Bangladesh Economy Beyond Hartal: An Econometric Analysis on the Temporal Behavior

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Abstract: *In this paper the principal purpose has been made to find out the impact of hartals and blockades with other macroeconomic variables namely: electricity consumption, trade openness, domestic investment, long-term external debt, and government spending on economic growth using modern econometric techniques based on time series data of the period between 1972 and 2014. From the estimated results of VEC model, short-run unidirectional causalities have been found from electricity consumption, domestic investment, trade openness, government spending and hartals to economic growth, from external debt to electricity consumption, from government spending to domestic investment, from hartal to trade openness, from economic growth, trade openness and government spending to external debt, from electricity consumption, trade openness, and hartals to government spending, and short-run bidirectional causalities are found between trade openness and domestic investment and between hartals and external debt. The test results also support the evidence of existence of long-run relationship among the variables in the equation (1). It has been found that over time higher electricity consumption, domestic investment and trade openness give rise to more economic growth and higher external debt causes more decline of economic growth in Bangladesh. It has been also found that in the long-run hartals have insignificant negative impact but in the short-run hartals have significant positive impact on Bangladesh economy.*

Keywords: *Hartals, VEC Model, Causality, Short-run and Long-run Impacts. Economic Growth*

JEL Classification*: C23, C32, C33, O50, O57, Q40*

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Introduction

After the War of Liberation hartals and blockades[1] are frequently happening in Bangladesh due to political conflicts between ruling party and oppositions. This problem is becoming more acute recently. In Bangladesh, the political turbulence has formed critical environment in the economy. The diffusion channels of hartal are widespread, with impacts stretching from an ordinary seller's loss in regular sales to the annulment of business voyages. In proposition to CPD's views in the early half of 2013, David Cowen, the outgoing IMF mission chief for Bangladesh, and Rodrigo Cubero, the incoming mission chief outlined that "Political turmoil is affecting negatively the economic channels with real GDP growth now expected to come down to below 6% in fiscal year (FY) 2013". The credit rating agency Moody has noted that the frequent strikes with more common occurrences of violence are injurious to the economy of Bangladesh (The Daily Star, 2013). "The economy is confronting a challenge of disaster due to hartals, blockades, and political instability. Industrial sectors are going to take the path of stagnation. Speed of the financial transaction is slowing down. Many people specifically day laborers and seasonal workers are losing engagement in works. As a result, gross interruption in work bases a bulk of impairment in the pool of the economy. The president of the Federation of Bangladesh Chambers of Commerce and Industry (FBCCI) remarks that political turmoil will depress the total economy by making an adverse impact in economic growth. International trade would be hampered and foreign investors may turn into back (The Financial Express, 2012)". "From December 2012 to March 2013 - percentage-wise - 18 per cent of the official working days saw hartals and according to a very elementary projection, each day of hartals produced a loss of US$ 200 million totaling a loss of US $3 billion in four months - enough to build Padma bridge (The Financial Express, 2013). Due to hartals the garments sectors is losing about $ 18 million per day in Bangladesh (Beyond Hartals, 2005). The appraisal may however be a little bit overstated, given that numerous adopting tactics are used to cut down losses. The yearly total loss of GDP (in % of GDP) and loss of export values (in % of GDP) due to hartals and blockades over a period of time are given below.

[1] The word hartal represents the strike action used for the first time during Indian Independence Movement. It is a protest usually comprising entire shutdown of work places, offices, shops, and other activities that contribute to the GDP of an economy. It works as a medium of tempting the empathies of the government to alter an out of favor and objectionable decision. Hartal is every so often called for political motives e.g., an antagonist political party complaining against a government policy or action (Wikipedia, 2016).
The meaning of the term hartal, originated from Gujarati, is "shutting down shops" or "blocking doors". However, in Bangladesh today hartals are often related to the strike of vehicles and shutting of markets, shops and offices for a particular time period (Huq, 1992).

Table 1: Economic Loss Due to Hartals after Liberation War

Year	Total GDP Loss(US$)	Total Export Loss(US$)	GDP Loss (in % of GDP)	Export Loss (in % of GDP)
1972	0.00	0.00	0.00	0.00
1973	196679598.42	8268201.23	1.10	0.05
1974	1939905175.98	52506182.15	9.86	0.27
1975	516832694.22	16360708.11	2.74	0.09
1976	327655475.91	12247743.66	1.64	0.06
1977	224275926.95	10243551.44	1.10	0.05
1978	480281684.20	18915981.69	2.19	0.09
1979	314589409.83	13773730.34	1.37	0.06
1980	253733074.72	11124224.72	1.10	0.05
1981	408131973.72	11385587.30	1.64	0.05
1982	69473808.01	1813045.72	0.27	0.01
1983	288680474.93	7921989.39	1.10	0.03
1984	605093386.19	15694310.20	2.19	0.06
1985	234493385.93	6350237.98	0.82	0.02
1986	1954237536.03	50218037.80	6.58	0.17
1987	1774464325.42	44775826.58	5.75	0.15
1988	519239983.24	14159347.92	1.64	0.04
1989	1156932078.92	33409344.49	3.56	0.10
1990	375993165.28	12108207.19	1.10	0.04
1991	0.00	0.00	0.00	0.00
1992	512843413.42	17871513.53	1.37	0.05
1993	1288815233.74	49922821.80	3.29	0.13
1994	223158629.32	8626527.91	0.55	0.02
1995	20057205846.18	964179357.90	46.85	2.25
1996	3187566103.28	158438928.51	7.12	0.35
1997	4099304027.21	222921678.79	8.77	0.48
1998	943146334.01	54746279.09	1.92	0.11
1999	3384660831.73	191926106.40	6.58	0.37
2000	1781910452.39	109779963.99	3.29	0.20
2001	3276670554.44	220747535.20	5.75	0.39
2002	1296102627.77	83956302.51	2.19	0.14
2003	1187840749.70	72215569.91	1.92	0.12
2004	1964408374.83	210636974.70	3.01	0.32
2005	2663564940.42	383362690.72	3.84	0.55

