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Causal Linkages between Financial Development, Trade Openness and Economic Growth: Fresh Evidence from Innovative Accounting Approach in Case of Bangladesh

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Abstract

This paper contributes to the literature by exploring the relationship between financial development, economic growth and trade openness in case of Bangladesh over the period 1975Q1-2011Q4. The ARDL bounds testing approach to cointegration and the innovative accounting approach for causality are used. Our results show that financial development, trade openness and economic growth are linked over the long-run. We find evidence in favor of the supply-side hypothesis while financial development and economic growth cause exports. Economic growth causes imports and feedback effect exists between trade openness and economic growth.

Keywords: Financial development, Growth, Trade openness, Bangladesh

1 . Introduction

The role of the development of financial sector in economic growth has been examined extensively in high, middle and lower income countries. The finding of the interaction between these variables are still inconclusive, since studies undertaken deduced positive interaction between financial development and economic growth; but failed to produce conclusive findings confirming the causal influence over one another. The importance of the continuing expansion of financial sector and its impact on economy cannot be overlooked. Empirical evidence supports that financial development constitutes a potentially important mechanism for long-run growth [Levine et al. (2000); Beck et al. (2007); Baltagi et al. (2009); Shahbaz (2012)]. Therefore, it is crucial for a country, especially for a developing country like Bangladesh, to verify if financial development fuels its economic growth as an engine.

The role of financial sector reforms in Bangladesh, which started in the early 1980s and accelerated its pace in the 1990s, was to improve the process of financial intermediation by taking up series of legal, policy and institutional restructuring. From the mid-1980s, Bangladesh gradually introduced various liberalization measures, liberalization of international trade was the first order of business which introduced devices like tariff reduction and dispersion, rationalization of the tariff structure, deregulation of the import process and various export incentives. During the first half of 1990s Bangladesh experienced major financial sector reforms which included liberalization of interest rates, improvement of monetary policy, abolishing priority sector lending, strengthening central bank supervision, regulating banks, improving debt recovery and broadening capital market development.

This paper investigates the possible co-integrating relationship between financial development, trade openness and economic growth, and tests the direction of causality between these three variables based on the supply-leading, the demand-following and trade-led hypotheses for Bangladesh economy. The findings of the study might give interesting conclusions for the literature. The developed and advanced industrialized countries received most attention with respect to studies conducted in the relevant field exploring close connection between economic growth and financial development. Therefore, the present study makes more sense to conduct experiments using the time series analysis of least developing country like Bangladesh in this regard. The direction of causality between financial development, trade openness and economic growth nexus needs further investigation and the relations between financial development, international trade and economic growth triangle needs further attention; and while these questions on the finance, trade and growth nexus of Bangladesh are intriguing, research on this aspect is conspicuously deficient. Our work intends to fill that gap by addressing these questions.

The rest of paper is organized as following. Section II reviews the relevant literature. Modelling and estimation strategy is explained in Section III. Section IV Discusses the results. Conclusion and policy implications are drawn in section-V.

2. Literature Review

The earlier findings of the empirical research mainly emphasizes on studies that examine the relationships between the importance of international trade for economic growth. There have been studies examining the export-led growth hypothesis using the cointegration and error-correction models (Ghatak et al. 1997). Some of these studies support export-led hypothesis while others support import-led hypothesis for particular countries. Although results on the direction of relationship between international trade and economic growth are still inconclusive. These studies have shown that international trade is crucial for economic growth of many countries (Chow, 1987). In the south Asian context, a few country specific studies using time series analysis like Granger causality, cointegration and error correction model¹ also find contradictory results in support of export-led growth hypothesis.

The line of research looks at the interaction between link between international trade and financial development is now emerging (see Huang and Temple, 2005; Baltagi et al. 2009) and suggesting that international trade and financial development may be jointly determined and the direction of causality between these two variables needs to be tested. Using a cross-country and dynamic panel data technique, Law and Demetriades (2006) find support for the Rajan and Zingales (2003) hypothesis that financial development is enhanced when a country's borders are simultaneously open to both capital flows and trade. In a similar vein, Beck (2002) finds that countries with a better-developed financial system have a higher export share and trade balance in manufactured goods. Similarly, Becker and Greenberg (2005) also found that higher levels of financial development increase exports, suggesting that financial development is an important determinant of export performance. In contrast, Baltagi et al. (2009) using dynamic panel data techniques provide limited support to the hypothesis that the simultaneous opening of both trade and capital accounts is necessary to promote financial development.

