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Analysis of the Impact of Exchange Rate, Inflation, Export and Import on Gross Domestic Product in Bangladesh

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Abstract

This study is about the impact of selected macroeconomic variables on economic growth of Bangladesh. Economic growth of Bangladesh is measured in terms of annual nominal GDP growth rate. Least squared regression model has been employed considering exchange rate, export, import and inflation rate as independent variables and gross domestic product as the dependent variable in this study. The results reveal that export and import have significant positive impact on GDP growth rate. The other variables (exchange rate and inflation) are not significant, indicating that there exists no significant relationship among the variables. The findings will help the policy makers to make policies concerning the country's economic growth to remain robust in the near future.

Keywords: GDP; Exchange rate; Inflation; Export and import.

1. Introduction

Bangladesh will be the third fastest growing economy in the world in terms of achieving high Gross Domestic Product (GDP) in 2019. Like most other countries, Bangladesh has access to international markets through multilateral trade. Bangladesh will require a breakthrough in the performance of the external sector. External factors have always played important role in the economy of Bangladesh. There are many external factors which may have an effect on the country's GDP. Among these factors, export, import, exchange rate and inflation rate have been considered in this study. Bangladesh's economy depends on the economic growth which can be expressed as the change of production of goods and services, compared from one period to another. High or low economic growth can be measured by calculating the gross domestic product (GDP) of the country concerned. Exchange rate indicates the value of currency in terms of US dollars. Rodrik (2008), substantiates that currency exchange rates (exchange rate) of a particular country affect GDP. Therefore, the value of currency indicates the purchasing power of imports with the value of exported items. The research objectives of this study are to determine the impact of exchange rate, inflation, export and import on GDP growth rate of Bangladesh. This study is useful to identify the significant macro-economic factors which affect economic growth of Bangladesh. This study can support policy makers pertaining to achieving high economic growth in Bangladesh. It is hypothesized in the study that exchange rate, inflation, export and import have significant effect on the GDP growth rate. Pearson correlation matrix, Granger Causality Test and Regression analysis are used to find out the effect and relationship of variables. Augmented Dickey Fuller (ADF) test is used to check stationarity of data.

The rest of the paper proceeds as follows: section 2 summarizes objectives, hypothesis and literature review. Research methodology is explained in section 3, Section 4 provides the results from the analysis and finally section 5 concludes the paper.

1.1. Objectives of the Study

i. To evaluate the impact of exchange rate on economic growth of Bangladesh.
ii. To look over the influences of export on economic growth.
iii. To examine the relationship of inflation with economic growth.
iv. To observe the impact of import towards economic growth.

1.2. Hypothesis of the Study

H_0: There is no relationship among GDP and export, import, exchange rate and inflation.
H_1: There is a relationship among GDP and export, import, exchange rate and inflation.

1.3. Literature Review

Several studies have been conducted to find out the impact of macroeconomic variables on economic growth. Some resulted that macroeconomic variables have positive relationship on economic growth but negative from other studies.

Michel (2011) and Mahboob-ul-Hasan and Mahmood (2013) varified the effect of remittances and financial openness in Pakistan considering exchange rate, GDP, foreign direct investment (FDI), real exchange rate, labor force and trade openness as independent variables, exports and financial openness as dependent variables. Augmented Dickey Fuller test, Auto-regressive Distributed Lag (ARDL), and Co-integration test have been used to find out the unit root and relationship among variables. The result found that remittances have consequence on

human capital and also on economic stability and FDI has positive but insignificant relationship with GDP of Pakistan.

Azam (2010), analyzed the impact of exports and FDI on economic growth by using South Asian countries particularly Bangladesh, India, Pakistan and Sri Lanka for the period of 1980 to 2009. He identified significant relationship in some countries and insignificant in others. The study pointed out that there is a positive as well as significant influence between FDI and economic growth in Bangladesh and Pakistan, while insignificant in India. But in Srilanka, this relationship is negatively significant at 1% level of significance.

Gokal and Hanif (2004), found that inflation and GDP has a negative result. At a certain level of inflation, there will be positive result towards GDP. On the other hand, a low level of inflation will not have a significant impact on GDP.

Wong et al. (2005), analyzed technological innovation on economic growth using exchange rate and liquidity of capital market positions. They investigated that there is a significant impact of high growth potential entrepreneurship on economic growth.

Barro (1995), found that economic growth will be reduced by high inflation considering data for around 100 countries over the period of 1960 to 1990. Another study was held by Barro and Lee (2013) to find out the relationship between inflation and economic growth which indicate price instability and its declining impact on GDP. Furthermore, favorable public policies stimulate growth rate which indicates positive relationship between inflation and economic growth at 1% level of significance.

