Potential Impact of the Sixth Five Year Plan on the Relationship among Exports, Imports, Remittances and Economic Growth in Bangladesh: A Vector Error Correction Modeling Analysis

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Abstract

This paper examines the potential impact of the Sixth Five Year Plan on the causal relationships among exports, imports, remittances and economic growth in Bangladesh. We first assess the relationship using annual time series data from 1972 to 2010, then add the projected data for 2011 to 2015 of the Sixth Five Year Plan to data from 1972 to 2015, and reassess the relationship and hence evaluate the impact. We apply the Augmented Dickey-Fuller and Phillips-Perron test to check the time series properties of the variables - export, import, remittance and GDP. Johansen's cointegration estimation procedure in a vector autoregressive (VAR) framework is applied to examine the causal relationships among the variables. Finally, we apply the method of Granger causality based on vector error correction model (VECM) to show the direction of causal relationships. Results indicate that there is short-run instability in export, import, remittance and economic growth and long-run equilibrium relationships among them for both the periods 1972 to 2010 and 1972 to 2015. Granger causality results show that there is unidirectional causality from economic growth to exports and imports for the period 1972 to 2010 and the order of the unidirectional causality is reversed when the projected data for 2011-2015 is added to data from 1972 to 2010. That is, for the period 1972 to 2015, we get unidirectional causality from exports, imports and remittances to economic growth in Bangladesh. Further, results of Pairwise Granger causality show that while none of exports, imports and

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remittance causes economic growth during the period 1972 to 2010, all of them cause economic growth for the period 1972 to 2015. The proper realization of the targets set by the Sixth Five Year Plan will therefore help the economy to achieve its targeted growth in general and to work the export-led growth hypothesis in Bangladesh in particular.

Keywords: *Sixth Five Year Plan, Johansen Cointegration Approach, Granger Causality, Bangladesh*

1.   Introduction

Exports, imports, and remittance are likely to have individual and joint causal effects on economic growth. An economy can boast its economic growth by improving their relationship. A growing body of trade and development literature has emphasized exports as a vehicle to accelerate economic growth. It is argued that exports can help the process of economic growth through a variety of channels including, for example, efficient allocation of resources, economies of scale, comparative advantage, enhanced capacity utilization, improved productivity, and diffusion of technological knowledge and innovation, exchange of new ideas and production process. Thus, international trade and development theory suggests that export growth due to export-oriented policies contributes positively to economic growth. Imports may have either positive or negative impact on economic growth depending upon the types of imports. If the import bundles consist of necessary food items, luxurious commodities and other unproductive ones, it may negatively affect economic growth because of pressures created on balance of payments. But if import bundles consist of industrial machinery, low cost production process, latest production system, new technology etc., it will positively affect economic growth in the long-run. Imports can also help get comparative advantage and specialization.

Remittance is another major source of foreign exchange earnings, which can accelerate economic growth. International labor migration and workers' remittances play major roles in economic growth by reducing unemployment, increasing national income and augmenting foreign exchange reserves. Remittances fill the critical gap resulting from the shortage of foreign exchange due to limited FDI and the still narrow export base. Recognizing the role of migration as an instrument for transferring skills, raising productive efficiency, and stimulating domestic investment, international labor migration and remittances are assigned high priority in a country's development strategy. That being the reason, remittances can help accelerate economic growth in developing

countries. Output, on the other hand, can influence exports (Kaldor, 1967, Lancaster, 1980, and Krugman, 1984). However, imports and economic growth are closely related in many countries, as many developing countries are bound to import some commodities from industrially developed countries. A large number of studies tested the individual and joint causal relationships among exports, imports, remittance and economic growth using different econometric procedures ranging from simple OLS to multivariate cointegration but produced mixed and conflicting results on the nature and direction of their causal relationships.

