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# AN EMPIRICAL INVESTIGATION OF THE IMPACT OF FDI, EXPORT AND GROSS DOMESTIC SAVINGS ON THE ECONOMIC GROWTH IN BANGLADESH

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## *ABSTRACT*

Bangladesh is a developing country with a huge population. So it is necessary to ensure better economic performance of Bangladesh. The purpose of the paper is to empirically investigate the impact of FDI, export, and gross domestic savings on the economic growth of Bangladesh and also tries to show the impact of inflation, industry value-added, and population growth on economic growth. We conduct the research with data covering the year from 1972 to 2017. Autoregressive Distributed Lag Bound Testing (ARDL BT) and Error Correction Model (ECM) are applied. The result of the ARDL model shows that the coefficient of FDI is 0.05 indicating that if FDI rises 1% then growth of the GDP will rise 0.05%. The coefficient of one year lag FDI is negative but insignificant. Again 1% rise in exports leads 0.03% rise in growth. Gross domestic savings positively affect GDP growth but statistically not significant. Inflation negatively affects the economic growth of Bangladesh. If inflation decreases by 1% then GDP growth will increase by 0.04%. Industry value added has positive effects on growth, a 1% increase in Industry value-added leads to a significant increasing in growth by 8.68%. Population growth negatively impacts economic growth. If the growth of the population decreases by 1% then 1.88% will increase the growth. Long run relation of the variables is ensured by the bound test and ECM-1 is significantly negative and indicating that adjustment is corrected by 145%. Hypotheses testing ensure except export other variables are short-run determinants of growth.

**Contribution/Originality:** This study contributes to the existing literature by showing the empirical contribution of Export, FDI, Gross Domestic Savings, inflation, industry value-added, and population growth on the Economic Growth in Bangladesh using ARDL ECM approach and also be beneficial for policymakers to take necessary steps.

## 1. INTRODUCTION

Bangladesh is a country with a huge population in the world that fails to achieve its goals of development due to political instability, corruption, lack of good governance. Bangladesh is a small country with an emerging economy. After the liberation, the situation of this country was a beggar description. Besides, this country has to fight natural calamities. As economic growth is made up of various factors, it's not possible to cover all of the factors. Table 1 exposes the GDP growth in Bangladesh from 2010 to 2017. In 2010 it was 5.57% and continuously increases. In 2015 it was 6.55% and in 2016 and 2017 it was respectively 7.11% and 7.28%.

**Table-1.** GDP growth in Bangladesh from 2010 to 2017.

| Year | GDP growth (annual %) |
|---|---|
| 2010 | 5.571802274 |
| 2011 | 6.46438388 |
| 2012 | 6.521435078 |
| 2013 | 6.013610365 |
| 2014 | 6.061059359 |
| 2015 | 6.552652796 |
| 2016 | 7.113489474 |
| 2017 | 7.284184092 |

**Source:** World Bank (2019).

From Figure 1 we see that from 2010 to 2012 there was an increasing trend in exports but after then exports decreases. In 2015 it was 17.34% and in 2017 it was 15.04% shown by the blue line. Whereas Gross Domestic Savings continuously increases are shown by the red line.

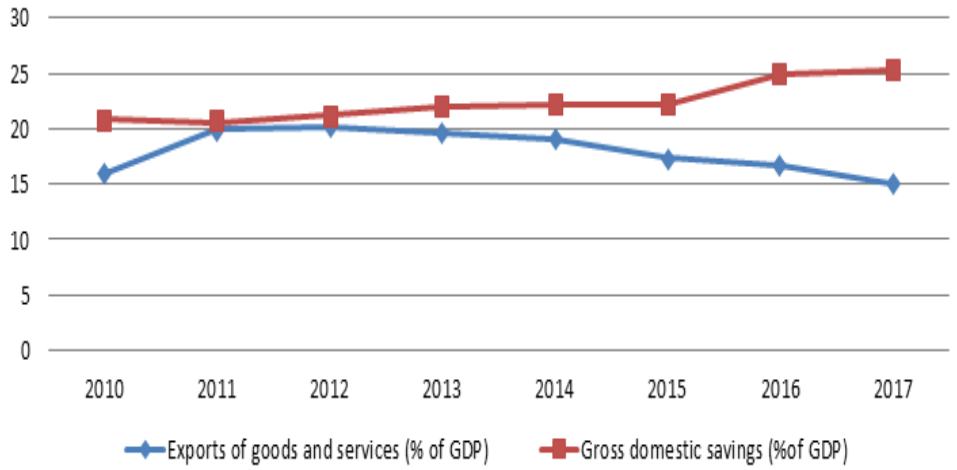


**Figure-1.** The trend for exports and gross domestic savings in Bangladesh from 2010 to 2017.
**Source:** World Bank (2019).