The study of Hosseini and Leelavathi (2013) evaluated the positive result of trade openness on economic growth of India. In this study, Trade Openness, FDI, Inflation, Gross Fixed Capital Formation, Capital Stock, Human Capital have been considered as independent variables and Real GDP Growth Rate as dependent variable. They identified the relationship of these variables using Johanson Co-integration test.

Shaheen and Kauser (2013), carried out an investigation of the gross fixed capital formation and trade openness and its significant and positive impact on economic growth of Pakistan.

The correlation between FDI inflows, exchange rate, and economic growth of Kazakhastan has been analyzed by Lee et al. (2009). They researched the minimum significant impact of FDI on GDP growth of Kazakhastan.

Ayadi and Ayadi (2008), figure out the effect of the huge external debt on economic growth in Nigeria and South Africa. They exclaimed that the contribution of external debt positively affect economic growth to a certain point after which its contribution becomes negative in Nigeria. Both ordinary least squares (OLS) and generalized least squares (GLS) have been used in this analysis to identify the relationship among variables. The study can conclude that South Africa performs better than Nigeria in the application of external loans to promote economic growth.

Kormendi and Meguire (1985), explored an analysis which reveals the cross-sectional association between growth and other variables using post-war data from forty-seven countries. The study investigated that growth have influenced investment and return to capital. They also pointed out that the domination of growth over the other variables is reflected by investment.

Kryeziu (2016), identified that economic growth is largely affected by public debt, budget and he found no strong relationship between these variables because the coefficients acquired did not have great explanatory skills for economic variables.

Samuel et al. (2013), explored the effect of long-run macroeconomic variables on economic growth in Ghana using Johansen approach to cointegration during the period of 1980 to 2010. They found cointegration relationship between real GDP per capita (economic growth) and its macroeconomic factors and a suggestion is provided by their study that the government should create more revenue domestically than relying on foreign aid.

In a research study, Mohammed and Ehikioya. (2015) pointed out that gross fixed capital formation, foreign direct investment and total government expenditure are the main determinants of Nigeria economic output under stable inflationary rate. They also established the existence of short and long run relationship between economic growth and its macroeconomics variables. The targeted time period of this study was the period from 1986 to 2012 and Augmented Dickey-Fuller (ADF) test and Johansen's co-integration test were used to determine the result.

Okunnu et al. (2017), carried out their own study examining the effect of exchange rate volatility on macroeconomic performance in Nigeria from 1986 to 2010. In this study, real GDP has been considered as dependent variable and exchange rate, balance of payment and oil revenue have been used as independent variables. They used Ordinary Least Squared (OLS) and Johansen co-integration estimation techniques to test the short and long run effect of exchange rate volatility on macroeconomic performance.

Chughtai et al. (2015), identified economic variables such as inflation rate, interest rate and exchange rate influencing economic growth of Pakistan. It has been found that both inflation rate and interest rate negatively affect economic growth while only exchange rate positively affect the economy of Pakistan.

Jilani and Asim (2010); Sinha (1998); Ramzan and Kiani (2012); and Yanikkaya (2003) analyzed the similar titles of Foreign Direct Investment, Trade Openness and Economic Growth by using annual data of developing countries for almost three decades.

2. Research Methodology

This section provides the research `methodology of the study. Here selection and collection data, dependent and independent variables of the study, model specification and methods of data analysis are described sequentially.

2.1. Selection and Collection of Data

This paper focuses on the macro economic variables. There are only four macro economic variables collected from world bank data indicators. This analysis is based on recent ten year period from 2009 to 2018. Data has been collected mainly from secondary sources.

2.2. Dependent and Independent Variables

This paper considers only those variables that may have an effect on economic growth. All the variables have been chosen based on past research in this sector.

2.2.1. Dependent Variable

Gross domestic product: GDP is one of the indicators of economic growth.GDP is a good indicator of a country's microeconomic status and development (Haggart, 2000). GDP can be seen from two sides such as the expenditure approach and the income approach. First we will consider the expenditure approach. It takes account of all goods and services within a given time period (Andolfatto, 2005). In the other hand the income approach considers the level of worker's compensation, rent, interest rates, income of a particular business, tax of a produced goods and import level (McConnel *et al.*, 2008).

2.2.2. Independent Variables

Exchange rate: Exchange rate indicates the value of Taka in terms of US Dollars. Exchange rate is the value of currency which can be compared to another currency (Krugman, 2001). There are two categories of exchange rate: fixed exchange rate and flexible exchange rate. Fixed exchange rate is set by the government whereas flexible exchange rate is set by the market with or without the influence of the government in the effort to stabilize the monetary (Kuncoro, 2001).

