

Exchange Rates and Economic Growth in Bangladesh: An Econometric Analysis

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Abstract: *Exchange rate and exports play an important role in an economy. This study examines the impact of exchange rate and export to GDP in Bangladesh using the time series data from 1981-2013. Ordinary Least Square (OLS) method is used to estimate the model. The results show that there is a positive relationships between exchange rate, export and GDP. The value of R^2 is 98.8%. This indicates that about 98.8% of the total variation in the GDP is explained by the exchange rate and export in Bangladesh. The results are statistically significant at 5% level of significance. This study suggests to increase exchange rate and export to increase economic growth in Bangladesh.*

Key words: Economic Growth, Exchange Rate, and Export.

1. Introduction

In the era of globalization and financial liberalization, exchange rate plays an important role in international trade and finance for a small open economy like Bangladesh. This is because movements in exchange rates affect the profitability of multinationals and increase exchange exposure to enterprises and financial institutions. A stable exchange rate may help enterprise and financial institutions in evaluating the performance of investments, financing and hedging and thus reducing their operational risks. Fluctuations in the exchange rate may have a significant impact on the macroeconomic fundamentals such as interest rates, prices, wages, unemployment, and the level of output. This may ultimately results in a macroeconomic disequilibrium that would lead to real exchange rate devaluation to correct for external imbalances.

In different countries study shows that there is theoretical relationship between

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exchange rate fluctuations and various macroeconomic indicators such as interest rate, inflation rate, current account and gross domestic product (GDP). Changes in interest rate, inflation rate, current account and gross domestic product affects exchange rate fluctuation. The findings of the research suggest that effects of gross domestic product over exchange rate is high in nature, the currency is devalue in exchange due to deficit GDP, and its impact is high on exchange rate followed by other variables such as inflation rate which effects is also not negotiable, followed by interest rate and current account balances.

Besides the exchange rate export is an important of economic growth in Bangladesh. In the last four years Bangladesh were achieved on an average export growth of 14.6 percent. Hence, in 2013 the contribution of export to GDP is 23.7%. (Source: BBS). Mainly Bangladesh exports two types of goods namely primary goods and industrial goods. Therefore, frozen food, tea, raw jute, agricultural products are included in primary goods and woven garments, knitwear, leather, jute goods, fertilizer and chemical products, footwear, ceramic products, petroleum products, handicrafts, etc are included in industrial exportable goods. Analysis of Bangladesh's country-wise export shows that USA is the main destination of export. The other countries where Bangladesh exports are Germany, UK, France, Belgium, Italy, Netherlands, Canada, Japan.

2. Review of literature

There are numerous studies that have assessed the relationship among export, exchange rate movements and economic growth. The main findings of these studies are represented below.

Begum and Abul (1998), based on a two sector growth model and by using annual data for the period 1961-92 found that export growth has significantly increased economic growth through its positive impacts on total factor productivity in the country. Ahmed and Uddin (2009) found that export growth is often considered to be a principal determinant of production and employment growth in an economy and they argued that foreign currency made available through export earnings facilitates import of capital goods, which in turn increases production potential of an economy. Edwards (1986) and Rhodd (1993) found negative short-run effects but in the long-run the output response to devaluation appeared to be positive. Rizzo (1998) found that the higher the exchange rate, the poorer will be the condition of the importing country and vice versa. In such a case, there is no doubt to say that exchange rate has a direct impact on the economic growth of any country. Kendal (2004) reported that depreciation of the currency leads to increase in real output. Rosengren, Eric (1992) reported that there has been a significant correlation between inward foreign direct investment in the United States and the US real exchange rates since 1970. Two alternative reasons were responsible for that. Real exchange rate affect relative cost of production and relative exchange rates affect

the relative wealth significantly across countries. He also found that relative wealth significantly affects foreign direct investment in the united state and the effects of real wages have little impact on FDI. Arizonan (1992) have concluded that nominal shocks in flexible exchange rate regimes have adverse implications on investment behavior and a fixed exchange rate encourage FDI. Agenor (1991),and Montiel (1997) study on exchange rate found that exchange rate fluctuations have significant implications for economic performance in Bangladesh. This is because fluctuation in exchange rate brings about changes in trade balance by influencing the country's export and import. Exchange rates may cause the price level to change and, as a consequence, it may change the income distribution of the economy. Eichengreen (2008) argued that developing countries may not have the capacity of maintaining a depreciated exchange rate. This policy choice is likely to cause tension with other countries and would invite costly and financially disruptive inflation. Kamal; et al (2004); by using quarterly data from 1974 to 1999, finds the evidence of export-led growth for Bangladesh in both the long run and short run. Zakir; et,al (2006) by using a dynamic panel data analysis , that existence of co-integration, that is, stable long-run relationship between trade balance of Bangladesh and its determinants.

These studies indicate that there is an important relationship among exchange rate, export and GDP. In this backdrop, the currency of Bangladesh has been devalued and depreciated since independence against some of the foreign currencies to whom it was pegged with, especially against USD.