Recent studies; Shahbaz and Rahman (2010) explored the roles of foreign capital inflows and domestic financial sector development on economic growth in Pakistan over the period of 1971-2008. The ARDL bounds testing approach to cointegration and Error Correction Model (ECM) are employed for long run and short run relationships, respectively and empirical evidence reveals that foreign capital inflows have positive effect on economic growth. Financial sector's development and public investment stimulate economic growth. Using the similar method, Shahbaz et al. (2011a) investigates the validity of the exports-led growth hypothesis using quarterly data over the period 1990-2008 in case of Pakistan. The results indicate that exports are positively correlated with economic growth confirming the validity of exports-led growth hypothesis. Nasreen (2011) examined the export-growth linkages for selected Asian developing countries for the period of 1975-2008 applying panel unit root tests and likelihood-based panel co-integration technique and panel causality test. The estimated results of FMOLS shows that during a long period of time to export more, higher growth is required. The empirical results on heterogeneous causality hypothesis show that the causality is found running from economic growth to exports in case of Pakistan, Sri Lanka and Indonesia and from exports to economic growth in Malaysia and Thailand. The bidirectional causality also exists in case of India, Sri Lanka and Indonesia while neutral hypothesis is found in case of Bangladesh. Working with annual data, Shahbaz (2012) investigated the impact of trade openness on economic growth in

¹ Nandi, 1991; Abhayaratne, 1996; Mollik, 1996; Xu, 1996; Ghatak and Wheatley, 1997 and many more.

long run applying ARDL bounds testing approach and the augmented production function by incorporating financial development as an additional determinant of economic growth using the framework of Mankiw et al. (1992). The results confirm cointegration among the series. In the long run, trade openness promotes economic growth. The growth-led-trade hypothesis is vindicated by VECM Granger causality test. The causality is also checked by using the innovative accounting approach (IAA). Shahbaz and Rahman, (2012) investigated the relationship between financial development, foreign capital inflows, imports and economic growth and reported the feedback effect between financial development and economic growth (financial development and imports) and same is true for economic growth and imports. Rahman and Shahbaz, (2013) also noted that the relationship between imports and economic growth is bidirectional².

Studies aiming on the effects of liberalisation on economic growth is initiated after the implementation of the trade liberalization policy in Bangladesh. Rashid (2000) using participatory research method found positive impact of trade liberalisation on manufacturing growth in Bangladesh. Ahmed (2001) used Lucas' "human capital model of endogenous growth" to study impact of trade liberalisation on industrial growth in Bangladesh through cointegration analysis and error correction model. The author's used ratio of investment to GDP, ratio of exports to GDP, customs duty collection rate, and secondary enrolment ratio as exogenous variables. He found positive effects of trade liberalisation on growth. Habib (2002) using cointegration analysis and error correction model tested whether Bangladesh's external financial openness and economic growth could be linked. He modeled economic growth as a function of long-term domestic investment (function of gross domestic savings, broad money, and private sector credit) and productivity. He found that external financial openness has a positive impact on growth through financial deepening and longterm investment. However, he could not find any evidence suggesting external financial liberalisation contributes to Bangladesh's economic growth through productivity improvement.

Mamun and Nath (2004) using cointegration analysis, error correction model and Granger causality test investigated the link between exports and economic growth in Bangladesh. They used exports of goods and services to capture the effects of exports (trade openness) and found unidirectional causality from exports to growth. Working on the annual data from 1960-2002 on the 44 developing economies including Bangladesh, Bahmani-Oskooee and Oyolola (2007) found evidence on export-led growth for Bangladesh in long run. The short-run effect of export growth on GDP growth is highly insignificant. This work excludes imports. Using annual data for the 1973-2008 period, Hossain et al. (2009) found long-run evidence on export-led growth for Bangladesh. They also find that exports significantly affect imports both in long run and short run. This work has sample selection issue. A relatively liberalized regime, which began in 1979 in Bangladesh, is desirable while examining the GDP export-import interaction. Another study by, Rahman (2009) examined the contributions of exports, foreign direct investments, and remittances to GDP of South Asian countries including Bangladesh. Based on a sample from 1976 to 2006, Rahman works on an autoregressive distributed lag (ARDL) bounds test approach, and finds the evidence of cointegration among these variables in Bangladesh. He also finds