Year	Total GDP Loss(US$)	Total Export Loss(US$)	GDP Loss (in % of GDP)	Export Loss (in % of GDP)
2006	3450119016.77	584107076.84	4.66	0.79
2007	11298224651.50	2018513036.44	14.25	2.55
2008	921359702.20	166264312.15	1.10	0.20
2009	0.00	0.00	0.00	0.00
2010	3065309316.83	503632749.46	3.29	0.54
2011	2719552231.82	542828491.75	2.74	0.55
2012	4055668491.06	855200027.58	3.84	0.81
2013	23340468636.31	4756343519.70	20.82	4.24
2014	20205493278.97	4004385169.66	16.99	3.37

Source: Data from WDI, Daily News Papers of Bangladesh, and Own Calculations

The economic losses due to hartals and strikes are highlighted below graphically:

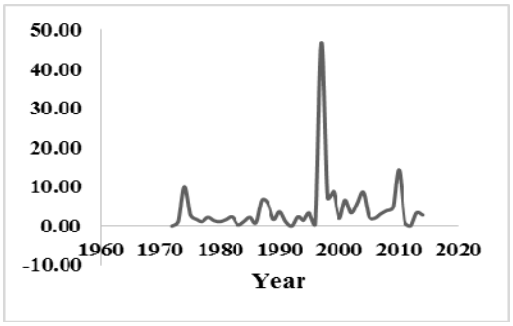

Figure 1(a): Loss of GDP (in % of GDP)

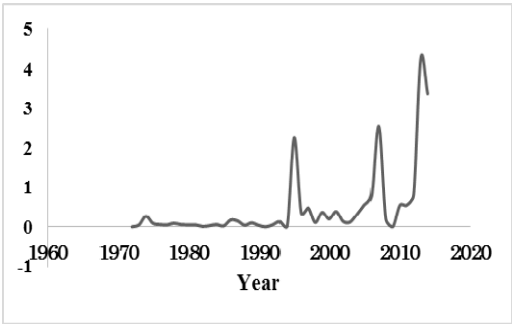

Figure1 (b): Loss of Export Values (in % of GDP)

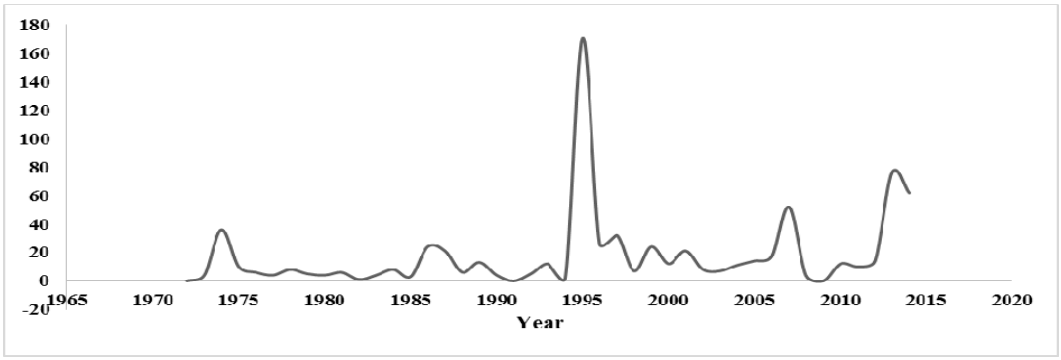

Figure 2: Number of days that hartals have been observed during 1972-2014

"Hartals inflict the economy of Bangladesh to the adequate extent particularly during time frame of overlong hartals related with changes in government. The average loss of hartals to the economy during the period 1972-2014 was projected at amid 3% to 4% of GDP. And the mean loss of export values during period 1972 to 2014 is 0.4633%. These losses comprise lost income, lost engagement in work and output, long-term effects because of decreased savings, capital losses, and turned down profitability of businesses (Beyond Hartals, 2005)".

A question, therefore, arises on whether the negative impact of hartals and blockades on economic growth in Bangladesh is either statistically significant or not both in short-run and long-run. To give the answer to this question, the principal objective has been made to investigate both the co-integrating and the causal relationships between hartals and economic growth including other macroeconomic variables namely electricity consumption, domestic investment, trade openness, external debt and government spending using modern econometric techniques based on time series data during 1972-2014.

The paper is organized as follows: Section II presents a literature review; Section III discusses data sources and empirical model; Section IV provides empirical analysis and finally section V concludes with a summary of the main findings and policy implications.