Export: Exports would be a crucial component of economy of a country when the sale of goods and services adds to the producing nation's gross output. In international trade, export means goods produced in one country shipped to another country for further trade.

Import: Imports are also essential factor of a country's economy. In international trade, import means goods and services brought from abroad for sale.

Inflation: According to McConnel *et al.* (2008), inflation is an increase in price level as general and a decrease in purchasing power from a currency. There are a few causes of inflation where aggregate demand increases faster than aggregate supply, therefore increasing the cost of goods and services. The imbalance of aggregate demand and supply is linked to the government's deficit, expansion of bank's interest rates and the increase of foreign demand (Haberler, 1960). Inflation has a few indicators such as Consumer Price Index (CPI), Wholesale Price Index (WPI), and Implicit Price Index (deflator GDP) (Tempo, 2002).

2.3. Model Specification

The equation of this model is as follows:

GDP = f(exchange rate, export, inflation, import)

$$\text{GDP}_{i,t} = a_i + b_1 ER_{i,t} + b_2 EX_{i,t} + b_3 IF_{i,t} + b_4 IM_{i,t} + e_{i,t}$$

Where, GDP-gross domestic product, ER-exchange rate, EX-export, IF-inflation, IM-import, a-constant, e-residual component (error term), i- t-

2.4. Methods of Data Analysis

For analysis, a well known statistical package named EViews is used. This study employs statistical tools for both its descriptive and quantitative analysis. To explore the general statistics (e.g. mean, median etc), data are analysed in the descriptive sector. Then again, data are analysed by employing Augmented Dickey-Fuller (ADF) Unit Root Test, Pearson correlation matrix, Granger Causality Test and Regression analysis in quantitative analysis portion.

3. Analysis and Findings
3.1. Descriptive Statistics

As mentioned before, data are first analysed in this sector to find out some general statistics. Summary of the findings are presented in the following table:

Table-1. Descriptive Statistics

	GDP	ER	EX	IF	IM
Mean	6.460000	7.100000	10.30000	6.920000	33.94000
Median	6.500000	7.500000	8.500000	6.750000	34.90000
Maximum	7.860000	9.000000	23.00000	8.800000	46.00000
Minimum	5.100000	3.000000	4.000000	5.400000	17.50000
Std. Dev.	0.816265	1.791957	5.850926	1.155470	9.029729

Source: Complied by authors

Table 1 shows a summary of the describtive statictics of dependent and independent variables in the study.The mean GDP over the ten years is 6.46 with a standard deviation of .82. The highest GDP is 7.86 while the lowest is 5.10. Among the explanatory variables, the mean of exchange rate over the test period is 7.10 with the highest exchange rate 9 and lowest 3. The mean value of export is 10.30. The correspondent minimum and maximum values are 4 and 23 respectively. The mean value of inflation is 6.92 with a standard deviation of 1.16. Import has a mean of 33.94 with a maximum and minimum values of 46 and 17.50 respectively.

3.2. Quantitative Analysis
3.2.1. Augmented Dickey Fuller Unit Root Test

To avoid the chance of spurious regression all the variables under the study must be stationary. To ensure that all variables in the regression equation are stationary we have done Augmented Dickey Fuller Unit root test. We have taken first stationary of the non stationary variables after testing all the variables. Four new variables are found DGDP, DER, DEX and DIF (1st difference of GDP, ER, EX and IF). Again test is done all the new four variables. Now all the data are found stationary. The results of ADF tests are as follows:

Table-2. Results of unit root tests

Variables name	t value	P value	Findings
D(GDP)	-5.000685	0.0310	Stationary
D(ER)	-3.535534	0.0033	Stationary
D(EX)	-4.757393	0.0105	Stationary
D(IF)	-3.970104	0.0255	Stationary
IM	-8.892248	0.0009	Stationary

Source: Complied by authors

3.3. Pearson Correlation Analysis

The Pearson correlation test indicates how the variables are related with each other and also what extent. Here, to investigate the existence of multicolinearity among regressors pearson correlation coeffient is used. The test result is shown in table 3. It was found that GDP is negatively correlated with exchange rate, export and inflation. On the other hand, the highest positive correlation exists between GDP and import. It can be assumed that data set is free from multicollinearity problem and fit for the regression analysis.