Table 2 shows the data for the inflation rate and population growth in Bangladesh. In 2010 the inflation rate was 7.144%. It has an increasing trend till 2012 after then decreases and in 2017 it was 6.27%. Population growth in Bangladesh is approximately stable from 2010 to 2014 then decreases in 2017and it was 1.05%.

**Table-2.** Inflation and Population growth in Bangladesh from 2010 to 2017.

| Year | Inflation, GDP deflator (annual %) | Population growth (annual %) |
|---|---|---|
| 2010 | 7.14464873 | 1.119887888 |
| 2011 | 7.859446035 | 1.151949049 |
| 2012 | 8.164597746 | 1.17243498 |
| 2013 | 7.174948668 | 1.177318892 |
| 2014 | 5.668788528 | 1.157188028 |
| 2015 | 5.872764205 | 1.120144259 |
| 2016 | 6.72784119 | 1.080165239 |
| 2017 | 6.278683267 | 1.048898039 |

**Source:** World Bank (2019).

Table 3 shows the FDI (Foreign direct investment) inflows in Bangladesh from the fiscal year 2010 to 2018. In 2010 it was 913.09 million USD and gradually increases. But in 2014 it was decreasing compared to 2013. In 2015, 2016, 2017 and 2018 FDI inflows were $1833.87, $2003.53, $2454.81 and $2580.44 million.

**Table-3.** FDI Inflows from the fiscal year 2005 to 2018.

| Fiscal year | FDI Inflows(in million USD) |
|---|---|
| 2010 | 913.09 |
| 2011 | 779.04 |
| 2012 | 1194.88 |
| 2013 | 1730.63 |
| 2014 | 1438.49 |
| 2015 | 1833.87 |
| 2016 | 2003.53 |
| 2017 | 2454.81 |
| 2018 | 2580.44 |

**Source:** Bangladesh bank.

For any country, the policymakers should know very well for the possible factors of economic growth as they are associated with the development of the country because if they know the possible factors they can respond and can take initiative to boost countries well being. A developing country like Bangladesh it's also crucial to know the potential determinants that have an impact on growth.

Many of the researcher's works with determinants of economic growth in Bangladesh like Ahamed and Tanin (2010) explored that FDI is an important determinant of economic growth for Bangladesh. Sultan (2008) shows export, import, and industry value added are important factors for growth. In this study we try to show the impact of FDI, export, gross domestic savings, inflation, industry value added and population growth on economic growth and also have a purpose for finding long and short-run determinants of economic growth among the variables.

Based on the data's nature we used the ARDL model for conducting this research. Where the result shows FDI, exports, industry value added and population growth are important for GDP growth. And also found that long-run determinants of GDP growth are exports where the rest of the variables are short-run determinants so it is important to remove government ineffectiveness to increase FDI, exports, and industry value-added.

The paper consists of the following sections, where part 2 gives the problem statement of the study, section 3 contains the literature review, and the objectives of the paper are revealed in section 4. Significance of the study, methodology, empirical results, and discussions, and finally conclusions and recommendations are described through sections 5, 6, 7, and 8 respectively.

## 2. PROBLEM STATEMENT

With a huge population, Bangladesh is a developing country. So it is necessary to ensure better economic performance for this country. For this, it is a prerequisite to know about the impact FDI, export and gross domestic savings, inflation, industry value added, and population growth on economic growth. And it's also important to empirically investigate the long and short-run determinants of economic growth.

## 3. LITERATURE REVIEW

There are enormous theoretical and empirical investigations on the topic and some of those are including in table 4. We detect economic growth's determinants of various countries, where several determinants are selected. In this paper, we try to find the potential impact of FDI, export, gross saving, inflation, industry value-added, and population growth on economic growth in Bangladesh.