Literature Review

Political unrest is becoming a source of distress in Bangladesh regardless of the constitutional regime. Key turbulence is usually observed though haratals, blockades and other similar activities. In recent time frame, haratals are getting more emphasis in the dialogue of people who are considerably involved with the channels which supply the life blood in the economy. The question is why it is getting more importance? A very few empirical studies have been conducted to show how hartals, strikes and blockades affect the overall economy.

Kamal and Kaiser (2015) have found alarming losses in the RMG sector due to political turmoil and overseas customers have annulled their orders for uncertain deliveries. Ahsan and Iqbal (2014) have found a hostile significant economic and statistical impact of haratals on exports of firms. They also have found that firms' exports drop by 6.6% on haratal day and firms tackle the pause deferring the exports by a number of days. Braithwaite *et al.* (2013) have found that foreign direct investment would be slightly disheartened by the domestic political unrest and fierce forms of turmoil increase risk and uncertainty. Bernal-Verdugo *et al.* (2013) have examined the dynamic impact of social and political instability on output and suggested that in the short term conflicts have a significant and negative effect on output with the scale of the effect being a function of the strength of political instability. Polachek and Sevastianova (2012) have found

injurious impact of conflict on growth. Aisen and Veiga (2011) have found that more political instability negatively affects growth by toning down the rates of per capita GDP. Forgha (2007) has shown negative significant impacts of strike on productivity. Alvi (2001) has found that strikes have negative impact on international trade. Alesina *et al.* (1996) have found that in countries during time periods with a high inclination of government downfall, growth is considerably lower than other time period. Saeed (1986) has attempted to spot the organizational determinants that fix economic growth and create situations favorable to the occurrence of political fierceness. Goldberg *et al.* (1954) have found that a little correlation exists between the extent of the publicity allocated to current national-emergency strike subject matters and scientific amount of the actual effect of these strikes. Impact of 2013 hartals and blockades on food security situation of vulnerable poor (2014) has shown that the means of support of municipal diurnal income recipients were more instantaneously affected by hartals and blockades than those of diurnal income recipients in rural areas. Recently with the decentralization of hartals, rural earners are getting more affected. It is observed that vegetable growers were more affected and rice growers may be affected in the long run.

Does it justifiably affect the economy or is it aligned with the economy? According to the knowledge of the authors, still now no one has conducted the study to find the short-run and long-run impacts on Bangladesh economy using the modern econometrics techniques. Thus this paper shall fill the gap in the literatures of the relationship between hartals and economic growth with other macroeconomic variables namely electricity consumption, domestic investment, trade openness, government spending, external debt in Bangladesh.

Data and the Empirical Model

Annual time series data from 1972 to 2014 are used in order to find the long-run and short-run impacts of hartals with other selected macroeconomic variables on Bangladesh economy. The variables in the model are hartals (HAR), per capita electricity consumptions in KhW (PEC), domestic investment (DIV), trade openness (OPN), long-term external debt stocks (EXD), government spending (GOV), and economic growth (PGDP). The variable hartals (HAR) are the number of days that hartals, blockades are observed due to political conflicts between ruling party and the oppositions after liberation war. The trade openness index measuring the degree of trade liberalization of Bangladesh is constructed by dividing the sum of exports and imports by nominal GDP of Bangladesh. External debt (EXD) is the total long-term (outstanding) debt of an economy. Government spending is the general government final consumption expenditures. The variables are measured as a percentage of nominal GDP. Here the variable per capita real GDP which is measured in 2005 constant price in USD is used as the indicator of economic growth of Bangladesh. The data sources are UNCTAD

Statistics and Word Bank Development Indicators except the variable HAR. The data of hartals are collected from the daily newspapers of Bangladesh and research reports.

The long-run impacts of electricity consumption, domestic investment, trade openness, external debt, government spending, and hartals on economic growth is examined by considering the following model:

$$\text{LnPGDP}_t = \beta_0 + \beta_1 \text{LnPEC}_t + \beta_2 \text{LnDIV}_t + \beta_3 \text{LnOPN}_t + \beta_4 \text{LnEXD}_t + \beta_5 \text{LnGOV}_t + \beta_6 \text{HAR}_t + \varepsilon_t \quad (1)$$

Where, $\beta_0 = \ln(A_0)$; t represents the time period under consideration. The parameters β_1, β_2, β_3, β_4 and β_5 are the long-run elasticities of economic growth with respect to PEC, DIV OPN, EXD and GOV respectively. The parameter β_6 represents the rate of change of economic growth with respect to HAR. The dynamic co-integration and causal relationships between electricity consumption, domestic investment, trade openness, long-term external debt, government spending, hartals, and economic growth of Bangladesh have been examined using advanced level of econometric techniques.

Co-integration and Causality Analysis

The investigation of the dynamic causal relationships between the variables involves the following steps. At the first step, the existence of a unit root in each variable is examined. If unit root problem presents, then at the second step long run co-integration relationships among the variables are examined. If a long-run relationship between the variables is found, then at the third step a VEC model is estimated to determine the direction of the causal relationships between the variables. At the final step, the GMM technique is applied to examine the short-run and the long-run impacts of hartals, electricity consumption, domestic investment, trade openness, external debt, government expenditure on economic growth in Bangladesh.

Unit Root Test

We know the application of the usual techniques of regression analysis can result in highly misleading conclusion when variables contains stochastic trend (Stock and Watson (1988), Granger and Newbold (1974)). In particular if the dependent variable and at least one independent variable contain stochastic trend, and if they are not co-integrated, the regression results are spurious (Phillips (1986), Granger and Newbold (1974)). To identify the correct specification of the model, an investigation of the presence of stochastic trend in the variables is needed. The Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests have applied in order to investigate that each of the variables contains stochastic trend or not. The ADF and PP tests results are given below in Table 2.

