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Export and Real Effective Exchange Rate: A study for Bangladesh using ARDL Method

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Abstract

The study examines the determinants of Readymade Garments' exports and other exports of Bangladesh with specific emphasis on the impact of the Real Effective Exchange Rate (REER). The hypothesis that persistent appreciation of the REER has negative implications on exports, when other determinants of exports remain constant, is tested using the export equation with annual data for the period 1984 to 2018 fiscal year. The Autoregressive Distributed Lag (ARDL) method is used for estimating the export equation. The results suggest that the REER is a key determinant of export performance of Bangladesh. The world demand, foreign direct investment and political stability are also contributory factor. If Bangladesh takes corrective macroeconomic policy measures to maintain the REER at a market consistent level and to provide to the upper income markets by improving the quality of products, linking with global supply chain networks and attract more foreign investment, Bangladesh would to enable to secure international competitiveness.

Key Words: *Real Effective Exchange Rate, Readymade Garments' Export, Autoregressive Distributed Lag (ARDL) model.*

1. Introduction

As part of the trade policy reform, Bangladesh formally adopted a floating exchange rate regime since May 31, 2003. To keep exports competitive, Bangladesh Bank continues to operate a managed floating of the Bangladeshi currency taka. The Real Effective Exchange Rate (REER) is avital determinant of measuring the global competitiveness of a country and, therefore, has a strong influence on export incomes, improvements in balance of payments

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and long term growth (Soutar and Santoya 2011). The study emphasizes on the impact of the REER on manufacturing exports. The REER is computed by adjusting the trade weighted nominal exchange rate with relative prices between the exporting country and destination countries, and used to measure the relative profitability and competitiveness of exports. Exchange rate misalignment, that is, relative to the equilibrium level, persistent appreciation of the real exchange rate, considering other factors remain constant, has negative implications on exports (Edwards 1988).

Bangladesh is an ideal case to examine the relationship between the REER and the performance of Readymade garments (RMG) exports, particularly for two reasons: First, due to a significant contribution in the international market in recent years. Second, in the ongoing policy debate, the real exchange rate appreciation over the past few years has been highlighted as one of the key determinants for the reverse pattern of export modification. However, this hypothesis has not yet been tested empirically and the main objective of this study is to fill this gap by testing this hypothesis.

There is significant empirical literature on the relationship between the REER and the export performance in developing countries (Fang et al. 2006, Grobar 1993,Hinkle &Monteil 1999, Krugman 1989). The misalignment of the REER has been a source of serious economic distress for many developing countries (Edwards 1988, Shatz&Tarr 2000). Moreover, there have been significant changes in the structure of the export sector performance over the last two decades, which require renewed research on the sector with a more realistic approach.

The current policy debate and decisive macroeconomic policy changes over the last decades provide ample space to analyze the role of the REER on Readymade Garments exports. The purpose of this study is to observe the determinants of Readymade Garments exports from Bangladesh, with specific focus on the REER. Accordingly, the study tests the hypothesis of whether persistent appreciation of the REER has an impact on the performance of Readymade Garments exports.

In order to test the hypothesis, this study employs a fully specified reduced form export equation to identify the determinants of the performance of Readymade Garments exports. The study analyses the RMG exports and other export items. Though the main focus is to examine the impact of the REER on the performance of exports, a bivariate model is not appropriate as many other factors, which cannot be captured by the REER variable, influence exports. Therefore, the REER variable is incorporated as the key explanatory variable, while other variables are included as controlled variables. In addition to the REER, this study takes into account the world demand for exports, the impact of foreign direct investments and political stability.

The paper is organized as follows: Section Two gives a brief overview of policy of Bangladesh and literature review. The next two sections will cover the model and data description. The estimation of the model will be given in section five. The findings are discussed in section six, followed by the conclusion.

