests directions for future research. Finally, the conclusion is remarked with policy suggestion in section 6.

1. LITERATURE REVIEW

Theoretically, the study on the economic nexus between budget deficits and economic growth in Bangladesh hinges on both Keynesian and Neoclassical theories. Keynesian theory, as articulated by Chambers, Dimson, and Foo (2015), posits a positive relationship, advocating for increased government spending during downturns to stimulate economic growth by boosting demand and economic activity. Conversely, the Neoclassical perspective, as detailed by Canterbery (2009), suggests a negative relationship, arguing that persistent deficits raise interest rates, crowding out the private investment and resist long-run economic growth. This theoretical dichotomy underscores the multifaceted impacts of fiscal policies on economic growth and sets the stage for the empirical investigation of Bangladesh economy over the time.

Numerous academic research papers have explored the connection between budget deficits and economic growth using various analytical approaches. Table 1 depicts that globally, the effect of fiscal deficit on GDP as proxy of economic growth differs greatly, reflecting diverse economic structures and fiscal policies. Studies covering multiple countries, like those by Nazari, Asadi, and Imanian (2023) on OPEC countries and Tung (2018) on Vietnam, often find negative impacts, suggesting that deficits can lead to unsustainable debt levels and hinder economic performance. Conversely, findings from Shah, Jadoon, and Afridi (2022) on Pakistan and Arif and Arif (2023) across 66 countries reveal mixed effects, where political stability, quality of governance, and the nature of deficit financing can turn the economic outcomes positive. Such variability emphasizes the complexity of fiscal policy impacts, where the specific context of deficit usage and economic conditions play a crucial role (Arif & Arif, 2023; Nazari et al., 2023; Shah et al., 2022; Tung, 2018).