**Table-4.** Summary of Literature Review.

| Author(s) | Country and Sample | Methodology | Findings |
|---|---|---|---|
| Chirwa and Odhiambo (2016) | Both developing and developed countries | Various econometric methods | For both developing and developed countries, the important determinants of economic growth are fiscal policy, trade, human capital, demographics, and monetary policy. |
| Sultan (2008) | Bangladesh; 1965-2004 | OLS Regression; Multivariate and Vivariate Cointegration Test; Causality Test | Industry value added has long-run impacts on GDP. |
| Kasidi and Mwakanemela (2013) | Tanzania; 1990 -2011 | The linear regression equation and Cointegration test | Inflation negatively affects economic growth and no cointegration is found between them. |
| Chowdhury and Hossain (2018) | Bangladesh; 1979-2017 | Using different preventive checks | Inverse relation exists with economic development and population growth. |
| Klasen and Lawson (2007) | Uganda | Panel Data Analysis | Growth of population paused per capita growth. |
| Anaman (2004) | Brunei, 1971-2001 | ARDL Model | Growth of export and size of government influence long-run growth rates. |
| Behname (2012) | Southern Asia; 1977-2009 | Panel Data Analysis | FDI is a crucial determinant of growth where human capital, capital formation, and infrastructure are positively related to economic growth and population, technology gap and inflation are negatively in Southern Asia. |
| Sun and Heshmati (2010) | China; 2002 to 2007 | Non-parametric Approach | Trade volume and Trade structure positively accelerate regional productivity. |
| Baiashvili and Gattini (2020) | 111 countries of low -, middle - and high - income countries | Panel GMM Technique | Income levels and FDI have a U shaped relationship. |
| Majumder and Rana (2016) | Bangladesh, | OLS | Export and GDP per capita are mostly influenced components of economic growth in the country. |
| Fetahi-Vehapi, Sadiku, and Petkovski (2015) | European countries(South East); 1996 to 2012 | Panel GMM Technique | Trade openness, FDI, and Human capital positively influence economic growth. |
| Fitzová and Zídek (2015) | Czech and Slovak Republics | Cointegration, VECM, and Granger Causalities | Exports and economic growth are positively related. |
| Moudatsou (2003) | European Union (EU) countries | Panel Data Analysis | FDI is a positive determinant of growth rate. |
| Anyanwu (2014) | Africa; 1996 to 2010 | Two-step Least 2SLS and Two-stage Efficient Generalized Method of Moments. | Openness does not have a positive impact on growth. |
| Har, Teo, and Yee (2008) | Malaysia; | OLS Regressions | Economic growth and FDI inflows have a significant relationship and |

| | | | |
|---|---|---|---|
| | | | also for FDI. |
| Dinh, Vo, and Nguyen (2019) | Developing Countries; 2000–2014 | VECM and FMOLS | FDI accelerates growth both for the long run short-run and money supply, domestic investment and Domestic credit are important long-run economic determinant. |
| Dao (2012) | Forty-three Developing Economies | Multivariate linear regression | Population growth influenced GDP Per capita. |
| Saaed (2007) | Kuwait; 1985 to 2005 | Co-integration and ECM | Inflation and economic growth have negative relation. |
| Majumder. (2016) | Bangladesh, 1975-2013 | VECM Approach | Inflation and economic growth have positive long-run relation. |
| Ahamed and Tanin (2010) | Bangladesh; 1975- 2006 | 2SLS Procedure | FDI positively impacts the growth of the economy. |
| Ali and Saif (2017) | Pakistan; 1976-2015 | Maximum Likelihood Estimation Approach; VECM; Granger Causality | Agriculture, energy consumption, trade liberalization, and FDI have a positive influence on GDP. |
| Chizonde (2016) | Zambia | ARDL Approach | Physical capital, Exchange rate, inflation, price of crude oil is long-run economic determinants. |
| Darko (2015) | Ghana; 1975-2013 | Vector Autoregressive Model | GDP per capita depends on export, oil, and mineral rents. |
| Ghazanchyan, Stotsky, and Zhang (2015) | Asian countries; 1980 to 2012 | Panel Data Analysis | Private and Public investments strongly influence growth but the exchange rate does not. |
| Qadri and Waheed (2011) | Pakistan; 1978 to 2007 | The Standard Cobb Douglas Production Function, Sensitivity Analysis ARDL Model | Human capital positively influences economic growth. |
| Majumder and Donghui (2016) | Bangladesh, 1975-2013 | | There is a long-run significant relationship between remittances and economic growth in the country. |
| Simionescu, Lazanyi, Sopkova, Dobeš, and Balcerzak (2017) | V4 Countries; 2003-2016 | Bayesian Generalized Ridge Regression | FDI promotes economic growth. The expenditure on education generates economic growth. |
| Tridico (2008) | Emerging and Transition Economies; 1999-2005 | OLS Regression Analysis | Human capital and Export capacity are important for economic growth. |

## 4. OBJECTIVES OF THE STUDY

The main objective of this research is the empirical investigation of the impact of FDI, Export and Gross Domestic Savings on the Economic Growth in Bangladesh.

Where specific objectives are the following:

i. To find out the current situation of FDI inflows, Export, Inflation, Growth of population, and gross domestic savings in Bangladesh.

ii. To reveal the long and short-run determinants of growth in Bangladesh.

## 5. SIGNIFICANCE OF THE STUDY

Detecting all of the determinants that have an impact on economic growth is not easy as it consists of various factors. Here we try to briefly discuss some of them. This study helps in finding the influence of selected variables on growth by the Autoregressive Distributed Lag Bound Testing (ARDL BT) approach and also helps in finding both short and long-run determinants of growth in Bangladesh. This paper may be helpful for existing literature.