Safdari et al. (2011) analyze the causal relationship between exports and economic growth for a panel of thirteen Asian developing countries over the period 1988 to 2008. Empirical analyses presented a unidirectional causality from economic growth to export (Srivastava and Kapoor, 2007). Rahmaddi and Ichihashi (2011) test the linkage of exports and economic growth in Indonesia during the period 1771 to 2008. A few other studies conclude that exports and economic growth exhibit bidirectional causal relationship (Taban and Aktar, 2007; Shirazi and Manap, 2005; Ismail and Harjito, 2003; Lee and Huang, 2002).

Jordaan and Eita (2007) analyze the causality between exports and GDP of Namibia to evaluate the relationship of these variables for the period 1970 to 2005. The results reveal that exports Granger cause GDP and GDP per capita. Lonik (2007), Erfani (1999), Kwan (1991), Al-Mamun and Nath (2007), Amavilah (2003) and Keong et al. (2005) identify that the export-led growth hypothesis is valid.

Dutta and Ahmed (2004) investigate that import demand in India is largely explained by real GDP. However, the direction of influence between imports and economic growth is less certain. Li et al. (2003) apply a dynamic panel approach to investigate the impacts of imports of services on economic growth with a panel of 82 countries. The results suggest that the imports of services have a significant positive impact on economic growth in developed countries and a negative impact in developing countries. The results also suggest that imports of other services have significant positive effect in developed countries while imports of transportation and travel have no significant effect (Humpage, 2000; Kotan and Saygili, 1999; Gulati, 1988).

Evidence supporting the import-led growth effect can be found in Thangavelu and Rajaguru (2004) for India, Indonesia, Malaysia, Philippines, Singapore and Taiwan. Similar findings are found in Awokuse (2007) for Poland and in Awokuse (2008) for some South American countries. In Awokuse (2007), the causality is found to run in the opposite direction for the Czech Republic.

Shirazi and Manap (2004) reinvestigate the export-led growth hypothesis for

Pakistan. The empirical results strongly support a long-run relationship among imports, exports and output growth. The paper finds feedback effect between import and output growth, and unidirectional causality from export to output growth. Nevertheless, this paper does not find any significant causality between import and export growth. Asafu-Adjaye and Chakraborty (1999) also find that the causality runs indirectly from exports to imports and then to real output.

Barajas et al. (2009) show that workers' remittances have no impact on economic growth. Jongwanich (2007) suggests that, while remittances do have a significant impact on poverty reduction through increasing income, smoothing consumption and easing capital constraints of the poor, they have only a marginal impact on growth operating through domestic investment and human capital development.

Ekanayake and Mihalis (2008) find that both remittances and foreign direct investment significantly promote growth in developing countries. However, this positive relationship is challenged in several studies. Spatafora (2005) finds that there is no direct link between real per capita output growth and remittances. Chami et al. (2005), using panel data for 113 developing countries, find that remittances have a negative effect on economic growth.

The economy of Bangladesh has been facing deficit in trade balance since its very inception. The growth rate of GDP is also low and it fluctuates around 6 percent per year. The deficit in trade balance is met mostly by remittances, which is one of the major sources of foreign currency. In 1972, the export earnings ware US$356.84 million, while import payments ware US$863.53 million and GDP was US$23788.67 million. In 1980, export earnings increased to US$995.27 million and import payments also increased to US$3239.43 million, resulting in a trade deficit of US$2244.16 million. In that year, remittance receipts and GDP ware US$ 339 million and US$32010.41 million, respectively. In the beginning of the 1990s, export earnings, import payments, remittance receipts and GDP ware US$ 1844.50, US$4076.60, US$779.00 and US$51800.80 million, respectively. In the very beginning of 1990s, Bangladesh with many South Asian countries adopted export promotion trade policy which increased the volume of exports and export earnings significantly. Figure 1 shows exports, imports, remittance and GDP of Bangladesh during the period 1972 to 2010. Thus, analyzing the interrelationships and the direction of causality between exports, imports, remittance and economic growth is interesting from both academic and policy-makers' point of view, and can help us to determine the most suitable orientation of economic policies in developing countries.