2. Policy related to exchange rate and exports in Bangladesh and Literature Review

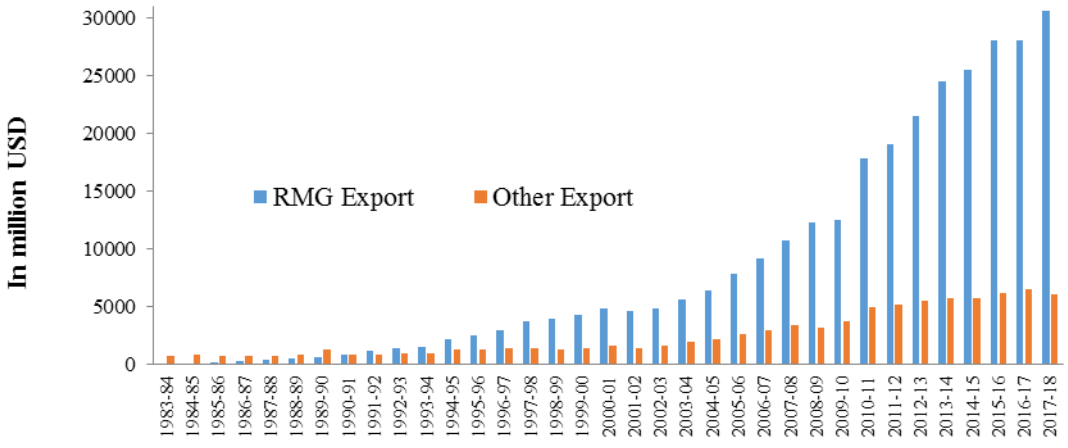
Cheung and Sengupta (2012) examine the effects of the REER on specific types of exports as an alternative of total exports. Their study explores the effects of the REER on the share of exports of Indian non-financial sector firms between 2000 and 2010. The empirical analysis reveals that firms with small export shares are more affected by the real effective exchange rate fluctuations. Using annual time series data (1992-2010) from various institutions in Ethiopia's and using the autoregressive distributive lag (ARDL) method, Mehare and Edriss (2012) shows the effect of the exchange rate variability on oilseeds' export of Ethiopia. The hypothesis is that 'there is no short run and long run relationship between export of oilseeds and explanatory variables included in the model'. The outcome shows a negative relationship between oilseeds' exports and exchange rates variability. The terms of trade (TOT) is found to be negative and significant. The underlined hypothesis is rejected which ensure a long run relationship between export of oilseeds and other explanatory variables.

Due to the limitations or unavailability of relevant data in Bangladesh, studies explain the dynamics of the REER changes in the context of Bangladesh. Aziz (2012) explores the impact of real devaluation on the trade balance in Bangladesh during the period of 1976-2009. The empirical results show a significant positive impact of the REER devaluation on the trade balance in Bangladesh. Error correction model, multivariate cointegration tests and impulse response functions are used to test the impact of the exchange rate policy in short and long run. The existence of a J-curve effect in Bangladesh was found in his study. Alam (2010) uses cointegration test, Granger causality test from the VAR model. The author concludes that the real exchange rate and export earnings have no significant relation in Bangladesh using yearly data from 1977-2005.

After its independence in 1971, Bangladesh took innovative trade policies to establish and expand the export-oriented industry and import substitution industry. In order to achieve higher growth, Bangladesh liberalized its market during the late '70s. This resulted in a significant rise in exports since the 1990s. Exporters enjoyed credit facilities at 12 percent when the prevailing market lending rate was 15.5 percent in the 1980s (Annual Report, Bangladesh Bank). By adopting policies to lower tariff rates, various types of rebate and convertibility in exchange rates helped to achieve a momentum in export growth (Aziz 2012).The Export Development Fund (EDF) was established in 1988 to encourage exporters to diversify the export basket. A very interesting factor is that RMG export was not significant before 1985, but around 80 percent of export ordered from this sector. Figure 1 shows over time, the export development of Bangladesh divided into two categories.

The other important variable we need to examine is exchange rate. Bangladesh started to manage its exchange rates system in 1979 to encourage exporters and to accelerate the export industry. In order to improve the balance of payments, the Taka was devalued about 130 times between 1972 and 2002 (Younus and Chowdhury 2006). However, the demand for the

Figure 1: Export performance of Bangladesh



Data Source: EPB

U.S Dollar consistently increased due to a rise in official trade. For this reason, in 1985, U.S. dollar replaced the U.K. pound sterling as an intervention currency for Bangladesh's trade (Younus and Chowdhury 2014). From May 2003, Bangladesh started to use the floating exchange rate according to demand and supply pressures for foreign currencies in the inter-bank market in Bangladesh to stabilize the exchange rate (Annual Report, Bangladesh Bank). Bangladesh Bank often intervenes in the inter-bank market to control the volatility of the money market to ensure market friendly exchange rates. Actually, exchange rate policies

impact Bangladesh's trade balance which indicates exchange rate policies may have a momentous effect on the export (Aziz 2008).

3. The Model

The REER is a decisive factor in a country's degree of competitiveness in the world market. Any appreciation of the REER indicates the cost of producing tradable goods has increased, while relative prices in the rest of the world are held constant. So, the production has become less cost efficient. Therefore, appreciation of the REER reflects a deterioration of the level of international competitiveness. On the contrary, a depreciation of the REER helps improve the country's degree of international competitiveness. Therefore, when the REER deviates from the optimal level consistent with long equilibrium, it affects the performance of the export sector. Such disequilibrium in the REER for a longer period of time, leads to economic instability (Willet 1986).