Table 2: The Augmented Dickey-Fuller (ADF) and Philips-Perron (PP) Tests Results

Variables	ADF Test [Level form]				Test [Level form]			
	Case 1	Lags	Case 2	Lags	Case 1	Lags	Case 2	Lags
LnPGDP	1.04235	3	3.00588	3	1.250058	4	1.982463	4
LnPEC	-3.16027	2	0.48145	2	-31.8429**	4	-0.37782	4
LnDIV	-3.03730	3	-2.37239	2	-16.9194	4	-13.0358	4
LnOPN	-3.03499	1	-0.05931	4	-20.4953	4	-1.49846	4
LnEXD	-1.63081	4	-0.70957	4	-11.2858	4	-13.3814	4
LnGOV	-3.09415	1	-1.70426	4	-21.7904	4	-13.4593	4
HAR	-3.51474	2	-3.55523*	1	-38.1272**	4	-37.480**	4
Variable	1st Differenced Form				1st Differenced Form			
ΔLnPGDP	-3.64689*	2	-1.60392	2	-51.6184**	4	-49.386**	4
ΔLnPEC	-7.19381**	1	-7.2406**	1	-34.7627**	4	-35.5232**	4
ΔLnDIV	-4.05422*	3	-4.4757**	2	-43.7682**	4	-38.7557**	4
ΔLnOPN	-3.89558*	4	-6.3674**	2	-44.0576**	4	-43.9286**	4
ΔLnEXD	-7.53801**	3	-6.9735**	3	-32.6337**	4	-29.2848**	4
ΔLnGOV	-4.98281**	3	-5.1069**	3	-45.4325**	4	-45.5228**	4
ΔHAR	-6.44285**	1	-6.4680**	1	-54.1982**	4	-54.2107**	4

Case One: Constant and trend terms are included in the model, **Case Two:** Only constant term is included in the model **significant at 1% level, *significant at 5% level.

The ADF and PP tests results indicate that all the variables are integrated of order (1).

Co-integration Test: The long-run relationship among the variables is investigated using the Johansen and Juselius's, (JJ, 1990) test. Since the Johansen and Juselius's (1990) multivariate co-integration methodology is fairly well documented, a brief reminder of this method is given below:

$$\Delta X_t = B_0 + \Pi X_{t-p} + \sum_{i=1}^{p} B\Delta X_{t-i} + \eta_t \qquad (2)$$

Where, X_t represents a vector of endogenous I(1) variables, B_0 represents a vector of constant terms, B is a matrix of coefficients, η_t is a vector of residuals, and p denotes the lag length. All variables in equation (2) are deemed to be potentially endogenous. The long-run equilibrium relationship among X_t is determined by the rank of Π (say r). If r is zero, the variables in level form do not have any co-integration relationship and the equation (2) can be transformed to VAR model of p-th order. If 0<r<n, then there are $n \times r$ matrices of α and β such that

$$\Pi = \alpha\beta' \qquad (3)$$

The strength of co-integration relationship is measured by $\alpha.\beta$ is called co-integration

vector and $\beta' X_t$ is I(0) although X_t are I(1). The co-integrating rank can be found via the trace and the maximum eigenvalue statistics significance test. The lag length of the unrestricted vector autoregressive (VAR) model in equation (2) is determined on the basis of AIC and SBIC criteria and the adjusted likelihood ratio (LR) test is most commonly used. The test results are reported below in Table (4).

Table 4: Johansen and Juseliues's Co-integration Test Results (Model: Intercept and no trend in co-integration equation and VAR)

Hypothesized No. of Co-integrated Equation(s)	Trace Statistic	5% Critical Values	Max-Eigen Statistic	5% Critical Value
None*	226.8095*	125.6154	81.32766*	46.23142
At Most 1*	145.4819*	95.75366	53.46169*	40.07757
At Most 2*	92.02019*	69.81889	47.75004*	33.87687
At Most 3	44.27015	47.85613	24.23254	27.58434
At Most 4	20.03761	29.79707	14.47578	21.13162
At Most 5	5.561824	15.49471	5.550262	14.26460
At Most 6	0.011562	3.841466	0.011562	3.841466

The trace statistic and maximum eigen value statistic significance test results support that there exist 3 co-integrating equations at 5% level of significance which means the existence of cointegrating relationships between the variables.