In 2000, export earnings, import payments, remittances and GDP ware US$6588.07, US$9060.86, US$1968, US$91988.98 million, respectively. In 2008, these amounted to US$16181.03, US$22873.05, US$8941 and US$

Figure 1 :   Exports, Imports, Remittances and GDP for the Period 1972 -
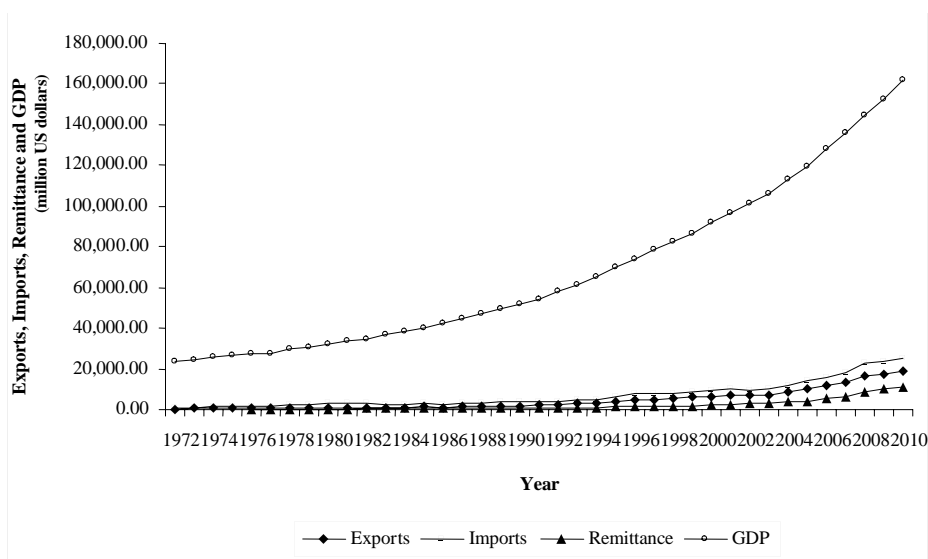
144418.21 million, respectively. By the end of 2010, these amounts ware US$ 18546.46, US$ 24944.61, US$ 10804 and US$ 161619.75 million, respectively. We find that the economy of Bangladesh moved forward with a substantial amount of trade deficit over the periods.

1.2   Sixth Five Year Plan and Exports, Imports, Remittances and Economic Growth

The Government of Bangladesh has adopted the Sixth Five Year Plan which provides strategic directions and policy framework for implementing the main socioeconomic targets of the Vision 2021. It focuses on the underlying strategies, policies and institutions for achieving the major targets for economic growth, employment, human development, poverty reduction, social protection and environment management. It sets a number of targets that will influence exports, imports, remittance and economic growth in Bangladesh. Further, it has projected the amount of exports, imports, remittance and GDP growth over the period from 2011 to 2015. Projected exports, imports, remittance and GDP are shown in Figure 2.

Figure 2 shows that while exports, imports, remittances and GDP are US$18546.46, US$24944.61, US$10804 and US$161619.75 million, respectively in 2010, they are projected by the Sixth Five Year Plan to be US$38800, US$52800, US$17829, and US$229865.33 million, respectively, by the end of 2015. There is still trade deficit over the period from 2011 to 2015.