In the above literature review it is seen that the previous study on impact of exchange rate and export on economic growth were used backdated data and method. However; in recent years, the impact of growing balance of payment have pressured on exchange rate of Bangladesh. In this context, the study is an attempt to evaluate the impact of exchange rate change and rise in export volume on output growth of Bangladesh economy by using up-to-date data and econometric method.

3. Data and methodology

This study is primarily based on secondary data. To conduct this study annual data of exchange rate, export and GDP growth from 1981-2013 are collected from Bangladesh Economic Review and Bangladesh Bank Monthly Economic Trend. In this work, simple linear regression analysis has been used. Regression analysis studies the causal relationship between one economic variable to be explained (the dependent variable) and one or more independent variables. It helps us to see the trend and make predictions outside or within a given data. Due to the linear relationship between GDP growth rate; and exchange rate and export our model specification is stated of the form:

$$GDP = \beta_0 + \beta_1 EXR + \beta_2 EXP + U_i$$

In this equation GDP (Gross Domestic Product) is the dependent variable. EXR

and EXP are the independent variable and denote exchange rate and export respectively. Also β_0 is the intercept and β_1 , and β_2 , are the slope of the GDP growth equation. U_i denotes the error term which is normally distributed with a zero mean and a constant variance.

The values of β_0 , β_1 , β_2 and β_3 will be obtained by using the ordinary least squares estimation technique by the help of SPSS (Statistical Package for the Social Sciences). The value of the F statistic is used to ascertain the overall significance of the GDP growth rate equation. We compare the value of the F statistic with the value of the critical value of F at a given significance level usually 5%. If the value of the F statistic is greater than the value of the F critical, then the overall GDP growth rate equation is statistically significant or otherwise.

The statistical significance of the parameters will be established. In testing for the statistical significance of the parameters, we use the rule of thumb and the t-test. The rule of thumb states that for a parameter to be statistically significant, the absolute value of the t-statistic should be greater than or equal to two. Using the t-test, the t- critical value is compared with the t-statistic at a given significance level (5%). If the t-statistic is greater than the t-critical value, then, the parameter in question is statistically significant. If otherwise, then, the parameter is not statistically significant. The t-critical value is given by (n = number of observations, and k is the number of parameters); where $n-k$ is the degree of freedom and α is the level of significance. The critical value of t is obtained from the t distribution table.

There are three major problems which affect regression results. These problems are heteroscedasticity, autocorrelation and multicollinearity. In this study to test these problems Spearman's Rank correlation; Durbin-Watson d test and VIF (Variance Inflation Factor) have been used.

4. Objectives of the study

The objectives of this study are referring as follows:

- To investigate the exchange rate policy of the government of Bangladesh and to analyze its impact on growth of the economy i.e. GDP.
- To give some possible solutions and recommendation based on the empirical result of this study.

5. Result Analysis

An estimated regression result of econometric model is shown in the following tabular form:

Table-1; Model: $GDP = \beta_0 + \beta_1 EXR + \beta_2 EXP + U_i$

Variable	Coefficient	T statistics	Collinearity Statistics
Constant	12305.536	4.268	
EXR	.844	17.465	5.681
EXP	.163	3.369	5.681
R square	.988		
DW test	1.149		
Predictors	EXP, EXR		
Dependent Variable	GDP		

To test for heteroscedasticity, using spearman's rank correlation, we obtained the correlation coefficients between considering independent variable and residual for three model are shown in the following tabular form -

Variable	Spearman's Rank Correlation between residual and independent variable
EXR	0.015
EXP	0.028

In this table all the values of spearman's rank correlation (r) are less than .05. That means very low rank correlation. This indicates the absence of heteroscedasticity in the estimated model.

Using the Durbin –Watson test formula, we obtain $d = 1.149$. Based on the decision rule ($n = 32$ and $k = 3$, from the Durbin-Watson table, $dL = 1.24$ and $dU = 1.65$; $n = 32$ $k = 2$, from the Durbin-Watson table, $dL = 1.31$ and $dU = 1.57$) we accept H_0 and reject H_1 because $d = 1.149$ lies within the acceptance range which means that there is no autocorrelation.

It is seen that in table-1 the value of VIF for both exchange rate and import is 5.681 which is less than 10; that indicates estimated result of econometric model is free from multicollinearity.

As shown from the above tests, the results shown from the ordinary least square (OLS) for econometric model is a sensible one and has no problem of heteroscedasticity; autocorrelation multicollinearity. We therefore accept the results of the above estimated econometric model.