Granger Causality Test: The co-integration relationship indicates the existence of causal relationship among variables but it does not indicate the direction of causal relationship among variables. Therefore it is common to test for detecting the causal relationship among variables using the Engle and Granger test procedure. There are three different models that can be used to detect the direction of causality between two variables X and Y depending upon the order of integration and the presence or absence of co-integration relationship. If two variables say X and Y are individually integrated of order one I(1) and co-integrated, then Granger causality test may use I(1) data because of super consistency properties of estimators. If X and Y are of I(1) and co-integrated, the Granger causality test can be applied to I(0) data with an error correction term. If X and Y are I(1) but not co-integrated, Granger causality test requires transformation of the data to make I(0) without error correction term. Due to the presence of co-integration relationship, the augmented form of the Granger causality test involves the error correction term and has been formulated in a multivariate pth order vector error correction model which is given below:

$$\begin{bmatrix}\Delta LnPGDP_t\\ \Delta LnPEC_t\\ \Delta LnDIV_t\\ \Delta LnOPN_t\\ \Delta LnEXD_t\\ \Delta LnGOV_t\\ \Delta HAR_t\end{bmatrix}=\begin{bmatrix}C_1\\ C_2\\ C_3\\ C_4\\ C_5\\ C_6\\ C_7\end{bmatrix}+\sum_{i=1}^{p}\begin{bmatrix}\beta_{11i} & \beta_{12i} & \beta_{13i} & \beta_{14i} & \beta_{15i} & \beta_{16i} & \beta_{17i}\\ \beta_{21i} & \beta_{22i} & \beta_{23i} & \beta_{24i} & \beta_{25i} & \beta_{26i} & \beta_{27i}\\ \beta_{31i} & \beta_{32i} & \beta_{33i} & \beta_{34i} & \beta_{35i} & \beta_{36i} & \beta_{37i}\\ \beta_{41i} & \beta_{42i} & \beta_{43i} & \beta_{44i} & \beta_{45i} & \beta_{46i} & \beta_{47i}\\ \beta_{51i} & \beta_{52i} & \beta_{53i} & \beta_{54i} & \beta_{55i} & \beta_{56i} & \beta_{57i}\\ \beta_{61i} & \beta_{62i} & \beta_{63i} & \beta_{64i} & \beta_{65i} & \beta_{66i} & \beta_{67i}\\ \beta_{71i} & \beta_{72i} & \beta_{73i} & \beta_{74i} & \beta_{75i} & \beta_{76i} & \beta_{77i}\end{bmatrix}\begin{bmatrix}\Delta LnPGDP_{t-i}\\ \Delta LnPEC_{t-i}\\ \Delta LnDIV_{t-i}\\ \Delta LnOPN_{t-i}\\ \Delta LnEXD_{t-i}\\ \Delta LnGOV_{t-i}\\ \Delta HAR_{t-i}\end{bmatrix}+\begin{bmatrix}\lambda_1\\ \lambda_2\\ \lambda_3\\ \lambda_4\\ \lambda_5\\ \lambda_6\\ \lambda_7\end{bmatrix}ECM_{t-1}+\begin{bmatrix}\varepsilon_{1t}\\ \varepsilon_{2t}\\ \varepsilon_{3t}\\ \varepsilon_{4t}\\ \varepsilon_{5t}\\ \varepsilon_{6t}\\ \varepsilon_{7t}\end{bmatrix} \quad (4)$$

The C's, β's and λ's are the parameters to be estimated. ECM_{t-1} represents the one period lagged error-term derived from the co-integration vector and the ε's are serially independent with mean zero and finite covariance matrix. From the equation (4) given the use of a VAR structure, all variables are treated as endogenous variables. The F test is applied here to examine the direction of any causal relationship among the variables. The electricity consumption does not Granger cause economic growth in the short run, if and only if all the coefficients β_{12i}'s $\forall$ i are not significantly different from zero in equation (4). Similarly the economic growth does not Granger cause electricity consumption in the short run if and only if all the coefficients β_{21i}'s $\forall$ i are not significantly different from zero in the equation (4). This is referred to as the short-run Granger causality test. The coefficients on the ECM(-1) represent how fast deviations from the long-run equilibrium are eliminated. Another channel of causality can be studied by testing the significance of ECM(-1). This test is referred to as the long run causality test. The short-run and long-run Granger causality results are reported below in Table (5).

Table 5 Granger F-test Results

	ΔLnPGDP	ΔLnPEC	ΔLnDIV	ΔLnOPN	ΔLnEXD	ΔLnGOV	ΔHAR	ECM(-1) LR Test
ΔLnPGDP		5.0034* (0.0067)	5.7259* (0.0033)	8.887* (0.0001)	1.8207 0.1619	2.8565** (0.0575)	2.7061** (0.0668)	0.6917 (0.4056)
ΔLnPEC	0.00002 (0.9965)		1.7839 (0.1817)	0.0395 (0.8424)	3.2823** (0.070)	0.4899 0.4840	0.0995 (0.7524)	0.1975 (0.6567)
ΔLnDIV	1.4545 (0.2335)	1.5462 (0.2131)		3.6983* (0.0248)	1.4814 0.2273	9.156* (0.0001)	2.0653 (0.1268)	2.1544 (0.1421)
ΔLnOPN	1.0891 (0.2967)	0.4715 (0.4923)	4.1388* (0.0419)		1.0960 (0.2952)	0.8444 (0.3581)	7.9204* (0.0049)	14.4086* (0.0001)
ΔLnEXD	8.3236* (0.0039)	0.0219 (0.8824)	0.5424 (0.4615)	7.1008* (0.0077)		3.0520** (0.0806)	4.7262* (0.0297)	4.9672* (0.0258)
ΔLnGOV	1.2049 (0.2723)	3.9989* (0.0455)	1.3516 (0.2450)	4.7255* 0.0297	0.3835 (0.5356)		3.6939** (0.0546)	3.6619** (0.0557)
ΔHAR	0.2785 (0.5977)	0.0226 (0.8804)	1.5304 (0.2161)	0.0158 (0.9001)	2.9991** 0.0833	0.5253 (0.4686)		116.552* (0.0000)

The reported values in parentheses are the p-values of the test. * Significant at 5% level, **significant at 10% level.