Figure 1 : Exports, Imports, Remittances and GDP for the Period 1972 -
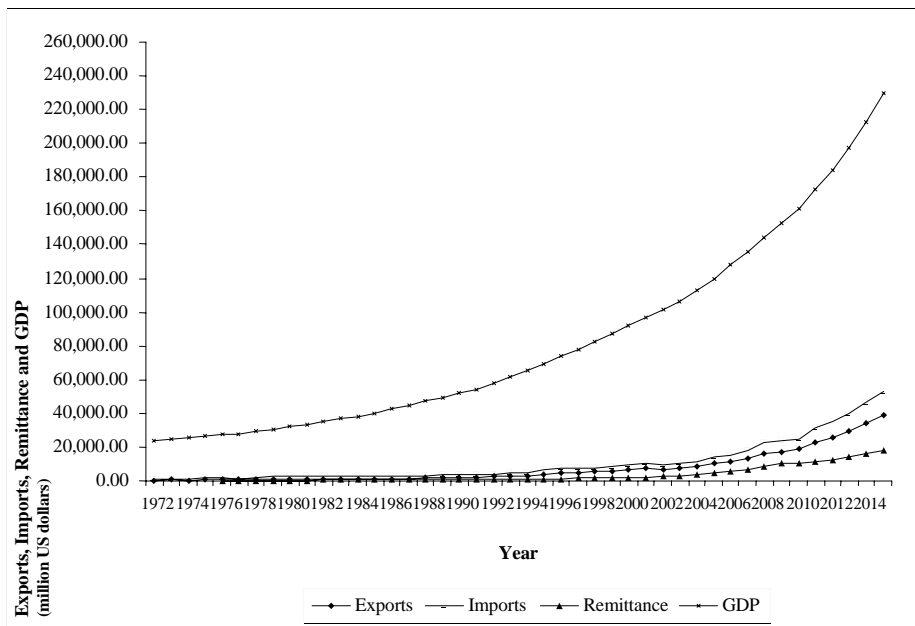
Now a question may arise about the current status of the cointegration and causal relationship among export, imports, remittance and GDP and what will happen to the cointegration and causal relationship among them after the completion of the Sixth Five Year Plan in 2015. This research is, therefore, designed to assess the cointegration and causal relationship among the variables, namely, exports, imports, remittance and GDP for the period 1972 – 2010 and for the period 1972-2015 that includes the period of the Sixth Five Year Plan, and also to find if there is any short-run instability in the variables and short-run causality among them. Further we calculate pairwise Granger causality between the variables. Finally, we compare results for the period 1972-2010 and for the period 1972-2015.

3.   Methodology

The empirical methodology of this paper consists of three steps, checking the time series properties of the variables, that is, testing for a unit root, testing for the

long-run cointegration relationship among the variables and estimating Granger causality based on vector error-correction model (VECM) in a multivariate framework. These steps are briefly explained below.

3.1 Unit Root Test

To check whether the variables used are stationary or nonstationary is the first step of the methodology. If the variables are nonstationary, stationarity can be achieved by differencing them. The number of differencing required to make the variables stationary is called order of integration. We use the Augmented Dickey Fuller (ADF) and Phillips-Perron test to examine whether the variables are stationary or not. The ADF test is estimated by the following regression:

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \sum_{i=1}^{m} \alpha_i \Delta Y_{t-i} + u_t \tag{1}$$

where ΔY is the first difference of Y series, β_1 is a constant term, t is a trend variable, m is the number of lags which are included to allow for serial correlation in the residuals and u_t is the residual term. A test for nonstationarity of the series, Y_t, amounts to a t-test of $\delta=0$. The alternative hypothesis of stationarity requires that δ be significantly negative.

If the absolute value of the computed t-statistics for δ exceeds the absolute critical value, then the null hypothesis, that the Y_t series is not stationary, must be rejected against its alternative hypothesis. If, on the other hand, it is less than the critical value, it is concluded that the Y_t series is nonstationary.

Phillips-Perron (1988) test (PP) is also applied to test nonstationarity. The ADF test takes care of possible serial correlation in the error terms by adding the lagged difference terms of the regressand. Phillips and Perron (PP) use nonparametric statistical methods to take care of the serial correlation in the error terms without adding lagged difference terms. The test detects the presence of a unit root in a series, say Y_t, by estimating the regression as follows:

$$\Delta Y_t = \alpha + \rho Y_{t-1} + u_t \tag{2}$$

$$\Delta Y_t = \alpha + \beta t + \rho Y_{t-1} + u_t \tag{3}$$

where the second equation includes a trend variable. The PP test is the t value associated with the estimated coefficient of ρ. The series is stationary if ρ is negative and significant. The test is performed for all the variables where both the original series and the differences of the series are tested for stationarity.