The REER is a function of a number of variables, other than the nominal exchange rate and reflects the significance of each currency in trade as well as relative inflation rates of related nations. Therefore, the changes in the prices of tradable goods, i.e. import tariff, export taxes or the variables that can be influenced the price levels of non-tradable goods i.e. real interest rate, capital controls etc., are all fundamentals of the REER. The basic macroeconomic requirements for sustainable export oriented growth are favorable investment climates and the maintenance of a realistic, competitive real exchange rate (Athukorala & Rajapairana 2000).

Most of the previous empirical studies for the determinants of the performance of export sector have concentrated on the formulation of the reduced form of the export equation. Following the traditional way to estimate the sensitivity of exports to the real exchange rate, derived by solving export demand and export supply equations assuming an equilibrium between demand and supply functions of exports (Xdt = Xst= EXt), this study employs a fully specified reduced form of the export equation to identify the determinants of the performance of manufacturing exports. Accordingly, the model can accommodate factors of both the demand and supply side. The advantage of the reduced form of the export equation is to avoid simultaneous equation bias, which may arise when estimating a demand or a supply function solely (Goldstein & Khan1978).

In the model, total readymade garments exports (including knitwear and woven garments), which accounted for around 80 percent of total exports in the country, is the dependent variable. Accordingly, the study estimates two different models for RMG exports and other exports, to ascertain whether the degree of the impact of the REER varies among different categories of exports.

The REER, which measures the country's competitiveness in international markets, is the key determinant variable in the study. The real exchange rate (REER) is defined as 'the relative price of tradable with respect to non-tradable goods' (Edwards 1988).

REER = Price of Tradable Goods / Price of non-tradable goods

Since prices of tradable and non-tradable goods are not readily available, the above equation is not usually used in studies. Therefore, the study uses the proximate measure based on the method proposed by Edwards (1988), which is as follows:

$$REER_t = [\ \Sigma\ S_i * NEER_{it} * Pw_{it}\ ] / Pd_t$$

In the given equation, the REER is measured using available domestic and world price indices and the nominal exchange rate. The Si is the export share corresponding to partner i. The NEER denotes the nominal exchange rate (units of domestic currency per one unit of the currency of country i), Pw is an index of world prices, which is represented by producer price index of corresponding partner i. Pd is an index of domestic prices. NEER and Pw are weighted averages of the share of trading partners. The measures used for Pw and Pd in previous studies are different to each other. The proxy for Pw is usually the whole sale price index. The consumer price index (CPI) has been used in many studies as a proxy for Pd.A decrease (increase) in the REER index denotes appreciation (depreciation) of the domestic currency with respect to the currencies of trading partners, which impact export performance negatively (positively).

The first controlled variable is the world demand approximated by the real income of importing countries. Readymade garments exports of Bangladesh are heavily concentrated on a few advanced countries like USA and European countries. However, RMG of Bangladesh is competitive in the international markets due to high quality and established brand names. Therefore, it is important to examine whether RMG export performance is influenced by the income level of importing nations. Further, any impact due to external shocks on export performance is also indirectly captured by the world demand variable, as the demand of developed countries are more sensitive to such changes and tend to adjust their preferences fast. In case of Bangladesh top 15 countries of export trade partners' GDP (covers 85 percent of total export) have been used to create WD (world demand) variables. The top 15 countries are: Australia, Belgium, Canada, China, Denmark, France, Germany, India, Italy, Japan, Netherlands, Poland, Spain, United Kingdom and United States of America.

The second controlled variable is Foreign Direct Investment (FDI). The FDI has played an important role in establishing and promoting the manufacturing industries in Bangladesh since the 1980s. The FDI not only contributes to domestic capital formation, but also brings technology, managerial knowhow and marketing channels. Following the market oriented policy reforms, many steps have been taken to attract export-oriented investors. The Bangladesh Investment Development Authority (BIDA) is the unique institution that promotes export-oriented investments and Bangladesh Export Processing Zone Authority (BEPZA) has the power to establish and operate Export Processing Zones (EPZ) in the country, where majority of export oriented manufacturing industries are located. Further, several incentive packages were offered to investors in EPZs, allowing complete foreign ownership of investment projects'. At the end of June 2018, 20 percent of total FDI stocks contributed as textile sector.