Table-3. Pearson Correlation Matrix

	DGDP	DER	DEX	DIF	IM
DGDP	1	(..30)	(.34)	(.425)	.90**
DER	(..30)	1	.01	.17	(.23)
DEX	(.34)	.01	1	.40	(.12)
DIF	(.42)	.17	.40	1	(.59)
IM	.90**	(.23)	(.12)	(.59)	1

Source: Complied by authors

Table-4. Test result of Granger Causality Model

Null Hypothesis:	Obs	F-Statistic	Prob.
ER does not Granger Cause GDP	8	0.32135	0.7474
GDP does not Granger Cause ER		1.04138	0.4535
EX does not Granger Cause GDP	8	0.04779	0.9540
GDP does not Granger Cause EX		10.4997	0.0442
IF does not Granger Cause GDP	8	14.8328	0.0278
GDP does not Granger Cause IF		1.28913	0.3944
IM does not Granger Cause GDP	8	2.63261	0.2187
GDP does not Granger Cause IM		0.70895	0.5596
EX does not Granger Cause ER	8	0.53668	0.6321
ER does not Granger Cause EX		0.74297	0.5469
IF does not Granger Cause ER	8	0.33847	0.7370
ER does not Granger Cause IF		0.07172	0.9323
IM does not Granger Cause ER	8	0.12033	0.8907
ER does not Granger Cause IM		0.78839	0.5307
IF does not Granger Cause EX	8	3.99269	0.1427
EX does not Granger Cause IF		0.46223	0.6684
IM does not Granger Cause EX	8	1.01802	0.4598
EX does not Granger Cause IM		0.63766	0.5878
IM does not Granger Cause IF	8	10.0282	0.0469
IF does not Granger Cause IM		8.64887	0.0568

Source: Complied by authors

3.4. Granger Causality Test

The causality amongst the variables cannot be explained by the simple correlation matrix. So, Engle Granger causality model is used to test the causality between each exogenous variable and dependent variable. As shown in table 4 there is no bilateral directional relationship between exchange rate and GDP, export and GDP, inflation and GDP, import and GDP at 5% significance level.

3.5. Regression Analysis

The regression equation estimates the linear relationship between the dependent and independent variables. Here, the four explanatory variables are regressed on the one and only dependent variable DGDP to test the multiple regression of the selected empirical model. Table 5 presents the summary of the test.

Table-5. Test result of regression model

Dependent Variable: DGDP				
Method: Least Squares				
Sample: 2009 2018				
Included observations: 10				
DGDP=C(1)+C(2)*DER+C(3)*DEX+C(4)*DIF+C(5)*IM				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	2.387183	1.039952	2.295473	0.0702
C(2)	-0.055478	0.050089	-1.107589	0.3185
C(3)	0.051585	0.016523	3.122047	0.0262
C(4)	0.259776	0.102962	2.523025	0.0530
C(5)	0.094295	0.012263	7.689529	0.0006
R-squared	0.942852	Mean dependent var		6.460000
Adjusted R-squared	0.897133	S.D. dependent var		0.816265
S.E. of regression	0.261800	Akaike info criterion		0.464378
Sum squared resid	0.342695	Schwarz criterion		0.615671
Log likelihood	2.678109	Hannan-Quinn criter.		0.298411
F-statistic	20.62293	Durbin-Watson stat		1.430463
Prob(F-statistic)	0.002621			

The regression equation can be written as follows:
DGDP= 2.3872 - 0.0555 *DER + 0.0516 * DEX + 0.2598 * DIF + 0.0943* IM

R-squared , the coefficient of determination, represents a value of .942852 which means that 94.29% variation in the dependent variable is altogether explained by four explanatory variables of this model. The value of Durbin-Watson stat is 1.43 which indicates that the model is free from significant autocorrelation. Here the intercept term of the equation is 2.39 but it is not statistically significant. The regression coefficient of export is 0.051585 and the result is statistically significant at 5% significance level. So it suggests that export has strong positive impact on gross domestic product. The beta coefficient of import is 0.094295 which is also statistically significant.

4. Conclusion

The study tries to identify how gross domestic product of a country is affected by macro economic factors based on a dataset of 2009 to 2018 from secondary source -the website of Bangladesh Bank, World Bank and Bangladesh Bureau of Statistics by using least squares regression method. According to the result of our model, import and export have significant positive impact on GDP growth rate. It has been found that exchange rate and inflation have insignificant impact on GDP. The exchange rate has negative value, consequently GDP will decrease by certain amount because exchange rate and inflation rate changes for one taka. Based on the study, it can be said that export and import play an important role in accelerating the economic growth of Bangladesh. Growth of an economy is directly related to export. If export increase more rapidly as compare to imports, nothing can stop an economy from being developed one. One of the components of aggregate demand (AD) is export. So, exports can cause economic growth.

Suggestion

This study only uses exchange rate, inflation, export and import as a factor affecting GDP in Bangladesh. Therefore, further research may add other factors such as, interest rate, political conditions or non-economic factors also may affect GDP. Samples and timescales can be extended in order to improve the accuracy of the research results.

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