² Shahbaz et al. (2013a) noted the bidirectional causality between trade openness and economic growth in Indonesia. Latter on, Shahbaz et al. (2013b) also reported the feedback effect between exports and economic growth (imports and economic growth) and same is true for trade openness and economic growth in China.

short-run net effects of exports on GDP for the country. Ahmed and Uddin, (2009) the causal nexus between export, import, remittance and GDP growth for Bangladesh using annual data from 1976 to 2005. Study finds limited support in favor of export-led growth hypothesis for Bangladesh. In summary, the existing literature on Bangladesh's has major shortcomings: first, structural break is not attached with the econometric modeling, where as recent earlier studies found that structural break valid in the Bangladesh economy (Paul and Uddin, 2011). Second, the sample selection for Bangladesh economy is an important discussion for econometric modeling since political regimes has significant influence on both financial and trade liberalization process (Paul, 2011). Earlier studies in the above mentioned area has improper sample selection for investigating the relationship. Third, majority of the earlier studies on Bangladesh investigates either export and GDP or Finance-GDP nexus. Bivariate model has limitation for omitted variables. In this present study attempts to overcome these shortcomings, and reexamines the trade-finance-income relationship for Bangladesh with an extended dataset on the liberalized regime.

3. Estimation Technique

3.1 The ARDL Bounds Testing Approach to Cointegration

The ARDL bounds testing approach (Pesaran and Shin, 1999 and Pesaran et al. 2001) to examine the existence of long-run equilibrium relation is used. This procedure has a number of advantages compared to other traditional cointegration techniques. First, it allows testing cointegration for small sample sizes. Second, It can be used regardless of whether the variables are purely I (0), purely I (1), or mutually cointegrated. Third, it provides unbiased long-run estimates and valid t-statistics. Finally, this approach provides a method of assessing the short-run and long-run. Moreover, a dynamic unrestricted error correction model (UECM) can be derived through a simple linear transformation. The UECM integrates the short-run dynamics with the long-run equilibrium without losing any long-run information. The UECM is specified as follows:

$$\Delta \ln Y_t = \alpha_1 + \alpha_Y \ln Y_{t-1} + \alpha_F \ln F_{t-1} + \alpha_{TR} \ln TR_{t-1} + \sum_{j=0}^q \alpha_j \Delta \ln Y_{t-j} + \sum_{k=0}^r \alpha_k \Delta \ln F_{t-k} + \sum_{l=0}^s \alpha_l \Delta \ln TR_{t-l} + \mu_t \quad (1)$$

where,

$\ln Y_t$ is the natural log of real GDP per capita; $\ln F_t$ is the natural log of real domestic credit to private sector per capita $\ln TR_t$ is the natural log of real trade openness (exports + imports) per capita³, T is the time trend and μ_t is the error term. The optimal lag structure of the first difference regression is selected based on Akaike Information Criteria (AIC). The F-test is used in a bounds test for the existence of the long-run relationship (Pesaran et al. 2001) and it tests for the joint significance of lagged level variables involved. The null hypothesis of the non-existence of a long-run relationship for the equation of being $H_0 : \alpha_Y = \alpha_F = \alpha_{TR} = 0$ against the alternative

³ We have used exports per capita and imports per capita as separate indicators of trade openness

hypothesis $H_a : \alpha_Y \neq \alpha_F \neq \alpha_{TR} \neq 0$. According to the ARDL approach, if the F-statistic exceeds the upper critical value, we conclude the favor of long run relationship. If the F-statistic falls below the lower critical value, we cannot reject the null hypothesis of no cointegration. However, if the F-statistic lies between the two bounds, inference is inconclusive.

3. 2 Innovative Accounting Approach for Granger Causality

Shahbaz (2012) mentions that the Granger causality test is unable to indicate how much extent of feedback exists from one variable to the other. Due to the limitation of the Granger causality test, we include innovative accounting approach (IAA) to investigate the dynamic causal relationships among economic growth, financial development and trade openness. The uniqueness of the IAA is that it avoids the problem of endogeneity and integration of the series. This approach has an advantage compared to the VECM Granger causality test because the latter only shows a causal relationship between the variables within the sample period while the former illustrates the extent of causal relationship ahead the selected sample period. The IAA includes forecast error variance decomposition and impulse response function. This procedure decomposes forecast error variance for each series following a standard deviation shock to a specific variable and enables us to test which series is strongly impacted and vice versa.