The findings in Table (5) indicates that there exists short-run unidirectional causality running from electricity consumption, domestic investment, trade openness, government spending and hartals to economic growth, from external debt to electricity consumption, from government spending to domestic investment, from hartal to trade openness, from economic growth and trade openness and government spending to external debt, from electricity consumption, trade openness, and hartals to government spending, and short-run bidirectional causalities have been found between trade openness and domestic investment and between hartals and external debt. It has been found that the error correction terms are statistically significant when $\Delta LnOPN$, $\Delta LnEXD$, $\Delta LnGOV$, and ΔHAR are treated as the endogenous variables indicating that there exists a long-run relationship among the variables in the form of equation (1) which is also confirmed by the results of the Johansen and Juseliues's (JJ,1990) co-integration test.

Short-run and Long-run Elasticities of Economic Growth: Since, it has been found that there exists a co-integrating vector among the variables, the following co-integration model is projected here in order to find the long-run impacts of PEC, DIV, OPN, EXD, GOV, and HAR on economic growth:

$$LnPGDP_t = \delta_0 + \sum_{i=0}^{p} \delta_{1i} LnPEC_{t-i} + \sum_{i=0}^{p} \delta_{2i} LnDIV_{t-i} + \sum_{i=0}^{p} \delta_{3i} LnOPN_{t-i} + \sum_{i=0}^{p} \delta_{4i} LnEXD_{t-i} + \sum_{i=0}^{p} \delta_{5i} LnGOV_{t-i} + \sum_{i=0}^{p} \delta_{6i} HAR_{t-i} + \omega_t \quad (5)$$

The selection of the order of lags in the above models is done by using two criteria- AIC and SBIC. The results are given below in Table (6).

Table 6: The Long-run Elasticities of Economic Growth

Dependent Variable (LnPGDP)	Coefficient	t-statistic	Probability
Constant	4.59739*	53.53995	0.00000
LnPEC	0.26595*	15.14796	0.00000
LnDIV	0.14218*	4.38427	0.0000
LnOPN	0.10946*	2.17931	0.02931
LnEXD	-0.17888*	-7.03015	0.00000
LnGOV	-0.01717	-0.24166	0.80904
HAR	-0.00027	-0.93826	0.34811

*Significant at 5% level, **Significant at 10% level.

From estimated results in Table (6), it has been found that for a 100% increase in electricity consumption, domestic investment, and trade openness, economic growth will

be increased by 26.595%, 14.218% and 10.946% respectively in the long-run and the impact of PEC and DIV is statistically significant at any significance level but the long-run impact of OPN is statistically significant at 5% level. Also it has been found that for 100% increase in external debt and government expenditures, economic growth will be decreased by 17.888% and 1.717% respectively and the negative impact of EXD on economic growth is statistically significant at any significance level but the negative impact of GOV is not statistically significant. It has also been found that in the long-run the hartals and blockades have negative impact on economic growth but the impact is not statistically significant at all. The appropriate instruments for equation (5) have been selected based on trial and error basis to have best p-value of J-statistic. The short run association among the variables can be calculated considering the following error correction model:

$$\Delta LnPGDP_t = \psi_0 + \sum_{i=0}^{p} \psi_{1i} \Delta LnPEC_{t-i} + \sum_{i=0}^{p} \psi_{2i} \Delta LnDIV_{t-i} + \sum_{i=0}^{p} \psi_{3i} \Delta LnOPN_{t-i} + \sum_{i=0}^{p} \psi_{4i} \Delta LnEXD_{t-i} + \sum_{i=0}^{p} \psi_{5i} \Delta LnGOV_{t-i} + \sum_{i=0}^{p} \psi_{6i} \Delta HAR_{t-i} + \lambda ECM_{t-1} + u_t \quad (6)$$

Where, ECM_{t-1} is the error correction term which will be obtained from the following estimated co-integration equation:

$$ECM_t = LnPGDP_t - \delta_0 - \sum_{i=0}^{p} \delta_{1i} LnPEC_{t-i} - \sum_{i=0}^{p} \delta_{2i} LnDIV_{t-i} - \sum_{i=0}^{p} \delta_{3i} LnOPN_{t-i} - \sum_{i=0}^{p} \delta_{4i} LnEXD_{t-i} - \sum_{i=0}^{p} \delta_{5i} LnGOV_{t-i} - \sum_{i=0}^{p} \delta_{6i} HAR_{t-i} \quad (7)$$

Here, the parameter λ represents the speed of adjustment for short-run to reach in the long-run equilibrium. The short –run coefficients of economic growth with respect to PEC, DIV, OPN, EXD, GOV and HAR are given below with the diagnostic test results in Table (7).

Table 7: Short-run Elasticities of Economic Growth

Dependent Variable (Δ lnPGDP)	Coefficient	t-statistic	Probability
Constant	0.01529*	3.15336	0.00337
Δ LnPEC	0.11141*	2.42638	0.02071
Δ LnDIV	0.06852*	3.28062	0.00239
Δ LnOPN	0.02113	0.94058	0.35356
Δ LnEXD	-0.07211*	-3.54199	0.00118
Δ LnGOV	0.09389*	2.99951	0.00503
Δ HAR	0.000065	0.78734	0.43654
ECM{-1}	-0.093150	-1.33482	0.19081

Sensitivity Analysis: The Short-run Diagnostic Test Results		
LM Test for Autocorrelation	6.123576*	0.01333907
LM test for Heteroscedasticity	5.195730	0.51896567
ARCH Test	0.881888	0.34768517
F-Test for Misspecification	3.077453	0.08866801
JB Test for Normality of Errors	0.886847	0.641835

*Significant at 5% level, **Significant at 10% level.