In table-1 the R^2 given from the regression analysis is 0.988; which is approximately 98.8%. Statistically, econometric model is a very good fit. Economically, it means that about 98.8% of the total variation in the GDP growth rate is attributed to or explained by the exchange rate and export in Bangladesh. R^2 value is statistically significant since F ratio ($1.202E3$) $>$ F critical (2.9340). The unexplained variation is 1.2%. From the regression results in table -1, if exchange rate (EXR) and export are zero, then the GDP of Bangladesh is increased by 12305.536%. The value of the constant term is statistically significant since its t statistic is greater than 2. Based on the t -test, β_0 is also statistically significant at 5% level of significance.

Based on economic theory and experience, it is expected that there will be a positive relationship among GDP growth rate, exchange rate and export in Bangladesh. In the estimated model the slope of exchange rate variable is 0.844 and the slope of the export variable is 0.163. This means that a 1% increase in exchange rate and export volume will cause GDP is increase by 0.844% and 0.163% respectively. Using the rule of thumb which states that if the absolute value of t -statistic is greater than 2; then, the parameter in question is statistically significant. From the regression results, in table-1 the t -statistic of exchange rate variable is 17.465 and export variable is 3.369; which are greater than 2. This implies that β_1 and β_2 are statistically significant in the estimated model. This means that exchange rate and export are key determinant of GDP growth rate in Bangladesh.

Here too, we can conclude that there is a positive relationship among GDP growth rate and exchange rate and export in Bangladesh. As seen from the literature, this can only happen in the short-run.

The analysis and discussion of the results in section 5 all confirm the conclusion that gross domestic product in Bangladesh is influenced significantly by the exchange rate and export volume. However, this is true in the short-run.

6. Conclusion and Recommendation

This study attempted to examine the relationship among GDP growth rate and exchange rate and export in Bangladesh for the period 1981 to 2013. The paper estimates the simple linear regression using OLS. Further tests were performed to ascertain the presence of autocorrelation, heteroscedasticity and multicollinearity. Autocorrelation and heteroscedasticity and multicollinearity were found to be absent but. The regression results was also found to be very sensible since the $DW > R^2$. Also, the regression results showed that there is a positive relationship among GDP growth rate and exchange rate and export in Bangladesh and the regression results are statistically significant since t -value ($6.594 > 1.70$). Therefore, we strongly concluded that there is a positive relationship among GDP growth rate and the rate of exchange and export in Bangladesh. This implies that as exchange rate and export increases, GDP growth rate also increases. This

results, confirm the theory that high exchange rate stimulates economic growth in the short run. Therefore, policy makers should stabilise monetary and fiscal policies in the long run. Policy makers should also continue to embark on productive activities that will increase Bangladesh's exports more than her imports.

In the long run, the authorities of Bangladesh should emphasis stable monetary and fiscal policies. They should intervene in the foreign exchange market as needed to prevent excessive volatility in the nominal and hence, the real exchange rate. However, they should not attempt to influence its level. Policy makers should also ensure that resources are put to maximum use under the correct and right avenues such as technical education, better incentive and motivation for effective and efficient performance. This will allow massive output expansion to meet the demands of Bangladeshis and then export the surpluses to other countries to obtain foreign exchange, instead of importing goods and services from other countries.

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Appendix

Fiscal Years	GDP (in million US\$)	GDP growth rate (in %)	Nominal exchange rate (with US\$)	Export (in million US\$)
1981-82	18028.2	3.80	20.07	626
1982-83	17159.3	2.38	23.80	687
1983-84	19635.8	4.02	24.94	811
1984-85	21643.5	5.18	25.96	936
1985-86	21170.0	3.22	29.89	819
1986-87	23758.5	4.25	30.63	1074
1987-88	25604.2	3.73	31.24	1231
1988-89	27710.1	2.16	32.14	1292
1989-90	30475.3	2.61	32.92	1524
1990-91	30978.9	5.94	35.68	1718
1991-92	31338.6	3.34	38.15	1994
1992-93	32031.3	5.04	39.14	2383
1993-94	33852.2	4.57	40.00	2534
1994-95	38088.6	4.08	40.20	3473
1995-96	40729.2	4.92	40.84	3884
1996-97	42317.9	4.62	42.70	4427
1997-98	44025.4	5.23	45.46	5172
1998-99	45708.9	4.87	48.06	5324
1999-00	47123.9	5.94	50.31	5752
2000-01	46988.5	5.27	53.96	6467
2001-02	47567.2	4.42	57.43	5986
2002-03	51913.6	5.26	57.90	6548
2003-04	56498.1	6.27	58.94	7603
2004-05	60381.7	5.96	61.39	8655
2005-06	61975.2	6.63	67.08	10526
2006-07	68443.4	6.43	69.03	12178
2007-08	79565.6	6.19	68.60	14111
2008-09	89360.5	5.74	68.80	15565
2009-10	100364.3	6.07	69.18	16205
2010-11	111943.2	6.71	71.17	22928
2011-12	116088.0	6.23	79.09	24302
2012-13	129863.6	6.00	79.93	27027

Source: Bangladesh Bureau of Statistics; Statistics Department, Bangladesh Bank; Export Promotion Bureau.