The final explanatory (dummy) variable is the Political Stability. It is believed that the political instability may create a negative impact on domestic production as well as external demand. Based on the above discussion, the empirical model used in the study can be specified as follows;

$$RMG_t = \beta_{10} + \beta_{11} REER_t + \beta_{12} WD_t + \beta_{13} FDI_t + \beta_{14} PS_t + U_{1t}$$

$$OEXP_t = \beta_{20} + \beta_{21} REER_t + \beta_{22} WD_t + \beta_{23} FDI_t + \beta_{24} PS_t + U_{2t}$$

……(1)

Where, RMG :Readymade Garments exports, OEXP: exports other than RMG, REER : Real Effective Exchange Rate, WD : World demand, FDI : Foreign Direct Investments (FDI) and PS: Political stability, dummy variable as politically instable year as 1 and stable is 0.

Sign of coefficient of the REER $\beta_{11}$and β_{21}would depend on the way exports respond to REER appreciation and depreciation. If the REER depreciates (increases), exports increase and if the

REER appreciates (decreases), exports decrease. Since there is a positive relationship between the REER and export performance, $\beta_{11}$and β_{21}will be positive. $\beta_{12}$and β_{22} will also be positive, as the levels of income of importing countries increase, demand for exports increase. However, if the partners are highly focused on export substitution policies though their income increases, they would not increase the demand for exports. This would lead to the yielding of a negative coefficient. FDI would generally impact exports positively. Therefore, $\beta_{13}$and β_{23} are expected to be positive. $\beta_{14}$and β_{24} are expected to be positive as it assumes that political stability shifts help the export sector to operate in a more business friendly environment.

4. Data and Sources

Data for RMG exports and other exports are compiled from Export Promotion Bureau (EPB), Ministry of Commerce. The REER series has been collected from United Nations Conference on Trade and Development (UNCTAD) data series index based on 2005. World Demand (WD) is approximated by the real income of trading partners. Data for WD has been obtained from the World Development Indicator (WDI) of the World Bank site. Foreign Direct Investment data has been collected from Bangladesh Bank FDI survey from fiscal year 1996-97. Before that, Balance of Payments (Financial account, FDI, Liability) data obtained from IMF database has been used. Political Stability is a dummy variable. Fiscal year 1983-84 to 2017-18 data has been used. Data and the sources for each variable are summarized in Table 1. The graphs of data series on logged level are given in Annexure.

Table 1: Data and the Sources

Variable	Data	Source
RMG	Readymade Garments exports	Export Promotion Bureau (EPB), Ministry of Commerce
OEXP	Exports other than RMG	

REER	Real Effective Exchange Rate	United Nations Conference on Trade and Development (UNCTAD) (Base year: 2005)
WD	World Demand: Trade weighted real GDP of trading partners	Authors' own calculation using World Development Indicator and EPB data
FDI	Total values of Foreign Direct Investment	Bangladesh Bank: FDI survey and Balance of Payments statement
PS	Political Stability	Based on literature survey

5. Estimation method

Since time series data are used in the study, it is necessary to examine whether the variables are stationary or non-stationary. Use of non-stationary data in regressions could produce spurious results through incorrect relationships. Therefore, logarithms of all variables were tested on the univariate basis, using the Augmented Dickey Fuller (ADF) test to examine the presence of unit roots, as proposed by Engle and Granger (1987). First logged level variables were tested and if a unit root for a particular series was found, then they were tested again by taking the first difference level of the series. If a series is stationary at level, the series is called I(0) and if a series becomes stationary after first differencing, the series is called I(1) series. When the ADF test is conducted, the intercept and trend were included based on the graphical analysis of each series. Table 2 presents the results of the ADF test.

Table 2: Results of ADF test

Variable	Level		First Difference		Order of Integration
	ADF Test Statistics	Critical Value at 5% Level	ADF Test Statistics	Critical Value at 5% Level	
LRMG	-5.27	-2.95	-8.48	-2.95	I(0)
LOEXP	-0.13	-2.95	-6.99	-2.95	I(1)
LFDI	-1.61	-2.95	-6.70	-2.95	I(1)
LWD	-1.32	-2.95	-4.15	-2.95	I(1)
LREER	-1.22	-2.95	-5.16	-2.95	I(1)

Source: Estimates using Eviews 9.0

Note: H_0: Series has a unit root, H_0 is rejected at the 5% level

The ADF test results show that one of the independent variables, the LRMG, is integrated of order zero (I(0)), while all other variables are integrated of order one. When the export

equation (1) above is estimated, it is necessary to estimate the long run relationships among the variables. The long run relationships can be estimated through a conventional co-integration technique, but the technique required all series to be integrated in the same order. According to the results of the unit root test, variables used in the study are a mix of I(0) and I(1). Therefore, the Autoregressive Distributed Lags (ARDL) method developed by Pesaran and Shin (1999) and Pesaran (2001) is used in the study.