The impulse response function explain to identify the time line of the impact of the shocks of the series in the VAR model. Applying this approach, we can explain the shock its own series and with others series in the said model. In this present study, our hypothesis is that financial development causes economic growth via impulse response function. This indicates that significant response of economic growth to shocks in financial development than other variables. This similar fashion incorporates economic growth, financial development and trade openness to examine the relationship among economic growth, financial development and trade openness using similar approach. A VAR system takes the following form (Shan, 2005):

$$\Phi_t = \sum_{i=1}^k \delta_i \Phi_{t-i} + \eta_t \quad (2)$$

Where, $\Phi_t = (Y_t, F_t, TR_t)$

$\eta_t = (\eta_Y, \eta_F, \eta_{TR})$

δ_i are the estimated coefficients and η is a vector of error terms.

3.3. Data Construction

This study uses annual data for the period 1975–2011 on Bangladesh economy from the world Development Indicators (WDI) published by the World Bank (WB 2012). The variables of the study are measured as follows: real gross domestic product (GDP) per capita at 2000 constant local prices ($\ln Y_t$), the measure of financial development is real domestic credit to private sector per capita. For trade openness, we use real trade of goods and services per capita (exports and

imports) is denoted by $\ln TR_t$. We also use real exports per capita ($\ln E_t$) and real imports per capita ($\ln I_t$) separately to consider individual effects. All of the variables in the study are at their natural logarithm. Thus, we get 164 observations on each series ranging from 1975Q1 to 2011Q4 the longest possible joint dataset on Bangladesh's. We have used quarterly match-sum method to convert annual data into quarter frequency (Romero, 2005; McDermott and McMenamin, 2008).

4. Results and their Discussions

4.1. Stationarity and cointegration analysis

In general, the findings of the unit root tests are not reliable in the presence of structural break (Baum, 2004). In this study, the shortcoming of the classical unit root tests has been covered by applying Zivot-Andrews, (1992) unit root test that contains information about one unknown structural break in the series. The results of Zivot and Andrew, (1992) unit root test are presented in Table-1. This empirical evidence indicates that the series are non-stationary at level but found to be stationary at first difference. This implies that all the series are integrated of order 1 i.e. $I(1)$.

Table-1: Zivot-Andrews Structural Break Unit Root Test

Variable	Level Results			1 st Difference Results		
	T-statistic	TB	Decision	T-statistic	TB	Decision
$\ln Y_t$	-2.840 (1)	1990Q2	Unit Exists	-9.732(3)*	1979Q4	Stationary
$\ln F_t$	-3.447 (2)*	1989Q2	Stationary	-7.235 (3)*	1979Q4	Stationary
$\ln E_t$	-2.552 (3)*	1984Q2	Stationary	-11.243 (2)*	1985q3	Stationary
$\ln I_t$	-3.800 (2)*	1985Q2	Stationary	-9.963 (3)*	1984Q2	Stationary
$\ln TR_t$	-3.160 (1)*	1985Q2	Stationary	-9.461 (4)*	1984Q2	Stationary

Notes: * represents significant at 1% level of significance. Lag order is shown in parenthesis.

This unique level of the series tends us to apply the ARDL bounds testing to examine cointegration between the variables. According to the ARDL approach, lag order of the variables is important for the model specification. Table-2 indicates the lag length criterion. In this paper, we rely on Akaike information criterion (AIC) to select an appropriate lag length. It is pointed by Lütkepohl, (2006) that AIC has superior power properties for small sample data compared to any lag length criterion. Akaike information criterion provides efficient and consistent results as compared to final prediction error (FPE), Schwarz information criterion (SBC) and Hannan-Quinn information criterion (HQ). Based on empirical evidence provided by AIC, we find that the optimum lag is 6 in such quarter frequency data over the period of 1975-2011 in case of Bangladesh.

Table-2: Lag Order Selection

VAR Lag Order Selection Criteria						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	1604.192	NA	8.24e-17	-22.8456	-22.7405	-22.8029
1	2904.323	2488.822	1.01e-24	-41.0617	-40.4314	-40.8056
2	3018.793	210.9520	2.82e-25	-42.3399	-41.1842	-41.8702
3	3032.800	24.8111	3.31e-25	-42.1828	-40.5019	-41.4997
4	3042.908	17.1851	4.12e-25	-41.9701	-39.7638	-41.0735
5	3212.685	276.4933	5.27e-26	-44.0383	-41.3068	-42.9283
6	3319.476	166.2894*	1.66e-26*	-45.2068*	-41.9499*	-43.8833*
7	3331.990	18.5921	2.03e-26	-45.0284	-41.2463	-43.4915
8	3342.852	15.3612	2.56e-26	-44.8264	-40.5190	-43.0760