## 6. METHODOLOGY

### *6.1. Data and Sample*

We conduct this research with the data covering the year from 1972 to 2017 where the secondary data is collected from WDI (World Bank, 2019) .

### *6.2. Model Specification*

The final econometric model is provided below by the equation (2),

$$GDP\ Growt\square = f(FDI, Exports, Inflation,, Gross\ Domestic\ Savings, Industry\ Value\ Added, Population\ growt\square) \quad \ldots\ldots\ldots\ldots (1)$$

By taking natural logarithm the final econometric model is

$$lnGDPG_t = \alpha + \beta_1 lnGDPG_{t-1} + \beta_2 lnFDI_t + \beta_3 lnFDI_{t-1} + \beta_4 lnExp_t + \beta_5 lnGDS_t + \beta_6 lnInf_t + \beta_6 lnInf_{t-1} + +\beta_7 lnIVA_t + \beta_8 lnIVA_{t-1} + \beta_9 lnPG_t + \beta_{10} lnPG_{t-1} + \mu_t \quad \ldots\ldots\ldots\ldots (2)$$

Here, $GDPG_t$ =GDP growth (annual %),$GDPG_{t-1}$= GDP growth(One year lag), $FDI_t$=FDI, net inflows (current US$), $FDI_{t-1}$= FDI(One year lag), $Exp_t$=Exports of goods and services (% of GDP), $GDS_t$=Gross domestic savings (%of GDP), $Inf$=Inflation,(annual %), $Inf_{t-1}$ = One year lag of inflation, $lnIVA_t$=Industry value added (constant 2010 US$), $lnIVA_{t-1}$= One year lag of Industry value-added, $lnPG_t$=Population growth, $lnPG_{t-1}$= One year lag of Population growth.

### *6.3. Hypotheses of the Study*

*H₁: FDI positively affects economic growth.*
*H₂: Exports positively affects economic growth.*
*H₃: Gross domestic savings positively affects economic growth.*
*H₄: Inflation negatively affects economic growth.*
*H₅: Industry value added positively affects economic growth.*
*H₆: Population growth negatively affects economic growth.*

## 7. EMPIRICAL RESULTS AND DISCUSSION

### *7.1. Unit Root Test*

**Table-5.** Augmented Dickey-Fuller Test (ADF).

| Variable | Level | 1st difference | Decision |
|---|---|---|---|
| | t-statistics | t-statistics | |
| lnGDPG | -4.291117*** | -2.666190* | I(0) |
| lnFDI | -6.170034*** | -5.163381*** | I(0) |
| lnExp | -3.566072 ** | -7.497741 *** | I(0) |
| lnInf | -3.112398** | -9.870831*** | I(0) |
| lnGDS | -0.859094 | -8.430113*** | I(1) |
| lnIVA | 2.362661 | -10.07564*** | I(1) |
| lnPG | -1.854644* | -2.695684* | I(0) |

**Note:** 10%, 5%, and 1% level of significance are denoted with *, **, ***.

Augmented Dickey-Fuller test is used to test the stationarity. The results are presented below in table 5 where lnGDPG, lnFDI, lnExp, lnInf, lnPG is stationary at I(0); whereas the data of lnGDS and lnIVA is stationary at I(1) at 1, 5 and10 percent significance level.

### *7.2. Lag -Length Criteria*

As all of our data is stationary at mixed order we can apply Autoregressive Distributed Lag Model for the study developed by Pesaran and Shin (1999). From automatic lag selection criteria by SIC, we found appropriate lag 2 which are presented in Appendix Table 1.

### *7.3. Top of Form Bottom of Form ARDL Model*

Table 6 shows the ARDL Model, where the negative coefficient of one-year lag GDP growth is significant. The coefficient of FDI is 0.05 refers to a 1% increase in it then growth will increase by 0.05%. The coefficient of one year lag FDI is negative but insignificant.

Exports positively affect GDP growth. From the model 1% increases in exports leads 0.03% increase in GDP growth. Gross domestic savings also positively affect GDP growth but statistically not significant. Inflation negatively affects the economic growth of Bangladesh. If inflation goes down by 1% then GDP growth will increase by 0.04%.

Industry value added positively affects economic growth.1% increase in IVA leads to an 8.68% increase in GDP growth and significant at 1percent level. Population growth negatively accelerates the growth of the economy; a 1% decrease in it then GDP growth will increase by 1.88%.