The ARDL technique provides some additional advantages in the estimation process compared to other estimation methods. First, it allows the use of a mix of I(0) and/or I(1) in the ARDL and pre-testing for the unit root is only required to confirm that the series are not of I(2) or a higher order. Second, it supports small and finite samples to deliver statistically significant results compared to other techniques that prefer to have large samples to deliver reliable results. Third, the ARDL technique has the ability of accommodating different time lags for different variables in the model, while other techniques require all variables to be kept in the same order of lag. Fourthly, it takes care of omitted variables and serial correlation problems and addresses any endogeneity problem, since it provides unbiased estimates in the long-run model. Further, the ARDL model estimates both short run and long run dynamics simultaneously in one single reduced form equation (Harris & Sollis 2003).

The Log linear transformation of the model (1) in the ARDL specification is as follows;

$$\Delta LRMG_t = \alpha_1 + \sum_{k-1}^{p} \psi_{1k} \Delta LREER_{t-k} + \sum_{k-1}^{p} \gamma_{1k} \Delta LWD_{t-k} + \sum_{k-1}^{p} \delta_{1k} \Delta LFDI_{t-k} + \sum_{k-1}^{p} \lambda_{1k} \Delta LRMG_{t-k} + \beta_{11} LREER_{t-1} + \beta_{12} LWD_{t-1} + \beta_{13} LFDI_{t-1} + \beta_{14} LRMG_{t-1} + \beta_{15} PS_t + \epsilon_{1t}$$

$$\Delta LOEXP_t = \alpha_2 + \sum_{k-1}^{p} \psi_{2k} \Delta LREER_{t-k} + \sum_{k-1}^{p} \gamma_{2k} \Delta LWD_{t-k} + \sum_{k-1}^{p} \delta_{2k} \Delta LFDI_{t-k} + \sum_{k-1}^{p} \lambda_{2k} \Delta LOEXP_{t-k} + \beta_{21} LREER_{t-1} + \beta_{22} LWD_{t-1} + \beta_{23} LFDI_{t-1} + \beta_{24} LOEXP_{t-1} + \beta_{25} PS_t + \epsilon_{2t} \quad \ldots\ldots\ldots\ldots\ldots\ldots (2)$$

where Δ indicates the variables are in the first-difference form and p is the optimal lag length. ϵtis the random error term. Coefficients β1, β2, β3, β4, β5 show long term dynamics while ψk, γk, δk, and λk stand for short term dynamics. The study followed the three stages of the ARDL approach to Cointegration as follows.

First, the orders of the lags in the ARDL model can be selected either by the Akaike information criterion (AIC) or the Schwarz Bayesian criterion (SBC). Since the study used annual data, it used two as the maximum order of lags in the estimations, as Pesaran and Shin (1999) recommended. The AIC (Akaike Information criterion) is used to decide the lag structure of the series. In the second step, the bound testing approach (Wald test) is employed to examine the existence of a long-run relationship between the variables. Whether to include the long-run dynamics in the model is decided by comparing the F test statistic with the critical values proposed by Pesaran (2001).

The null hypothesis and alternative hypothesis in the F test are,

$$H_0: \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = 0$$
$$H_1: \beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq 0$$

The F statistic depends on the number of independent variables in the regression (k), the sample size (n), stationary I(0) and non-stationary I(1) properties and whether the estimated model has a trend and/or intercept.

Two sets of critical values are provided by Pesaran (2001); an upper bound critical value (I1) that is used when all variables in the model are integrated of order I(1), and a lower bound critical value (I0) that is used when variables are (I(0)). If the calculated F statistic by the joint test is greater than the upper bound critical value, the variables are said to be cointegrated, where there is a long run relationship in the model.

In the third step, the following long-run model is estimated if there is evidence of a long-run relationship (cointegration) of the variables.

$$LRMG_t = \alpha_{11} + \sum_{k-1}^{p} \psi_{11k} LREER_{t-k} + \sum_{k-1}^{p} \gamma_{11k} LWD_{t-k} + \sum_{k-1}^{p} \delta_{11k} LFDI_{t-k} + \sum_{k-1}^{p} \lambda_{11k} LRMG_{t-k} + u_{1t}$$

$$LOEXP_t = \alpha_{12} + \sum_{k-1}^{p} \psi_{12k} LREER_{t-k} + \sum_{k-1}^{p} \gamma_{12k} LWD_{t-k} + \sum_{k-1}^{p} \delta_{12k} LFDI_{t-k} + \sum_{k-1}^{p} \lambda_{12k} LRMG_{t-k} + u_{2t}$$