Notes: * indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

Next, we present the empirical findings based on our methodology discussed in the last section. The estimation results for cointegration are presented in Table-3. According to the properties of the F statistics, its explained that the null hypothesis of no cointegration among variables can be rejected when F-statistic exceeds the upper bound. The results reported on Table-3 show that there is evidence of cointegration when the $\ln E_t$ and $\ln I_t$ ($\ln TR_t$) are taken as independent variables in the presence of structural break at 1% in case for Bangladesh keeping $\ln Y_t$ is dependent variable. This shows that there are three cointegrating vectors validating the existence of long run relationship between the variables in presence of structural break stemming in the series of economic growth financial development and trade openness (exports, imports).

Table-3: The Results of ARDL Cointegration Test

Bounds Testing to Cointegration			Diagnostic tests		
Estimated Models	Optimal lag length	F-statistics	χ^2_{HETERO}	χ^2_{ARCH}	χ^2_{SERIAL}
$F_Y(Y/E, F)$	6, 5, 6	6.339*	1.3364	1.7715	[1]: 1.4465; [2]: 2.6882
$F_Y(Y/I, F)$	6, 6, 6	5.805*	1.4196	1.9161	[1]: 0.9407; [3]: 5.5953
$F_Y(Y/TR, F)$	6, 5, 6	6.104*	1.7882	0.8782	[1]: 0.7363; [2]: 0.6617
Significant level	Critical values (T= 148)				
	Lower bounds $I(0)$	Upper bounds $I(1)$			
1 per cent level	3.15	4.43			
5 per cent level	2.45	3.61			
10 per cent level	2.12	3.23			

Notes: * represents significant at 1 per cent at level.

The next step is to examine the causal relationship between economic growth, financial development and trade openness. The problem is that the VECM Granger causality is suitable to detect a causal relationship between the variables within the sampled period, but to determine causality ahead the sample period, the innovative accounting approach is much better. The innovative accounting approach is the combination of variance decomposition and the impulse response function. The variance decomposition approach indicates the magnitude of the predicted error variance for a series accounted for by innovations from each of the independent variable over different time-horizons beyond the selected time period. It is pointed by Pesaran and Shin (1999) that generalized forecast error variance decomposition method shows the proportional contribution in one variable due to innovative shocks stemming in other variables. The main advantage of this approach is that like orthogonalized forecast error variance decomposition approach; it is insensitive with ordering of the variables because ordering of the variables is uniquely determined by VAR system. Further, the generalized forecast error variance decomposition approach estimates the simultaneous shock effects. Engle and Granger (1987) and Ibrahim (2005) argued that with VAR framework, variance decomposition approach produces better results as compared to other traditional approaches.

4.2 Variance Decomposition Approach

The variance decomposition approach results for exports model are presented in Table-4. Results show that a 68.02 percent portion of economic growth is contributed by its own innovative shocks and one standard deviation shock in financial development explains economic growth by 26.05 percent while the support of exports to economic growth is minimal i.e. 5.91 percent. The contribution of economic growth and exports to explain financial development is 2.05 percent and 7.81 percent and rest is contributed by financial development itself i.e. 90.12 percent. The share of economic growth and financial development to exports is 15.74 percent and 15.42 percent respectively. The innovative shocks stem in exports explain itself by 68.83 percent.

Table-4: Variance Decomposition Method (VDM)

Horizon	Variance Decomposition of $\ln Y_t$			Variance Decomposition of $\ln F_t$			Variance Decomposition of $\ln E_t$		
	$\ln Y_t$	$\ln F_t$	$\ln E_t$	$\ln Y_t$	$\ln F_t$	$\ln E_t$	$\ln Y_t$	$\ln F_t$	$\ln E_t$
1	100.000	0.0000	0.0000	12.5057	87.4942	0.0000	0.8742	0.0727	99.0529
5	94.5745	2.4520	2.9734	6.6425	92.8796	0.4777	7.8372	0.7156	91.4468
10	82.7619	8.1099	9.1280	3.7412	95.2019	1.0568	9.6837	9.7572	80.5590
15	74.2688	19.4625	6.2686	2.6469	93.0718	4.2812	14.6282	11.9903	73.3814
20	68.0278	26.0583	5.9137	2.0574	90.1266	7.8159	15.7458	15.4216	68.8326