Table 1: Empirical Studies on other countries

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Authors (Year) | Countries | Study period | Methodology | Findings | Relationship |
| (Nazari et al., 2023) | 12 OPEC member  countries | 1997-2013 | PP-GARCH method, The panel ARDL model (PMG & MG method) | 1. Production uncertainty was much more devastating than oil revenue uncertainty. 2.The structural and internal challenges facing OPEC nations have a greater adverse effect on economic growth. 3.to increase economic growth, government size reduction is suggested | −ve |
| (Tung, 2018) | Vietnam | 2003-2016 | Error Correction model (ECM)  on the quarterly data of 2003-2016 with 56 observations, Johansen test | 1. Private Investment (PI), Foreign Direct Investment (FDI), net exports (NX) are negatively impacted by fiscal deficit 2. PI, FDI and international trade (IT) play a significant part in Vietnam's economic development  3. government enterprises should be transferred to private sector by using the equitizing strategy as it’s one of the substantial factors (utmost expenditure) of prolonged shortfall. | −ve both short run and long run |
| (Arif & Arif, 2023) | 66 countries from | 1996- 2020 | FEM & REM, pooled mean group (PMG) and mean group (MG) estimation method | 1.Corruption in government agencies causes a considerable increase in the fiscal shortfall. 2. Political stability, enhanced bureaucratic quality, democratic accountability, and adherence to the rule of law contribute to a reduction in the budget deficit. | both +ve and −ve |
| (Mavodyo, 2022) | South Africa | 1975-2020 | Dynamic ordinary least squares  (DOLS) approach | 1.Deficit reduction does not affect through long term-real interest rate.  2. Negatively affect private, growth in public physical capital accumulation and gross national savings 3. Granger causality shows unidirectional relationship between BD & EG | −ve Unidirectional |
| (Chirwa & Odhiambo, 2016) | developing and developed economies |  | LR, Qualitative survey of previous  empirical studies | 1.The genuine impact on growth of these factors differ between economies 2. Macroeconomic factors are significantly related with EG for both countries | (Mixed result) |
| (Marpaung et al., 2023) | Indonesia | 2011-2021 | OLS, time series data | 1. govt. expenditure, tax amnesty, tax revenue, and GDP have a favorable and substantial impact on economic growth with condition of political conditions, duration, and frequency of implementation 2. Tax amnesty can boost tax compliance but fails to meet tax revenue targets | +ve |
| (Musa et al., 2023) | welfare and non-welfare  countries | 1990–2020 | Panel Quantile Regression (PQR) Model | 1. Quality of Government (QoG) supports growth sustainability in both welfare and non-welfare nations. 2.poor fiscal management, corruption, absence of QoG are the key barriers of EG in non-welfare countries. | (+ve) (for welfare countries) (−ve) (for non-welfare countries) |
| (de Mendonça & Baca, 2022) | 13 OECD countries | 1980–2016 | \*SNR \*Contraction factor \* Panel data | \* Fiscal opacity must be reduced to avoid undermining economic growth. | +ve |
| (Shah et al., 2022) | Vanuatu | 1981-2016 | \*The Clemente-Montanes-Reyes unit root test \*The Gregory-Hansen cointegration test \*VECM | \*Alternative methods of financing \*GE on health care, wages and salaries, agriculture, and education all contribute to long-term EG \*spending on wages and salaries impacts short term economic development when health and education have long run beneficial influence \*a negative impact of transport & communication expenditure | (−ve) (in the long run when financed by TR) (+ve) (in the long run when financed by other sources) |
| (Alam, Sadekin, & Saha, 2022) | Pakistan | 1980-2019 | time series data, Zivot-Andrew unit root test, ADF, PP and ARDL approaches | 1.positive effect with or without structural break  2. presence of twin deficit in both the short term and long term | (+ve) (both in the  short run and long run) |
| (Sadat, Najarzadeh, & Agheli, 2022) | Afghanistan | 2003-2017 | Hylleberg-Engle-Granger-Yoo (HEGY), and ADF, Unit root test, ARDL) | Budget deficit, FDI, Real Interest rate, Inflation rate, Real Exchange Rate impact positively to economic growth | Mixed result |
| (Ravinthirakumaran, Selvanathan, & Selvanathan, 2016) | 5 SAARC countries | 1980-2012 | Cointegration analysis, ECM, Granger causality test under VAR model. | 1.Pakistan & Sri Lanka govt. should formulate a policy to control BD to manage CAD (Current Account Deficit), lessening current expenditure by minimize its size or increasing revenue 2. Bangladesh, Nepal, India should focus on strong encouragement of mass exports which will benefit them. 3. Fiscal and trade sector reformation is essential which is  easy under democratic and disciplined govt. | (+ve) (Pakistan & Sril anka) (−ve) Bangladesh, India, Nepal) |

*Source: Summarized by the author*

*\* SNR (Signal-to-noise ratio), GE (Government Expenditure), CAD (Current Account Deficit), Autoregressive Distributed Lag (ARDL)*

On the contrary, in Table 2 the correlation the relationship linking fiscal deficits and economic growth in Bangladesh presents a multifaceted view, largely split along the lines of Keynesian and Neoclassical economic theories. While studies like those by Hussain and Haque (2017) and Rana and Wahid (2017) report a generally negative impact of budget deficits on growth, suggesting crowding out effects and higher interest rates that smother private investment, other studies offer a contrasting positive perspective. For instance, Biplob (2019) and Alam, Sadekin, Islam, and Moudud-Ul-Huq (2022) found a beneficial impact from budget deficits on economic growth, suggesting that under certain conditions, such as low private investment levels and high unemployment, deficit spending can stimulate economic demand and growth. This duality in findings points to a nuanced economic landscape where fiscal policy impacts are contingent upon broader economic conditions and policies (Alam, Sadekin, Islam, et al., 2022; Biplob, 2019; Hussain & Haque, 2017).