…….. (3)

The ARDL specification of the short-run dynamics, derived by constructing an Error Correction Model (ECM) is as follows;

$$\Delta LRMG_t = \alpha_{21} + \sum_{k-1}^{p} \psi_{21k} \Delta LREER_{t-k} + \sum_{k-1}^{p} \gamma_{21k} \Delta LWD_{t-k} + \sum_{k-1}^{p} \delta_{21k} \Delta LFDI_{t-k} + \sum_{k-1}^{p} \lambda_{21k} \Delta LRMG_{t-k} + \gamma_1 ECM_{1(t-1)} + \varrho_{1t}$$

$$ECM_{1t} = LRMG_T - \alpha_{11} - \sum_{k-1}^{p} \psi_{11k} LREER_{t-k} - \sum_{k-1}^{p} \gamma_{11k} LWD_{t-k} - \sum_{k-1}^{p} \delta_{11k} LFDI_{t-k} - \sum_{k-1}^{p} \lambda_{11k} LRMG_{t-k}$$

$$\Delta LOEXP_t = \alpha_{22} + \sum_{k-1}^{p} \psi_{22k} \Delta LREER_{t-k} + \sum_{k-1}^{p} \gamma_{22k} \Delta LWD_{t-k} + \sum_{k-1}^{p} \delta_{22k} \Delta LFDI_{t-k} + \sum_{k-1}^{p} \lambda_{22k} \Delta LRMG_{t-k} + \gamma_2 ECM_{2(t-1)} + \varrho_{2t}$$

$$ECM_{2t} = LOEXP_T - \alpha_{12} - \sum_{k-1}^{p} \psi_{12k} LREER_{t-k} - \sum_{k-1}^{p} \gamma_{12k} LWD_{t-k} - \sum_{k-1}^{p} \delta_{12k} LFDI_{t-k} - \sum_{k-1}^{p} \lambda_{12k} LOEXP_{t-k}$$

…… (4)

In the short-run equation, all coefficients are related to the short-run dynamics of the model's convergence to equilibrium and γ represents the speed of adjustment. Following the methodology above, the study estimates two different models; for Readymade Garments (RMG), Other Exports (OEXP). After estimating the models, the residual of all selected models are tested for unit root, to check whether they are stationary at level, which further confirms the long run equilibrium that exists among variables. Further, the most common and standard residual diagnostics tests i.e. Serial Correlation LM test and Breusch-Pagan-Godfrey test for Heteroscedasticity were performed. In addition, the other standard residual diagnostic tests were performed to confirm the validity of the estimated model. Further, the stability of the system is tested by the CUSUM test.

6. Results

The prime objective of the study is to examine the impact of the REER on export performance. At the first step, the best models for LRMG and LOEXP were selected using the co-integration analysis and allthe diagnostic test results are presented below. The bound tests

proved the existence of a long- run relationship among the variables in theselected three models. The F test statistics for the selected two different models and therelevant lower and upper bound critical values from Pesaran (2001) table are reported in Table3 below.

Table 3: F test Statistics and Bound Test results

Models	F statistics	P value
LRMG	16.05	0.00***
LOEXP	5.96	0.00***
	I0 Bound	I1 Bound
5% significant level	2.86	4.01

Source: Pesaran (2001), Table CI(iii) Unrestricted intercept and no trend

Test statistics of all the models lie outside I1 and I0 Bound values and exceed the I1 critical value. Therefore, the null hypothesis is rejected in favor of the alternative and it can be concluded that there are long-run relationships in all models.

The residual of all models were tested for unit root tests and test results revealed that residuals are stationary at level, which further confirmed the long run equilibrium that exists among variables. The results of the Serial Correlation LM test and Breusch-Pagan-Godfrey test for Heteroscedasticity confirmed that there is no Serial Correlation in the systems and also no heteroscedasticity is present in all three cases. The residual diagnostic test results for the selected models are given in Table 4.

Table 4: Residual Diagnostic Test Results

Models	Test Statistics	F value	Results
LRMG	Heteroscedasticity Test B Beusch-Pegan-Godfrey	1.28 (0.33)	No heteroscedasticity
	Serial Correlation LM test	1.69 (0.23)	No serial correlation
LOEXP	Heteroscedasticity Test B Beusch-Pegan-Godfrey	0.13 (0.99)	No heteroscedasticity
	Serial Correlation LM test	0.07 (0.80)	No serial correlation

Values in the Parenthesis are the P-values

The CUSUM test results revealed that all systems are stable. Figure 1 presents the plots of the CUSUM statistics for two models that fall inside the critical bands at 5% confidence interval.