**Table-6.** ARDL Model Estimates.

| Variable | Coefficients | Standard error | Probability |
|---|---|---|---|
| lnGDPGt-1 | -0.448984 | 0.060153 | 0.0000 |
| $lnFDI_t$ | 0.048847 | 0.020244 | 0.0242 |
| $lnFDI_{t-1}$ | -0.033729 | 0.019976 | 0.1048 |
| lnExpt | 0.313499 | 0.133422 | 0.0277 |
| lnGDS | 0.072598 | 0.125246 | 0.5678 |
| $lnInf_t$ | -0.036804 | 0.028102 | 0.2032 |
| $lnInf_{t-1}$ | 0.047606 | 0.027926 | 0.1017 |
| lnIVAt | 8.680891 | 1.438476 | 0.0000 |
| lnIVAt-1 | -8.821380 | 1.506027 | 0.0000 |
| lnPGt | -1.879197 | 0.633603 | 0.0069 |
| lnPGt-1 | 1.527422 | 0.682103 | 0.0351 |
| Constant | 1.677531 | 1.385177 | 0.2382 |
| R square | | | |
| Adjusted R square | | | |
| Durbin Watson value | 0.927916 | | |
| 0.893441 | | | |
| 1.551148 | | | |

**Note:** 10, 5, and 1% significance level are denoted with *, **, ***.

Table 7 shows the diagnostic tests of the ARDL model; ensures the normal distribution of data as the Jarque-Bera probability value is 0.725. No autocorrelation and heteroscedasticity are detected in the model as the p-value of serial correlation and heteroscedasticity tests are 0.218 and 0.11 respectively.

**Table-7.** Diagnostic test.

| Test | Test statistic | P-Value |
|---|---|---|
| Normality Test Jarque –Bera | J-B=0.643 | 0.725 |
| Autocorrelation Breusch-Godfrey LM | F value=1.639 | 0.218 |
| Heteroskedasticity Breusch-Pagan-Godfrey LM test | F value=1.839 | 0.110 |

### *7.4. ARDL Bound Testing*

From table 8, the value 86.62 of ARDL BT estimation result at a 1 percent significance level admits that there exists a long-run relationship among the selected variables.

**Table-8.** ARDL BT estimation result.

| K | F-stat | Significant | Lower bound, I(0) | Upper bound, I(1) |
|---|---|---|---|---|
| | | 10% | 2.12 | 3.23 |
| 6 | 86.62 | 5% | 2.45 | 3.61 |
| | | 2.5% | 2.75 | 3.99 |
| | | 1% | 3.15 | 4.43 |

### *7.5. Cointegration form of ARDL Model*

From table 9, the short-run analyses of the model we see that the coefficient of ΔlnFDI, Δ *lnExp*, Δ *lnGDS*, and Δ *lnIVA* are positively significant at 1% and 5% level, meaning that all of these variables positively accelerate the economic growth of Bangladesh in the short run. Where the coefficients of Δ *lnInf* and Δ *lnPG* are negative meaning that in the short-run these variables have a negative impact on economic growth.

$ECM_{t-1}$ is negative and significant refers that adjustment is corrected by 145% from short to long run.

**Table-9.** ARDL- ECM model.

| Variable | Coefficient | Standard error | Probability value |
|---|---|---|---|
| $\Delta lnFDI_t$ | 0.048847 | 0.020244 | 0.0242** |
| $\Delta lnExp_t$ | 0.313499 | 0.133422 | 0.0277** |
| $\Delta lnGDS_t$ | 0.072598 | 0.125246 | 0.5678 |
| $\Delta lnInf_t$ | -0.036804 | 0.028102 | 0.2032 |
| $\Delta lnIVA_t$ | 8.680891 | 1.438476 | 0.0000*** |
| Δ lnPG | -1.879197 | 0.633603 | 0.0069*** |
| $ECM_{t-1}$ | -1.448984 | 0.060153 | 0.0000*** |

**Note:** 10%, 5%, and 1% level of significance are denoted with *, **, ***.

**Table-10.** Long run coefficient.

| Variable | Coefficient | Standard error | Probability value |
|---|---|---|---|
| lnFDI | 0.010434 | 0.014396 | 0.4759 |
| lnExp | 0.216358 | 0.091558 | 0.0270** |
| lnGDS | 0.050103 | 0.086927 | 0.5700 |
| lnInf | 0.007455 | 0.023245 | 0.7513 |
| lnIVA | -0.096957 | 0.102230 | 0.3528 |
| lnPG | -0.242774 | 0.182814 | 0.1972 |
| Constant | 1.157729 | 0.965429 | 0.2427 |

**Note:** 10%, 5%, and 1% level of significance are denoted with *, **, ***.

### *7.6. Long Run Coefficient of ARDL model*

Table 10 shows the long-run coefficient of the ARDL model where FDI, Exports, Gross domestic savings; Inflation has a positive coefficient, and Industry value-added and Population growth have negative coefficients.