3.2 Johansen's Multivariate Cointegration Approach

The second step is to test for long-run relationship among the variables. We apply the Johansen's multivariate cointegration procedure to assess the long-run relationship. We formulate the Vector Autoregressive (VAR) model following Johansen as follows:

$$y_t = \mu + \sum_{k=1}^{p} \Pi_k \, y_{t-k} + \varepsilon_t \tag{4}$$

where y_t is an *(n x 1)* column vector of *n I(1)* variables, Π_k is a coefficient matrix, μ presents a *(n x 1)* vector of constants, *p* denotes the lag length, and $?_t$ is a disturbance term independently and identically distributed with zero mean and constant variance. Equation (4) can also be expressed in first difference form as:

$$\Delta y_t = \mu + \eta y_{t-1} + \sum_{k=1}^{p-1} \Gamma_k y_{t-k} + \varepsilon_t \tag{5}$$

where Δ is the first difference operator and *I* is a n × n identity matrix, $\eta = \sum_{k=1}^{p} \Pi_k - I$ and $\Gamma_k = - \sum_{j=k+1}^{p} \Pi_j$. The rank of matrix Π determines the number of cointegration vectors which is equal to the number of independent number of cointegrations. If the rank of Π equals *r* and *r < n,* then there exists *r* cointegrating relationships in the model. The number of cointegrating relations can be tested with two statistics, namely trace and maximum eigenvalue. The trace test statistic for the null hypothesis that there are at most *r* distinct cointegrating vectors is:

$$\lambda_{trace} = T \sum_{i=r+1}^{p} \ln(1 - \lambda_i) \tag{6}$$

where $\lambda_{r+1} \ldots \lambda_p$ are *p-r* smallest estimated eigenvalues. The likelihood ratio test statistic for the null hypothesis of *r* cointegrating vectors against the alternative of *r+1* cointegrating vectors is the maximum eigenvalue test and is given by:

$$\lambda_{max} = T \ln(1 - \lambda_{r+1}) \tag{7}$$

3.3 Granger Causality

The notion of cointegration provides the basis for modeling both the short-run and the long-run relationships simultaneously. If it is found that the variables are cointegrated, then according to Granger representation theorem (Engle and Granger 1987), the relationship among exports, imports, remittances and economic growth can be expressed as the vector error correction mechanism in a multivariate framework. This is given below:

$$\Delta y = \alpha_{11} + \alpha_y v_{t-i} + \sum_{i=1}^{k}\delta_{11,i}\Delta y_{t-i} + \sum_{i=i}^{k}\delta_{12,i}x_{t-i} + \sum_{i=1}^{k}\delta_{13,i}m_{t-i} + \sum_{i=1}^{k}\delta_{14,i}r_{t-i} + \varepsilon_1 \tag{8}$$

$$\Delta x = \alpha_{21} + \alpha_x v_{t-i} + \sum_{i=1}^{k}\delta_{21,i}\Delta y_{t-i} + \sum_{i=i}^{k}\delta_{22,i}x_{t-i} + \sum_{i=1}^{k}\delta_{23,i}m_{t-i} + \sum_{i=1}^{k}\delta_{24,i}r_{t-i} + \varepsilon_2 \tag{9}$$

$$\Delta m = \alpha_{31} + \alpha_m v_{t-i} + \sum_{i=1}^{k}\delta_{31,i}\Delta y_{t-i} + \sum_{i=i}^{k}\delta_{32,i}x_{t-i} + \sum_{i=1}^{k}\delta_{33,i}m_{t-i} + \sum_{i=1}^{k}\delta_{34,i}r_{t-i} + \varepsilon_3 \tag{10}$$

$$\Delta r = \alpha_{41} + \alpha_r v_{t-i} + \sum_{i=1}^{k}\delta_{41,i}\Delta y_{t-i} + \sum_{i=i}^{k}\delta_{42,i}x_{t-i} + \sum_{i=1}^{k}\delta_{43,i}m_{t-i} + \sum_{i=1}^{k}\delta_{44,i}r_{t-i} + \varepsilon_4 \tag{12}$$

This equation system constitutes VAR in first differences, which include error correction terms, and allows examining the short-run dynamics of the long-run relationship among the variables. The coefficient of the error correction term must be seen as correcting towards equilibrium subspace, i.e., how adjustment is taking place in the short-run to maintain stable equilibrium long-run relationship among the variables. The coefficients of the lagged values of the variables show whether the independent variables cause the corresponding dependent variable (Ramos, 2001).