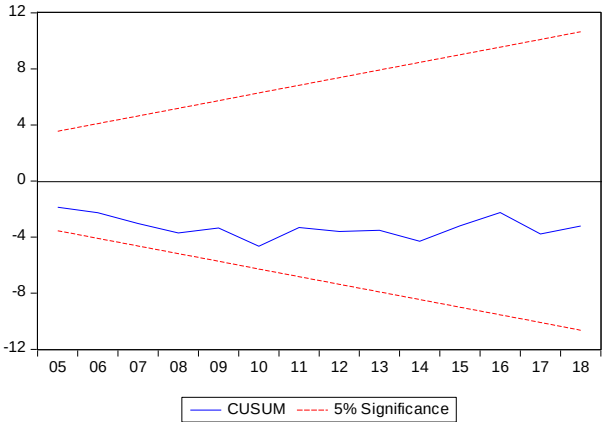
Based on the results of the co-integration analysis and the diagnostic tests, the models that were selected as the most preferred models in the study are as follows.

The results of the ECM for the two export categories are presented in Table 5 and the long-run estimations given in Table 6.

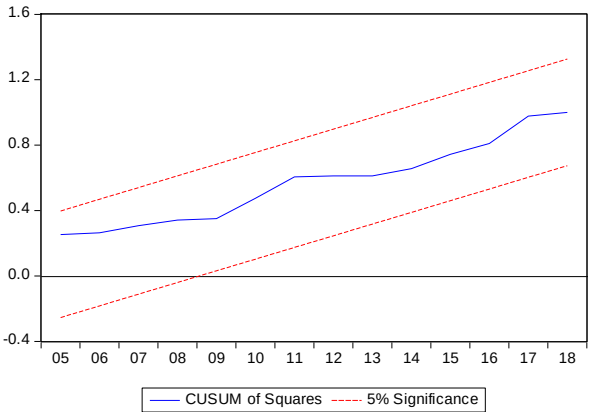
Figure 2: CUSUM test result

Model for LRMG

CUSUM



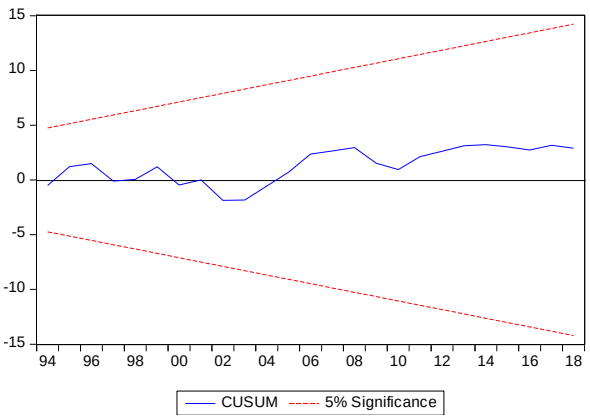
CUSUM of Squares

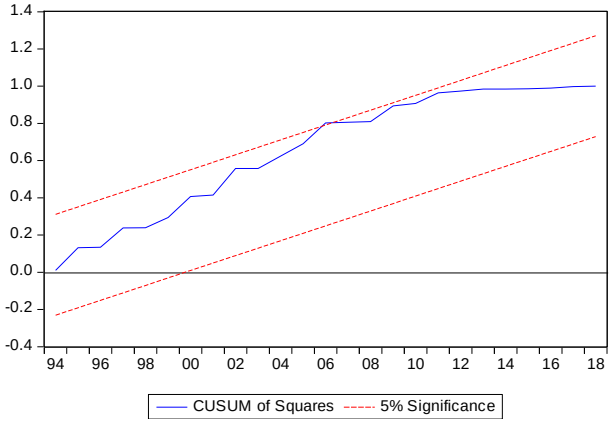


Model for LOEXP

CUSUM

CUSUM of Squares





In all models, coefficients of error correction terms ECM (-1) are negative and significant at a 5% level for all models. The absolute value of coefficient of ECM (-1) indicates the rate of convergence to equilibrium or the speed of adjustment to equilibrium following a short run shock. Accordingly, the whole system of other exports will get back to the long-run equilibrium at the speed of 41 percent and 37 percent for RMG export. These results provide the evidence of co-integration (long-run relationship) among variables in all models.