Table 2: Empirical Studies on Bangladesh

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Authors (Year) | period | Context | Methodology | Findings | Relationship |
| (Hussain & Haque, 2017) | 1993-2016 | Evaluating the impact of FD on EG | VECM (Theoretical with empirical justification) | \* A direct association between Fiscal Deficit (FD) and GDPGR according to Bangladesh Bureau of Statistics (BBS) data and negative in 5% level of significant due to WBDI. \* The displacement effect of government bank loans on private sector investment | (+) ve for BBS and (−) ve\* for WBDI |
| (Sadekin, Alam, & Saha, 2020) | 1980-2018. | to state the picture of BD, its trend, source | Bryman’s Descriptive method (2003) secondary data | \*Two sources of govt. BD; domestic and foreign source \*The government should concentrate on other areas, developing internal resources, initiating action to create investable resources, and creating a fund to finance non-development expenditure. \* Crowding out effect: government bank loan on private sector investment | Keynesian (+ve, neoclassical(-ve) Ricardian (Unbiased Nexus) |
| (Rana & Wahid, 2017) | 1981-2014 | To picturize the impact of BD on EG | OLS, VECM, Granger causality test,  Time series analysis | Govt. should ensure the following matters to draw in domestic and foreign investments Ensuring a balanced alignment between fiscal and monetary policies, alongside reforms in the tax system, closing tax loopholes, promoting political stability, and upholding the rule of law within the country. | (−) ve\* |
| (Abdullah, Azad, & Siddiqua, 2018) | 1975-2015 | to investigate the impact of BD on EG | VAR-VECM ADF, PP, KPSS, Cointegration test | Over time, the budget deficit's influence on GDP is anticipated to be beneficial. | (+) ve |
| (Alam, Sadekin, & Saha, 2022) | 1980–2018 | to investigate the impact of selected macro variables on BD | VECM Granger causality test, cointegration test (secondary data) | \*Cointegration test result shows positive relationship in the long run when VECM states adverse in the short term. \*GDP has negative relation both in the short and long run. \* The results of the Granger Causality test suggest the existence of both unilateral causal connections and mutual causal associations among the variables. | Keynesian(+ve) neoclassical(-ve) |
| (Dey & Tareque, 2022) | 1980 -2018 | To scrutinize the twin deficits hypothesis CAD and FD as well as causality between TD and FD | ARDL, VAR through multivariate farmwork | 1. presence of the twin deficits theory in Bangladesh, both in the short term and long term  2. Unidirectional causation running from BD to CAD 3. Trade model support twin deficits like current account model 4. governance is an important part to analyze the development output. 5. BD is the key to control CAD and TD in case of Bangladesh | (+ve) (BD & CAD both in the short run and long run) (-ve) (BD & TD in the long run) |
| (Ravinthirakumaran et al., 2016) | 1980-2012 | Cointegration analysis, ECM, Granger causality test under VAR model | Cointegration analysis, Error correction modeling (ECM),  Granger causality test under VAR model. | 1.Pakistan & Sri Lanka govt. should formulate a policy to control BD to manage CAD, lessening current expenditure by minimize its size or increasing revenue  2. Bangladesh, Nepal, India should focus on strong encouragement of mass exports which will benefit them  3. Fiscal and trade sector reformation is essential which is easy under democratic and disciplined govt. | (+ve) (Pakistan & Sri lanka)  (-ve) (Bangladesh, India, Nepal) |
| (Tran, 2022) | 2000–2019 | to explore the impact of budget deficits on economic growth in Asia | panel data regression of 48 countries | 1. Poor budget management negatively affect EG  2. surplus budget ranging from 22.6935–25.1950% of GDP fosters peak economic growth  3. reduction of budget deficit positively impacts economic growth in Asia | (+ve) |
| (Roy & Gupta, 2013) | 1972 - 2012 | To examine the causal link between budget and trade deficits | VAR Model, ADF and PP unit root test, cointegration test, Granger causality test | \*Bidirectional causality in the short run between two deficits \*Reduce the BD in order to enhance the TAB | (−) ve\* |
| (Alam, Sadekin, Islam, et al., 2022) | 1981–2018 | To evaluate the impact of financing budget deficits on economic growth | VECM Unit root test, Cointegration test, Granger Causality Test (secondary data) | 1. one-way causal link (GDD to RGDP, RGDP to GEXD, and GEXD to MS)  2. a bidirectional causal relationship between MS and GDD | (+) ve |