The table (7) shows that the coefficient of ECM (-1) is not statistically significant, meaning that speed of adjustment for short-run to research in the long-run equilibrium is not significant. The coefficient of error correction term is -0.09315 with the expected negative sign suggests that when per capita real GDP is above its equilibrium level it will be adjusted by almost 9.315% within the first year and the adjustment is not statistically significant. The full convergence process to reach its equilibrium level takes about more than ten years. Thus the speed of adjustment is very slow in the case of any shock to the economic growth in Bangladesh.

It has been found that the variables electricity consumption, domestic investment, trade openness, government expenditure and hartals have positive impact on economic growth in the short-run. The impact of PEC, DIV, and GOV is statistically significant at any significance level but the impact of OPN and HAR is not statistically significant. It has also been found that the long-run elasticities [see Table 6] of economic growth with respect to electricity consumption, domestic investment and trade openness are higher than short-run elasticities. It means that over time higher electricity consumption, domestic investment and trade openness will contribute more economic growth in Bangladesh. As a result the standard of living of the peoples of Bangladesh will be increased. It has also been found that the variable external debt has also negative impact on economic growth in the short-run and the impact is statistically significant at any significance level. From the estimated short-run and long-run elasticities of EXD, it can be said that over time due to higher external debt burden, economic condition will be declined more in Bangladesh.

Sensitivity Analysis: Diagnostic tests for serial correlation, autoregressive conditional heteroscedasticity, heteroscedasticity, functional form misspecification and non-normal errors are conducted and the results are reported in Table (7). The test results indicate that there is no problem of heteroscedasticity. Also the autoregressive conditional heteroscedasticity is not present in the short-run model. The test results also support that there is no problem of non-normality of random error terms in equation (6). But the test results indicate that there exists serial correlation problem. Thus the error correction model (6) has been re-estimated using the Cochrane-Orcutt iterative method. The estimated results with the diagnostic test results are given below in Table (8).

Table 8: Short-run Coefficients of the Error Correction Model

Dependent Variable (Δ lnPGDP)	Coefficient	t-Test	Probability
Constant	0.01634*	2.16043	0.03833
Δ LnPEC	0.11888*	3.23870	0.00279
Δ LnDIV	0.08394*	5.4381	0.00001
Δ LnOPN	0.01217	0.68609	0.49759
Δ LnEXD	-0.04367**	-1.75019	0.08967
Δ LnGOV	0.06641	2.60055	0.01397
Δ HAR	0.00002	0.44306	0.66070
ECM{-1}	-0.22777*	-2.16469	0.03798
Sensitivity Analysis: The Short-run Diagnostic Test Results			
LM Test for Autocorrelation		1.60175	0.20565
LM test for Heteroscedasticity		1.00213	0.98553
ARCH Test		0.60339	0.43729
F-test for Misspecification		1.6516	0.5433
JB Test for Normality of Errors		2.2555	0.2063

*Significant at 5% level, **Significant at 10% level.

The Table (8) shows that the coefficient of ECM (-1) is statistically significant at 5% level, indicating that speed of adjustment for short-run to reach into the long-run equilibrium is significant. The error correction term is statistically significant and its magnitude is quite higher indicates a faster return to equilibrium in the case of disequilibrium. The error correction term is -0.2278 with the expected negative sign suggests that when per capita real GDP is above or below its equilibrium level, it will be adjusted by almost 22.78% within the first year. The full convergence process to reach to the equilibrium level takes about more than four years. Thus the speed of adjustment is significantly faster in the case of any shock to economic growth.

The economic condition is found to be good with respect to electricity consumption, domestic investment and trade openness, because the long-run elasticities of economic growth with respect to electricity consumption, domestic investment and trade openness are higher than short run elasticities. This means that over time higher electricity consumption, domestic investment and trade openness give rise to more economic growth in Bangladesh. But in respect to the variables external debt, government spending and hartals, the economic condition will be declined in the long-run in Bangladesh. The variables government spending has significant and hartal has insignificant positive impact on economic growth in the short-run and the variable EXD has significant negative impact in the short-run.

Diagnostic Test Results: Again diagnostic tests for serial correlation, autoregressive conditional heteroscedasticity, heteroscedasticity, functional form misspecification and non-normal errors are conducted and the results are reported in Table (8). The test results indicate that there is no evidence of serial correlation and the functional form is well specified and there is no problem of heteroscedasticity. Also the autoregressive conditional heteroscedasticity is not present in the short-run model. The test results also support that there is no problem of non-normality of random error terms in equation (6).