### *7.7. Determinants of Economic Growth*

For finding the determinants of growth we notice Table 11, we see that hypothesis H1 is rejected; meaning that FDI isn't a long run rather a short run determinant and significant at a 5 % level. Hypotheses H2 is accepted as both the t statistics are significant in both the short and long run at a 5% level. Where 1% increases in export will boost 0.22% of GDP growth in Bangladesh. This evidence is empirically proved by Fitzová and Zídek (2015).

As hypotheses, H3 is rejected for both two terms. H4 is also rejected in the same way.H5 shows that industry value added is a short run determinant rather than long run.H6 is also rejected where population growth is a short-run determinant.

**Table-11.** Determinants of economic growth.

| Hypotheses | T statistics | | Decision |
|---|---|---|---|
| | Short-run | Long run | |
| H1: FDI positively affects Economic Growth | 2.412908** | 0.724786 | Rejected H1 |
| H2: Exports positively affects Economic Growth | 2.349689** | 2.363066** | Accepted H2 |
| H3: Gross domestic savings positively affect Economic Growth | 0.579642 | 0.576374 | Rejected H3 |
| H4: Inflation negatively affects Economic Growth | -1.309655 | 0.320707 | Rejected H4 |
| H5: Industry value added positively affects Economic Growth | 6.034783*** | -0.948416 | Rejected H5 |
| H6: Population growth negatively affects Economic Growth | -2.965892*** | -1.327984 | Rejected H6 |

**Note:** 10%, 5%, and 1% significance level are denoted by *, **, ***.

### *7.8. Stability Test*

The stability test of the model is proved through the CUSUM and CUSUM squares test and shows our ECM-ARDL model is stable. The results are given in figure 2(a) and 2(b); where the color of the blue line doesn't cross the red line. So we can say in the long run this model is stable.