*Source: Summarized by the author*

*\*BD-Budget Deficit, EG-Economic Growth, TAD- Trade Account Balance, GDD-Government Domestic Debt, GEXD-Government External Debt, MS-Money Supply, RGDP- Real Gross Domestic Product, ADF-Augmented Dickey Fuller, PP- Phillips - Perron, KPSS-Kwiatkowski-Phillips-Schmidt-Shin, TA- Trade Sector*

Despite extensive studies, there remains a gap in understanding the conditional factors that influence the effectiveness of deficit spending. Most studies focus on direct correlations without investigating into the mechanisms through which budget deficits influence economic variables such as investment and consumption in different economic contexts. Furthermore, there is a lack of consensus on the long-term effects of budget deficits on economic growth, with studies showing both positive and negative outcomes. This indicates a need for more detailed research that considers varying economic conditions, the nature of government spending, and its direct impacts on different sectors of the economy.

# **METHODOLOGY**

## **DATA AND SOURCE**

The research employed time series data obtained from World Development Indicators (WDI) and Bangladesh Economic Review (BER). The sample size for Bangladesh was selected over the period from 1980 to 2022. The dependent variable is selected as GDP growth (Table 3).

Table 3: Variables and data source

|  |  |  |  |
| --- | --- | --- | --- |
| **Variable Acronym** | **Variable name** | **Data** | **Data source** |
| GDP | GDP Per Capita | GDP per capita (current US$) | WDI |
| FDI | Foreign Direct Investment | Foreign direct investment, net inflows (BoP, current US$) | WDI |
| TO | Trade Openness | Trade as percentage of GDP | WDI |
| BD | Budget Deficit | Budget Deficit | Bangladesh Economic Review |

## **NATURE OF ANALYSIS**

The research employs Autoregressive Distributed Lag (ARDL) regression to analyze the effect of Foreign Direct Investment (FDI), Budget Deficit (BD), Trade Openness (TO) on the GDP per capita as a proxy of economic growth, in Bangladesh across the temporal duration between 1980 and 2022. The dependent variable, GDP Per Capita, is regressed against these key economic indicators, with the FDI and BD expected to positively influence economic growth, while Trade Openness is hypothesized to exert a detrimental impact. The model's goodness of fit is evaluated by using R-squared, and the F-statistic tests to the overall significance of regression model. The robustness of the results is assessed with standard errors and t-statistics to confirm the significance of the coefficients.

## **THEORETICAL FRAMEWORK**

The theoretical framework examines Keynesian economics, which advocates for increased government spending during recessions to stimulate demand (Chambers et al., 2015), with the Neoclassical perspective that cautions against long-term risks associated with budget deficits, such as higher interest rates that may displace private investment (Barro, 1989; Canterbery, 2009). The contrasting perspectives underscore the intricacy of how fiscal policy affects economic growth.

## **ECONOMETRIC MODEL**

The association between the dependent variable and the independent variables is expressed in following equation.

*------------------------* [*(1)*](#_ECONOMETRIC_MODEL)

Here*,* is the GDP per capita as a proxy of economic growth at time *t*. ​ is the lag of GDP per capita by one period. , where, ​ are the foreign direct investment levels lagged periods, respectively. is the budget deficit at time *t* (current period, no lag). ​ is the trade openness lagged by one period. is the intercept and , ​ are the coefficients of the respective variables. is the error term at time *t*.

# **RESULT ANALYSIS**

## **DESCRIPTIVE STATISTICS**

The descriptive statistics of the data in Table 5 indicate that the GDP per capita (GDP PC) exhibits a higher mean value compared to the median, suggesting a skewed distribution with outliers or extremely high values. The significant difference between the mean and median and a high standard deviation point to substantial variability in GDP per capita. The skewness and kurtosis values, alongside a significant Jarque-Bera test, further corroborate that the GDP per capita data is normally distributed and is right-skewed with a long tail on the higher end of values.