3.4 Data

Annual time series data on real GDP, exports, imports and remittances are used that are collected from World Development Indicators, World Bank's online version for the period from 1972 to 2010. Remittances data cover the period from 1976 to 2010. The projected data from 2011 to 2015 on exports, imports, remittances and real GDP are collected from the Sixth Five Year Plan (MoF, 2011). Real GDP is used as a proxy for economic growth.

4.   Discussion of Econometric Results

4.1   Results of Unit Root

We apply ADF and PP tests to check whether the variables suffer from unit root problems, that is, whether the variables are stationary or nonstationary and results are reported in Table 1. Both the tests include a trend and intercept at both level and first difference form. Results of Augmented Dickey-Fuller test indicate that all the series are nonstationary at level forms. While exports and imports series are stationary at first difference forms at 1 percent significance level, remittances and GDP series are stationary at first difference forms at 5 percent significance level. Results of PP test indicate that all the series except GDP are nonstationary at level forms. Results show that exports and imports are stationary at first difference forms at 1 percent significance level, import is stationary at 10 percent

significance level, and GDP is stationary at 5 percent significance level. Taking into account the projected data of the Sixth Five Year Plan from 2011 to 2015 along with data from 1972 to 2010 of the variables, we check the unit root and results are given in the lower portion of Table 1. Results exhibit that the series are nonstationary at level forms, but stationary at first differences.

Table 1 : Results of ADF and PP Tests for both the period 1972-2010 and 1972-2015

Variables	Augmented Dickey -Fuller Test		Phillips-Perron Test	
	Level	First Difference	Level	First Difference
1972-2010: Period before the Sixth Five Year Plan				
Exports	2.597572	-4.297700***	2.353297	-4.388177***
Imports	1.467019	-4.945741***	1.417691	-4.951845***
Remittances	2.820322	4.100412**	2.299483	-3.218806*
GDP	3.005879	-3.838737**	6.843553***	-3.612408**
Significance Levels	Critical Values	Critical values	Critical values	Critical values
1 Percent	-4.219126	-4.226815	-4.219126	-4.226815
5 Percent	-3.533083	-3.536601	-3.533083	-3.536601
10 Percent	-3.198312	-3.200320	-3.198312	-3.200320
1972-2015: Period Including the Sixth Five Year Plan				
Exports	3.122885	3.802991**	2.11249	-4.597211***
Imports	4.779092***	-3.236832*	2.75083	-3.628038**
Remittances	2.066028	-4.944992***	2.763861	-3.840711**
GDP	2.708469	4.229420***	4.63395***	3.489210*
Significance Levels	Critical Values	Critical Values	Critical Values	Critical Values
1 Percent	-4.186481	-4.205004	-4.186481	-4.192337
5 Percent	-3.518090	-3.526609	-3.518090	-3.520787
10 Percent	-3.189732	-3.194611	-3.189732	-3.191277

Note: ***, ** and * denote rejection of the null hypothesis of unit root at 1%, 5% and 10% level of significance. A variable is said to be stationary, if the absolute value of the ADF is larger than the MacKinnon asymptotic critical values.

4.2   Results of Johansen Multivariate Cointegration

Johansen's multivariate cointegration procedure provides maximum eigenvalue and trace statistics, which indicate the cointegration status among the variables and the number of cointegration vector. Results are given in Table 2 for both the period 1972-2010 and 1972-2015.