Table 5: The Short Run Dynamics: Error Correction Representation for the selected ARDL Models

	LRMG	**LOEXP**
C	0.04 (0.84)	0.07 (1.60)
D(LRMG(-1))	0.21 (0.82)	
D(LRMG(-2))	-0.20 (-0.81)	
D(LRMG(-3))	0.23* (1.83)	
D(LREER(-1))	-0.87** (-2.15)	-0.14 (-0.41)

D(LREER(-2))	-0.09 (-0.15)	
D(LREER(-3))	0.26 (0.56)	
D(OEXP(-1))		0.02 (0.11)
D(LWD(-1))	-0.46 (-0.62)	0.13 (0.23)
D(LWD(-2))	1.21 (1.43)	
D(LWD(-3))	0.34 (0.62)	
D(LFDI(-1))	-0.011 (-0.32)	-0.07** (-2.45)
D(LFDI(-2))	-0.03 (-0.81)	
D(LFDI(-3))	-0.01 (-0.20)	
D(PS(-1))	-0.05 (-0.85)	-0.08** (-1.77)
D(PS(-2))	-0.02 (-0.39)	
D(PS(-3))	-0.03 (-0.66)	
ECM(-1)	-0.37** (-2.09)	-0.41** (-2.19)
R^2	0.58	0.37
Adjusted R^2	0.11	0.22

***=1%, **=5%, *=1%

Values in the Parenthesis are the t statistics

In the short-run, coefficients of the REER are negative and significant only in the RMG equation and the REER is not statistically significant in other export equation.

However, in the long-run the REER is significant at a 5 per cent level and reported a negative sign in RMG exports. A one percent depreciation of the REER would lead to the increase of exports by less than one percent in the long-run, which creates a more elastic situation.

Table 6: Long Run Estimation Results

	LRMG	**LOEXP**
C	-33.44 (-7.52)	-17.36 (-6.40)
LREER(-1)	0.67** (2.15)	-0.31 (-1.64)
LWD(-1)	1.70*** (9.30)	1.41*** (12.64)
LFDI(-1)	0.16*** (4.23)	-0.04* (-1.92)
PS	-0.19* (-2.00)	0.14** (2.47)
R^2	0.98	0.96
Adjusted R^2	0.97	0.95

***=1%, **=5%, *=1%

Values in the Parenthesis are the t statistics

The short-run coefficients of WD are insignificant in all models. In the long-run, WD is significant with the positive sign in all types of export equation, suggesting that the RMG sector and other export sectors have the potential of capturing the markets with upper income by improving the quality standards and catering to globally branded products.

In contrast to the positive and significant impact of FDI on other exports in the short-run, FDI has no significant impact on RMG exports. In the long-run, FDI is reported a positive sign and other sectors as negative sign. This confirms that Bangladesh has successfully utilized FDI flows to improve the RMG sectors and failed to utilize to improve other export-oriented industries during the last few decades. Despite many incentive packages offered to attract investments over the years, the investment climate has not been so attractive to foreign investors in export oriented industries. The possible reasons may be policy uncertainty and inefficient institutional structures in terms of FDI promotion and facilitation.

The dummy used for the political stability has no significant impact on RMG exports in the short-run but has significant impact in long-run with a negative sign. Political stability has significant effect on both short-run and long-run with opposite sign. It is sensible, because the RMG exports industry had been able to establish strong market links. Moreover, the RMG industry in Bangladesh has already been well-established and has become internationally competitive due to trade and investment liberalization reforms that have been implemented.

Results clearly suggest that the REER has been a key determinant of readymade garments export performance of the country. According to the overall estimations, it can be suggested that domestic supply side related factors are important in determining the export performance as well as the factors associated with external demand factors.

7. Conclusion

The results clearly suggest that the REER has been a key determinant of RMG exports of Bangladesh. Policy makers should aim at maintaining the REER at a realistic (market consistent) level to reap such benefits. In order to restore international competitiveness, the nominal exchange rate should be allowed to adjust to the equilibrium level, which needs significant depreciation. However, nominal depreciation itself will not achieve the objective; itis crucial to maintain domestic macro- economic stability, as it impacts the objective through the relative prices. Results also suggest that Bangladesh has the ability to penetrate the world market through improvements in supply side competitiveness.

In the current economic conditions of a nation with a large deficit of trade and current account balances of the Balance of Payments, and a significantly higher ratio of foreign debt, nominal depreciation alone would not resolve the problem of those imbalances, since it also would be an expensive instrument, that would worsen government budgetary conditions further. It could also lead to sudden capital outflows due to adverse effects on investor sentiment. Therefore, a more prudent consolidated policy package is required; including a more flexible exchange rate policy and more disciplined fiscal management system to reduce public debt in a sustainable manner. Moreover, a more consistent but independent monetary policy framework, and trade and investment policy reforms are necessary to improve the overall economic condition in the country and foster sustainable growth.

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Annexure: Logged Level Time Series