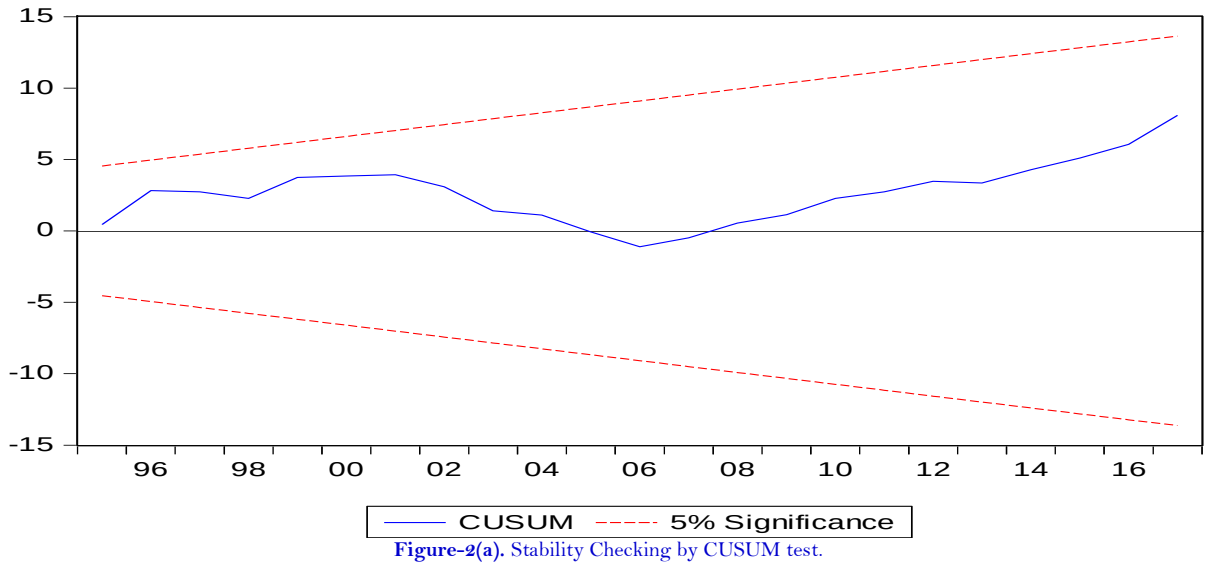


**Figure-2(a).** Stability Checking by CUSUM test.

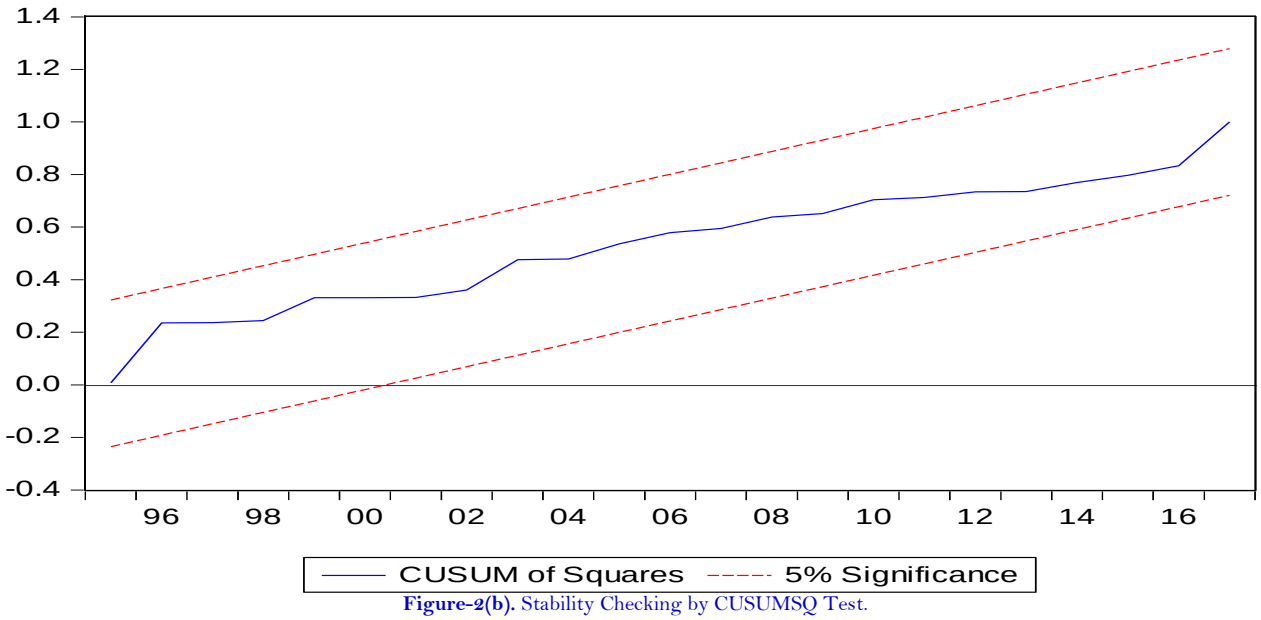


**Figure-2(b).** Stability Checking by CUSUMSQ Test.

### *7.9. Granger Causality Test*

Pairwise Granger Causality Test is presented in Appendix Table 2 shows no causal relation between lnGDPG and lnInf; lnFDI and lnGDS; lnFDI and lnInf; lnFDI and lnIVA; lnExp and lnGDS; lnGDS and lnInf; lnGDS and lnPG. Unidirectional causality is found between lnGDPG and lnFDI; lnPG and lnGDPG; lnFDI and lnPG; lnGDS and lnExp; lnInf and lnExp; lnEx and lnPG; lnIVA and lnGDS; lnInf and lnIVA; lnIVA and lnPG. A bidirectional causal relation is found between lnGDS and lnGDPG; lnExports and lnGDPG; lnIVA and lnGDPG; lnPG and lnGDPG.

## 8. CONCLUSION AND POLICY RECOMMENDATION

The empirical investigation for finding the influence of FDI, export, and gross domestic savings on economic growth is essential for any country. In this paper, we analyze that empirical investigation in Bangladesh covering the year 1972 to 2017. Secondary data is drawn from World Bank (2019).

We apply ARDL BT and ECM ARDL BT test. Our selected variables are GDP growth, FDI, Exports, Gross domestic savings, Inflation, Industry value-added, and Population growth.

The result of the ARDL model shows the negative coefficient of one-year lag GDP growth. The GDP growth will rise by 0.05% if FDI increases by 1%. The coefficient of one year lag FDI is negative but insignificant. Exports positively affect GDP growth. From the model, if the increase in exports is 1% then GDP growth will increase by 0.03%. Gross domestic savings also positively affect GDP growth but statistically not significant. Inflation negatively affects the economic growth of Bangladesh. If inflation goes down by 1% then GDP growth will increase by 0.04%. Industry value added positively affects economic growth. 1% increase in Industry value-added leads an 8.68% increase in GDP growth. The growth of the population has negative impacts on economic growth. If it decreases 1%, 1.88% will be GDP growth. Durbin Watson's value is 1.55.

ARDL bound testing approach shows a long-run association among variables. The $ECM_{t-1}$ is negative and significant indicating that adjustment will be corrected by 145% from short to long run. Hypotheses testing ensure except exports other determinants are short-run determinants. Cusum and Cusum squares test ensures the stability of this ARDL model.

Industrial goods and technology importing may accelerate the growth of the industry in Bangladesh. As export is an important determinant in Bangladesh it is urgent to have a look at exporting. In this case, export policy and export incentives will be helpful.