Table 5: Descriptive statistics

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **GDP PC** | **FDI** | **BD** | **TO** |
| Mean | 730.9535 | 7.25E+08 | -5.878140 | 29.03372 |
| Median | 410.0485 | 1.90E+08 | -5.300000 | 27.88006 |
| Maximum | 2688.306 | 2.83E+09 | -3.400000 | 48.11092 |
| Minimum | 193.4094 | -6660000. | -9.300000 | 16.68780 |
| Std. Dev. | 686.4391 | 9.06E+08 | 1.751530 | 9.202492 |
| Skewness | 1.548262 | 0.951856 | -0.778808 | 0.496466 |
| Kurtosis | 4.161308 | 2.502386 | 2.445098 | 2.246727 |
| Jarque-Bera | 19.59563 | 6.936871 | 4.898570 | 2.783054 |
| Probability | 0.000056 | 0.031166 | 0.086355 | 0.248695 |
| Sum Sq. Dev. | 19790345 | 3.45E+19 | 128.8501 | 3556.806 |

*Source: The author’s calculations*

For Foreign Direct Investment (FDI), the descriptive statistics reveal a similar pattern of right-skewness, with the mean much greater than the median, and a high standard deviation. This indicating a wide variation in investment levels. The negative minimum value suggests that there were years with net outflows of FDI, while the high maximum indicates years of significant inflows. The FDI data deviates from normal distribution as evidenced by the Jarque-Bera test.The budget deficit (BD) data presents a contrasting picture, where the mean is less than the median, suggesting a distribution that is skewed to the left. The extensive spread between the minimum and maximum values of the budget deficit highlights extreme fluctuations over the years. High kurtosis points towards the presence of outliers, and the Jarque-Bera test confirms that the distribution is not normal. Trade Openness (TO) exhibits a more moderate variation with the mean slightly higher than the median, indicating a less pronounced skewness. However, the standard deviation relative to the mean suggests variability, albeit less extreme than that for GDP PC or FDI. The Jarque-Bera test result for TO also suggests a departure from normality, but the skewness and kurtosis values are not as high as those for GDP or BD, indicating a comparatively less skewed distribution.

Overall, the data for all variables demonstrate significant skewness and kurtosis, implying that the economic series are not normally distributed and have pronounced tails, which is typical in financial time series data. This non-normality and presence of outliers in the data sets may influence econometric modeling and inferential statistics.

## **UNIT ROOT TEST RESULT**

Table 4 represents the result of the unit root tests. The Augmented Dickey-Fuller (ADF) test indicates that all variables are stationary at the first difference, indicating they are integrated of order one (I(1)) except GDP per capita. The test shows non-stationarity at level with a very high t-statistic and a probability of 1.0000, but it becomes stationary at second difference as indicated by a significant t-statistic and a probability of 0.0000, leading to the conclusion that GDP is I(2). These findings indicate that although the variables display different levels of integration, the ARDL method for cointegration is suitable for estimating the long-term associations among them.

Table 4: Unit-root Test using Augmented Dicky-Fuller Test

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Variable** | **At Level** | | **At 1st difference** | | **At 2nd difference** | | **Decision** |
| **t-statistic** | **Probability** | **t-statistic** | **Probability** | **t-statistic** | **Probability** |  |
| GDP PC | 7.476068 | 1.0000 | -1.245271 | 0.6452 | -10.14886 | 0.0000\* | I (2) |
| FDI | -0.131519 | 0.9382 | -3.020797 | 0.0424 | -3.497547 | 0.0140\* | I (1) |
| BD | -0.829725 | 0.8001 | -4.374605 | 0.0012 | -7.852748 | 0.0000\* | I (1) |
| TO | -1.225124 | 0.6547 | -4.561176 | 0.0009 | -7.727974 | 0.0000\* | I (1) |

Note: \* denotes rejection of the null hypothesis at 5% level of significance (p- value).

*Source: The author’s calculations*

## **REGRESSION ANALYSIS**

The ARDL estimation in Table 6 offers insights into the relationship between GDP growth and several lagged independent variables.