Table 2 reveals that trace statistic indicates the rejection of the null hypothesis that there is at most one cointegrating relationship at 5 percent level of significance. This tells the existence of two cointegrating relationships among the variables in

Table 2 : Results of Johansen's Cointegration Test for both the period 1972-2010 and 1972-2015

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	5 Percent Critical Value	1 Percent Critical Value	Hypothesized No. of CE(s)	Max-Eigen Statistic	5 Percent Critical Value	1 Percent Critical Value
1972-2010: Period before the Sixth Five Year Pla n								
None **	0.6455	64.211	47.21	54.46	None **	34.2254	27.07	32.24
At most 1*	0.4923	29.986	29.68	35.65	At most 1*	22.3684	20.97	25.52
At most 2	0.1950	7.6174	15.41	20.04	At most 2	7.1565	14.07	18.63
At most 3	0.0139	0.4609	3.76	6.65	At most 3	0.4609	3.76	6.65
1972-2015: Period Including the Sixth Five Year Plan								
None **	0.6116	68.331	47.21	54.46	None **	34.9901	27.07	32.24
At most 1 *	0.5141	33.341	29.68	35.65	At most 1 **	26.7055	20.97	25.52
At most 2	0.1638	6.6351	15.41	20.04	At most 2	6.61947	14.07	18.63

Note: * (**) denotes rejection of the hypothesis at the 5% (1%) level.

the series for Bangladesh. And maximum eigenvalue statistic indicates the existence of two cointegrating relationships at 1 percent level of significance for Bangladesh. However, addition of projected data from 2011 to 2015 to the previous data of exports, imports, remittances and GDP does not show any difference in results for cointegration.

4.3 Results of Granger Causality

The notion of cointegration provides the basis for modeling both the short-run and long-run relationships simultaneously. Granger causality results are presented in Table 3.

Table 3 reports the results of causality tests based on Granger causality to represent causality among the variables. Columns 2, 3, 4 and 5 report the F-statistic for the joint significance. Results indicate the existence of unidirectional causality from economic growth to exports, imports and remittances; from exports to imports and remittances and from imports to remittances. If we take into account the projected data from 2011 to 2015 of the sixth five year plan, we find that there is evidence of unidirectional causality from exports and imports to economic growth. There is, however, bidirectional causality between economic growth and remittances, between exports and remittances and between imports and remittances.

Table 3 : Results of Granger Causality Test for both the
period 1972-2010 and 1972-2015

Dependent Variables	GDP	Exports	Imports	Remittances
1972-2010: Period before the Sixth Five Year Plan				
GDP		1.11062	0.91413	0.00919
		(0.34172)	(0.41108)	(0.99085)
Exports	4.44159*		0.84858	0.16327
	(0.01985)		(0.43743)	(0.85016)
Imports	4.72067*	5.03113*		0.11056
	(0.01598)	(0.01259)		(0.89572)
Remittances	5.27013*	7.82500**	7.08196**	
	(0.01141)	(0.00200)	(0.00324)	
1972-2015: Period Including the Sixth Five Year Plan				
GDP		4.44583*	4.61821*	5.79661**
		0.01861	0.01620	0.00696
Exports	2.81015		0.10412	4.54606*
	0.07308		0.90138	0.01804
Imports	1.94952	1.87988		4.00999*
	0.15669	0.16690		0.02761
Remittances	5.24892*	5.92854**	5.19804*	
	0.01049	0.00631	0.01090	

*Note: *(**) denotes rejection of the hypothesis at the 5%(1%) level. Causality tests are based on Granger causality. Figures in parentheses are p-values of the F-statistic for the joint significance of variables.*

4.4   Results of Granger Causality Based on VECM

Granger causality tests based on VECM are conducted to assess both the short-run and long-run causality among the variables and results are provided in Table 4. Columns 2, 3, 4 and 5 of Table 4 report the X^2-statistic for the joint significance of the lagged independent variables while Column 6 provides the t-statistics for the error-correction terms. The statistical significance of the X^2-statistic and F statistics, respectively, would indicate the presence of short-run and long-run causality.