As inflation negatively impacts growth, policymakers should focus on this is issue to maintaining a low rate of inflation. Population growth should be checked to boost economic growth. In this case, female education can contribute a lot. Besides they have to make self-sufficient.

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## APPENDICES

**Appendix Table-1**. Optimum Lag Selection Model.

| Lag | LogL | LR | FPE | AIC | SC | HQ |
|---|---|---|---|---|---|---|
| 0 | 171.0979 | NA | 8.29e-14 | -10.25612 | -9.935492 | -10.14984 |
| 1 | 421.1312 | 375.0498 | 3.12e-19 | -22.82070 | -20.25566 | -21.97046 |
| 2 | 516.9354 | 101.7920* | 2.71e-20* | -25.74596* | -20.93651* | -24.15176* |

Note:* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion.

**Appendix Table-2.** Results of granger causality tests.

**Granger Causality Tests**

| Null Hypothesis: | Obs | F-Statistic | Prob. |
|---|---|---|---|
| LNFDI does not granger cause LNGDPG | 33 | 1.51946 | 0.2363 |
| LNGDPG does not granger cause LNFDI | | 2.57438 | 0.0941 |
| LNEXP does not granger cause LNGDPG | 40 | 10.4701 | 0.0003 |
| LNGDPG does not granger cause LNEXP | | 2.28626 | 0.1166 |
| LNGDS does not granger Cause LNGDPG | 39 | 7.41011 | 0.0021 |
| LNGDPG does not granger cause LNGDS | | 7.47371 | 0.0020 |
| LNINF does not granger cause LNGDPG | 38 | 1.53979 | 0.2294 |
| LNGDPG does not granger cause LNINF | | 0.18893 | 0.8287 |
| LNIVA does not granger cause LNGDPG | 40 | 12.2854 | 9.E-05 |
| LNGDPG does not granger cause LNIVA | | 5.60132 | 0.0078 |
| LNPG does not granger cause LNGDPG | 40 | 11.7673 | 0.0001 |
| LNGDPG does not granger cause LNPG | | 0.50727 | 0.6065 |
| LNEXP does not granger cause LNFDI | 37 | 3.09352 | 0.0591 |
| LNFDI does not granger cause LNEXP | | 3.19295 | 0.0544 |
| LNGDS does not granger cause LNFDI | 33 | 0.32502 | 0.7252 |
| LNFDI does not granger cause LNGDS | | 2.08130 | 0.1436 |
| LNINF does not granger cause LNFDI | 34 | 0.10134 | 0.9039 |
| LNFDI does not granger cause LNINF | | 0.55537 | 0.5798 |
| LNIVA does not granger cause LNFDI | 37 | 2.07752 | 0.1418 |
| LNFDI does not granger cause LNIVA | | 1.25213 | 0.2995 |
| LNPG does not granger cause LNFDI | 37 | 1.29927 | 0.2867 |
| LNFDI does not granger gause LNPG | | 21.8609 | 1.E-06 |
| LNGDS does not granger cause LNEXP | 40 | 2.42467 | 0.1032 |
| LNEXP does not granger cause LNGDS | | 1.87199 | 0.1689 |
| LNINF does not granger cause LNEXP | 40 | 4.64417 | 0.0163 |
| LNEXP does not granger cause LNINF | | 0.90063 | 0.4155 |
| LNIVA does not granger cause LNEXP | 44 | 13.8328 | 3.E-05 |
| LNEXP does not granger cause LNIVA | | 3.85900 | 0.0296 |
| LNPG does not granger cause LNEXP | 44 | 0.93162 | 0.4025 |
| LNEXP does not granger cause LNPG | | 15.9085 | 9.E-06 |

| | | | |
|---|---|---|---|
| LNINF does not granger cause LNGDS | 39 | 0.36631 | 0.6960 |
| LNGDS does not granger cause LNINF | | 2.26809 | 0.1190 |
| LNIVA does not granger cause LNGDS | 40 | 10.0985 | 0.0003 |
| LNGDS does not granger cause LNIVA | | 1.38620 | 0.2634 |
| LNPG does not granger cause LNGDS | 40 | 1.43661 | 0.2514 |
| LNGDS does not granger cause LNPG | | 2.02681 | 0.1469 |
| LNIVA does not granger cause LNINF | 40 | 2.32500 | 0.1127 |
| LNINF does not granger cause LNIVA | | 5.61251 | 0.0077 |
| LNPG does not granger cause LNINF | 40 | 0.61634 | 0.5457 |
| LNINF does not granger cause LNPG | | 4.53529 | 0.0177 |
| LNPG does not granger cause LNIVA | 44 | 0.10696 | 0.8988 |
| LNIVA does not granger cause LNPG | | 47.9784 | 3.E-11 |