Stability of the Parameters: Finally the stability of the short-run parameters together with the long-run movements has been examined using cumulative sum (CUSUM) and cumulative sum of squares (CUSUMSQ) tests proposed by Borensztein et al.(1998). The related graphs of these tests are presented below in Figure-3:

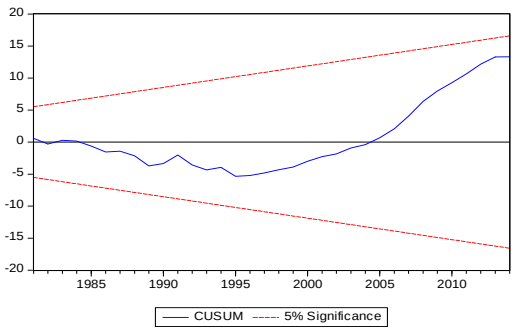

Figure 3(a): Plot of Cumulative Sum of Recursive Residuals

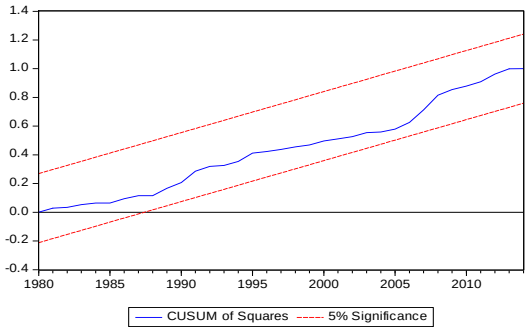

Figure 3(b): Plot of Cumulative Sum of Squares of Recursive Residuals

From figures 3(a) and 3(b), it can be said that the CUSUM and CUSUMSQ tests results are within the critical bounds implying that all coefficients in the error correction model are stable. Therefore the preferred economic growth model can be used for policy implication and decision making purpose and the impact of policy changes considering the explanatory variables of economic growth model not cause major distortion in the level of economic growth due to stable pattern of parameters during the estimation period.

Conclusions and Policy Implications

Since after the War of Liberation, due to political conflicts between ruling party and oppositions hartals and blockades are frequently observed in Bangladesh, people of this society strongly assume that this type of political activities has significant negative impacts on economic growth in Bangladesh. To test whether the assumption of the people of Bangladesh regarding hartals, strikes, and blockades on Bangladesh economy, this paper has investigated a dynamic co-integration and causal relationships between the variables- hartals and economic growth including other macroeconomic variables namely

electricity consumption, domestic investment, trade openness, long-term external debt, government spending using modern econometric techniques based on time series data for the period 1972-2014. The investigation involves the following steps-at the first step whether each variable contains a unit root has been examined using ADF and PP unit root tests. From the tests results it has been found that all the variables are integrated of order one (I(1)). At the second step, the long-run co-integration relationship among the variables has been examined using the Johansen and Juselius's (1990) multivariate co-integration technique and the test results imply that the explanatory variables- electricity consumption, domestic investment, trade openness, external debt, government spending, and hartals are coalescing with economic growth to achieve their steady-state equilibrium in the long-run although deviations may occur in the short-run. At the third step the Granger causality test has applied to VEC model to investigate the causal linkage between different pairs of variables. The Granger causality test results support the existence of unidirectional short-run causal relationships running from electricity consumption, domestic investment, trade openness, government spending and hartals to economic growth, from external debt to electricity consumption, from government spending to domestic investment, from hartal to trade openness, from economic growth and trade openness and government spending to external debt, from electricity consumption, trade openness, and hartal to government spending, and short-run bidirectional causalities have been found between trade openness and domestic investment and between hartal and external debt.

It has been found that the error correction terms are statistically significant when $\Delta LnOPN$, $\Delta LnEXD$, $\Delta LnGOV$, and ΔHAR are treated as the endogenous variables, indicating that there exists a long-run relationship among the variables in the form of equation (1). Finally long-run and short-run elasticities of economic growth with respect to these variables have been estimated using the VEC model. It has been found that in Bangladesh the economic condition will be improved with respect to electricity consumption, domestic investment and trade openness because the long-run elasticities of economic growth with respect to electricity consumption, domestic investment and trade openness are higher than short run elasticities. This means that over time higher electricity consumption, domestic investment and trade openness will give rise to more economic growth in Bangladesh. It has also been found that the variables external debt, government spending and hartal are working as barriers for economic growth in the long-run in Bangladesh. Both in the short-run and in the long-run, the variable external debt has significant negative impact on economic growth but the variable hartals have insignificant negative impact in the long-run and insignificant positive impact in the short-run on economic growth.

The CUSUM and CUSUMSQ tests results suggest the policy changes considering the explanatory variables of economic growth equation will not cause major distortion in the level of economic growth.

From the analytical results the following points should be implemented to accelerate the economic growth in Bangladesh. Since the variables electricity consumption, domestic investment and trade openness play significant positive role both in short-run and long-run to economic growth in Bangladesh, so the government needs to embrace more electricity production, domestic investment and liberalize trade policies as a policy-framework for sustainable economic growth and development. Since in the long-run the variable external debt and government spending have negative impact on economic growth, the government has to reduce the dependence on external debt. The government may raise funds if necessary from internal sources through issuing bonds or implementing the PPP policies for major sectors, and the government has to take necessary actions to control expenditures. Also it has been found that the variable hartals have negative impact in the long-run on economic growth, so all political parties should avoid exercising political activities like hartals, strikes, and blockades in the interest of the people of this society. Political leaders have to resolve any kind of political problems on the basis of dialogue and consensus.

All political parties of Bangladesh should follow norms of democracy and regulations that play significant role for sustainable economic growth and development as a result the standard of living of the people of Bangladesh.

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