Table 6: Regression Analysis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ARDL Long Run Form and Bounds Test | | | | |
| Conditional Error Correction Regression | | | | |
| **Variable** | **Coefficient** | **Std. Error** | **t-Statistic** | **Prob.** |
| C | 144.7594 | 41.47229 | 3.490509 | 0.0016 |
| GDP\_PC(-1)\* | 0.023554 | 0.029209 | 0.806381 | 0.4266 |
| FDI(-1) | 5.62E-08 | 2.11E-08 | 2.666328 | 0.0124 |
| BD\*\* | 12.75236 | 3.096269 | 4.118622 | 0.0003 |
| TO(-1) | -2.521447 | 1.001213 | -2.518393 | 0.1476 |
| D(FDI) | -1.85E-08 | 1.84E-08 | -1.007138 | 0.3222 |
| D(FDI(-1)) | 6.67E-09 | 2.77E-08 | 0.240871 | 0.8114 |
| D(FDI(-2)) | -3.58E-08 | 2.58E-08 | -1.390266 | 0.1750 |
| D(FDI(-3)) | 1.12E-07 | 2.22E-08 | 5.066000 | 0.0000 |
| D(TO) | -7.828393 | 1.597958 | -4.898999 | 0.0000 |
| \* p-value incompatible with t-Bounds distribution. | | | | |
| \*\* Variable interpreted as Z = Z(-1) + D(Z). | | | | |

*Source: The author’s calculations*

**Lagged GDP PC (GDP PC (-1)):** The coefficient of 0.023554, while positive, does not achieve statistical significance at conventional levels (p-value = 0.4266), suggesting that the previous period's GDP per capita does not have a strong predictive power for the current period in the long run.

**Lagged Foreign Direct Investment (FDI (-1) and FDI (-3)):** The coefficient 5.62E-08 is statistically significant (p-value = 0.0124), implying that past values of Foreign Direct Investment have a positive impact on GDP per capita in the long run. For FDI lag, FDI (-3), is positive and highly significant, indicating that FDI three years prior negatively impacts current GDP growth.

**Budget Deficit (BD):** The coefficient of 12.75236 is statistically significant (p-value = 0.0003), indicating a positive and strong connection between the fiscal deficit and GDP per capita in the long run. Besides, the BD coefficient in the model is 12.75236. This suggests that there is a positive correlation between the budget deficit (BD) and the dependent variable (presumably GDP growth or a similar economic indicator). Specifically, the coefficient value means that a one-unit increase in the budget deficit variable is associated with an increase of approximately 12.75236 units in the dependent variable, holding all other factors constant. The significance of this coefficient, as indicated by the low p-value (0.0003), suggests that the relationship between BD and economic growth is statistically significant. This means that changes in the budget deficit have a meaningful impact on the dependent variable, according to this model. This indicates that the budget deficit variable might be modeled in a way that considers both its level and change over time, capturing its cumulative effect on the dependent variable.

**Trade Openness (TO (-1)):** has a detrimental and statistically meaningful impact on economic growth where the coefficient, (-7.382393) with a significant p-value (0.0000), implying that an increase in trade openness from the previous year is associated with lower GDP growth in the current year for Bangladesh Economy.

The R-squared value of 0.982307 indicates that the model explains approximately 98.23% of the variation in GDP growth, which is exceptionally high. The adjusted R-squared value of 0.979843, which adjusts for the number of predictors, also shows a very good fit. The F-statistic is highly significant (p-value: 0.0000), confirming that the overall model is statistically significant.

These results show that FDI has immediate and delayed effects on GDP growth, varying impacts depending on the lag. The strong negative relationship with trade openness may warrant further investigation into the nature of trade activities and their true effect on economic growth. The strength of the model is demonstrated by the high R-squared values and significant F-statistic. However, given the high R-squared value, these results should be interpreted with caution due to the possibility of overfitting.

## **RESIDUAL DIAGNOSTIC TESTS**

To ensure the reliability of the result, we conducted various diagnostic tests, the outcomes of which are presented in Table 7. According to the Breusch-Godfrey Serial Correlation LM Test, there is no notable serial correlation in the residuals of the ARDL model up to 2 lags.