The error correction term is significant for the import equation, indicating a long-run causality from economic growth, exports, and remittance to imports. At the same time the error correction terms are insignificant for other three equations, namely GDP, exports and remittances equations, indicating the absence of long-run causality. There is, however, evidence of short-run bidirectional causality

Table 4 : Results of Granger Causality Based on Vector Error Correction

Variables	Lagged GDP	Lagged X	Lagged M	Lagged R	EC term
1972-2010: Period before the Sixth Five Year Plan					
GDP		2.384785	0.199512	1.812757	-0.000681
		(0.3035)	(0.9051)	(0.4040)	[-0.48024]
Export	10.89052**		1.758408	0.190041	0.228652
	(0.0043)		(0.4151)	(0.9094)	[0.55824]
Import	6.639974*	1.133219		2.160550	-1.729824*
	(0.0362)	(0.5674)		(0.3395)	[-2.69194]
Remittance	1.484869	1.352625	4.265727		0.024025
	(0.4760)	(0.5085)	(0.1185)		[0.68575]
1972-2015: Period Including the Sixth Five Year Plan					
GDP		1.243429	0.976947	2.785651	- 0.552534
		(0.5370)	(0.6136)	(0.2484)	[-1.42066***]
Export	21.04266**		6.193114*	7.820092*	0.912465*
	(0.0000)		(0.0452)	(0.0200)	[2.90919]
Import	36.58074**	7.538577*		12.58914**	2.358431*
	(0.0000)	(0.0231)		(0.0018)	[4.89413]
Remittance	0.399421	1.258305	3.765988		-0.040873
	(0.8190)	(0.5330)	(0.1521)		[-0.18550]

Note: *(**) denotes rejection of the hypothesis at the 5%(1%) level and *** indicate significance at 10% level. Causality tests for the above countries are based on error correction models in first differences. Figures in parentheses are p-values of the Wald tests for the joint significance of lagged variables, and figures in brackets are t-statistics.

between economic growth and exports and between economic growth and imports.

Results of Granger causality based on vector error correction model (VECM), which includes the addition of the projected data from 2011 to 2015 to data from 1972-2010 of these variables, are reported in the lower portion of Table 4. Results show that the error correction terms are significant for GDP, export and import equations, indicating long-run equilibrium relationships running from economic growth, imports and remittances to exports and economic growth, exports and

remittances to imports. There is also unidirectional causality from economic growth to exports and imports and from remittances to exports and imports. A bidirectional causality runs between exports and imports. We see, therefore, that the addition of the projected data from 2011 to 2015 to the data for the period 1972 to 2010 of exports, imports, remittances and GDP increases the status of both the short-run and long-run causalities.

5.   Summary and Conclusion

This paper studies the relationships existing among exports, imports, remittances and economic growth and the potential impacts of the sixth five year plan on these relationships using annual time series data from 1972 to 2010 and from 1972 to 2015 (including projected data from 2011 to 2015) for Bangladesh. Johansen's approach of cointegration is applied to investigate the number of cointegrating relationships. We also apply Granger causality test based on vector error correction model (VECM) to investigate the direction of causality among the variables. Results indicate the absence of long-run causality from exports, imports and remittances to economic growth for both series of data (1972-2010 and 1972-2015). A long-run causality runs from economic growth, exports and remittances to imports when we consider the period from 1972 to 2010. But when the projected data from 2011 to 2015 of the Sixth Five Year Plan are included, the long-run causality runs from economic growth, imports and remittances to exports and from economic growth, exports and remittances to imports. There is evidence of unidirectional causality from economic growth to exports and imports for the 1972 to 2010; but taking into account the projected data of the Sixth Five Year Plan for the period 2011 to 2015, we find the evidence of unidirectional causality running from exports, imports and remittances to economic growth.

To summarize, we may conclude that achievement of the targeted growth in GDP, exports, imports and remittances projected in the Sixth Five Year Plan would help strengthen the relationship among them and realize economic growth of the economy. Further, the proper achievement of the targets will help work the export-led growth hypothesis in Bangladesh.

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