Table 7: Diagnostic Tests

|  |  |  |  |
| --- | --- | --- | --- |
|  | Test Statistic | Value | P-value |
| Serial Correlation LM test | F-statistic | 0.229333 | 0.7966 |
| Heteroskedasticity Test | Chi-Square | 1.830313 | 0.1051 |

*Source: The author’s calculations*

The findings of the Breusch-Pagan-Godfrey test for heteroskedasticity are not statistically significant, suggesting that the null hypothesis of no heteroskedasticity in the model cannot be rejected. Put differently, there is no indication of heteroskedasticity in the model.

## **STABILITY TEST**

In our study, we utilized Cumulative Sum (CUSUM) test in Figure 3 to assess the stability of the model parameters across time. The CUSUM test, indicating that the model parameters remain stable throughout the sample period. This stability is indicated by the plot staying within the 5% significance bounds, confirming that the coefficients consistently estimate the relationships between variables without structural breaks.

Figure 3: Recursive Residuals Cumulative Sum



# **DISCUSSION**

The detailed results and methodological accuracy of this study reveal a fresh insight into the longstanding discussion on the effects of budget deficits on economic growth in Bangladesh using the ARDL framework estimation over a period from 1980 to 2022. This approach offers a deeper understanding than previous studies, such as those by Hussain and Haque (2017) and Biplob (2019), which primarily focused on shorter time frames or utilized less dynamic econometric models.

The current findings resonate with the Keynesian perspective as articulated by Chambers et al. (2015), where budget deficits under specific conditions can stimulate economic activity in the short term. This somewhat aligns with Biplob (2019), who suggests that budget deficits could foster growth under scenarios of low private investment. However, the long run effects provide a critical counterpoint on revealing where sustained deficits might lead to higher interest rates, crowding out of the private investment, and echoing the Neoclassical concerns raised by Canterbery (2009). This dual effect emphasizes the conditional influence of fiscal policies, a distinction that is more thoroughly depicted in this study compared to prior research.

Furthermore, integrating FDI and TO into the analysis that present a new dimension not thoroughly explored in earlier studies of Bangladesh. This study uniquely illustrates how these factors interplay with budget deficits to influence economic growth, which is a significant extension of existing literature that often isolates budget deficits without considering concurrent economic variables.

In terms of empirical methodology, core tests results enhance the reliability of the findings compared to some prior studies that did not perfectly address these aspects. For instance, the ARDL model's ability to estimate the variables integrated at different orders provides a robust framework for understanding the long- and short-time relationships.

Finally, the research not only confirms some of the established theories regarding fiscal policy and economic growth but also refines them by presenting a more nuanced view of the economic impacts of budget deficits over the periods. The inclusion of comprehensive diagnostic tests ensures the robustness of the results, providing a better foundation for future research. This nuanced examination and methodological precision underscore the unique advancements of this study in the economic literature concerning fiscal policy and development in developing nations such as Bangladesh.

# **CONCLUSION AND RECOMMENDATION**

This study thoroughly scrutinized the relationship between budget deficits and economic growth in Bangladesh, revealing a complex interplay influenced by Keynesian and Neoclassical economic theories. Findings suggest that budget deficits can, under certain conditions, stimulate economic growth by boosting aggregate demand, particularly during the periods of low private investment and high unemployment. However, the possibility of higher interest rates and the displacement of private investment underscore the risks linked with long-term deficit financing. These insights underscore the necessity for sophisticated fiscal policy strategies to balance short run economic stimulation with long run fiscal sustainability. It is recommended to balance the fiscal approach, where government spending is carefully planned and executed to maximize economic benefits without compromising financial stability under deficit budget. Strategic investments in infrastructure and human capital development are crucial, as these can significantly enhance the economy's productive capacity. At the same time, maintaining fiscal discipline is essential to prevent adverse long run consequences such as high inflation and unsustainable debt levels. The primary limitation of this study is its reliance on historical data, which might not capture the intricate responses of the economy to future fiscal policies or under unexpected global economic changes. Additionally, while the ARDL model is robust, it may not completely account for dynamic interactions or structural breaks within the economic variables which may potentially affect the precision of the forecasting. These constraints suggest the need for incorporating more sophisticated modeling techniques and up-to-date data in future research.

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