Table-5: Variance Decomposition Method (VDM)

Horizon	Variance Decomposition of $\ln Y_t$			Variance Decomposition of $\ln F_t$			Variance Decomposition of $\ln I_t$		
	$\ln Y_t$	$\ln F_t$	$\ln I_t$	$\ln Y_t$	$\ln F_t$	$\ln I_t$	$\ln Y_t$	$\ln F_t$	$\ln I_t$
1	100.0000	0.0000	0.0000	13.0709	86.9290	0.0000	2.4033	0.3702	97.2264
5	97.8441	1.9897	0.1660	8.4265	90.2020	1.3713	3.7269	5.4352	90.8378
10	89.7239	6.7961	3.4798	4.5797	92.5060	2.9141	15.4086	6.0910	78.5003
15	72.4154	17.9450	9.6394	3.8261	92.6029	3.5708	14.3812	10.3563	75.2624
20	62.4366	25.7767	11.7865	3.5954	92.3100	4.0945	15.2828	13.7028	71.0142

Table-6: Variance Decomposition Method (VDM)

Horizon	Variance Decomposition of $\ln Y_t$			Variance Decomposition of $\ln F_t$			Variance Decomposition of $\ln TR_t$		
	$\ln Y_t$	$\ln F_t$	$\ln TR_t$	$\ln Y_t$	$\ln F_t$	$\ln TR_t$	$\ln Y_t$	$\ln F_t$	$\ln TR_t$
1	100.0000	0.0000	0.0000	16.0105	83.9894	0.0000	5.8732	0.0018	94.1249
5	98.6719	1.2771	0.0508	11.5247	85.2041	3.2711	8.4106	1.7201	89.8691
10	93.2008	4.6606	2.1384	5.9054	83.1844	10.9100	18.0397	3.5924	78.3677
15	77.0049	13.9947	9.0002	4.6105	86.0918	9.2975	15.5704	8.1758	76.2536
20	64.2976	20.8722	14.8301	3.9885	87.3275	8.6839	14.1795	12.9291	72.8912

Financial development contributes to economic growth by 25.77 percent due to one standard shock stemming in financial development (Table-5 explains imports model results). The share of imports in economic growth is minimal i.e. 11.78 percent. Economic growth and imports explain financial development by 3.59 percent and 4.09 percent due to innovative shocks in economic growth and imports. A 71.01 percent of imports is explained by own standard shock. The contribution of economic growth and financial development to imports is 15.28 percent and 13.70 percent due to one standard shock arises in these series respectively. The results of trade openness model are reported in Table-6. We find that financial development (trade openness) is contributing 20.87 percent (14.83 percent) to economic growth while rest i.e. 64.29 percent is contributed by innovative shocks of economic growth. The share of economic growth and trade openness to financial development is minimal i.e. 3.98 percent and 8.68 percent respectively. A 87.32 percent portion of financial development is explained by innovative shocks stemming in financial development. Economic growth and financial development explain trade openness by 14.17 percent and 12.92 percent respectively. A 72.89 percent in financial development is contributed by its own innovative shocks.

Overall our results indicate that financial development causes economic growth. Exports are cause of economic growth and financial development. Economic growth causes imports. The feedback effect exists between trade openness and economic growth but strong causality running from trade openness to economic growth.

4.3. Impulse Response Function

The impulse response function is alternative to variance decomposition method shows how long and to what extent dependent variable reacts to shock stemming in the independent variables. The results indicate that the response in economic growth due to forecast error stemming in financial development initially it is negative, goes upwards after 8th time horizon. This finding is consistent with Hye and Islam (2012) who reported that financial development impedes economic growth in Bangladesh. The contribution of exports to economic growth is positive till 10th time horizon. The response of financial development is negative due forecast error stemming in economic growth and exports respectively. The contribution of economic growth to exports is positive but financial development declines exports before 5th time horizon. Imports contributes positively economic growth and same is true from imports to financial development. The response in imports is positive due to one standard deviation shock in economic growth and financial development (till 7th time horizon). Trade openness contributes positively to economic growth. The response of financial development is positive due to one standard deviation shock in trade openness. Trade openness responde positively due to one standard deviation shock in economic growth and financial development (after 9th time horizon).

Figure-1.A: Impulse Response Function

Response to Generalized One S.D. Innovations

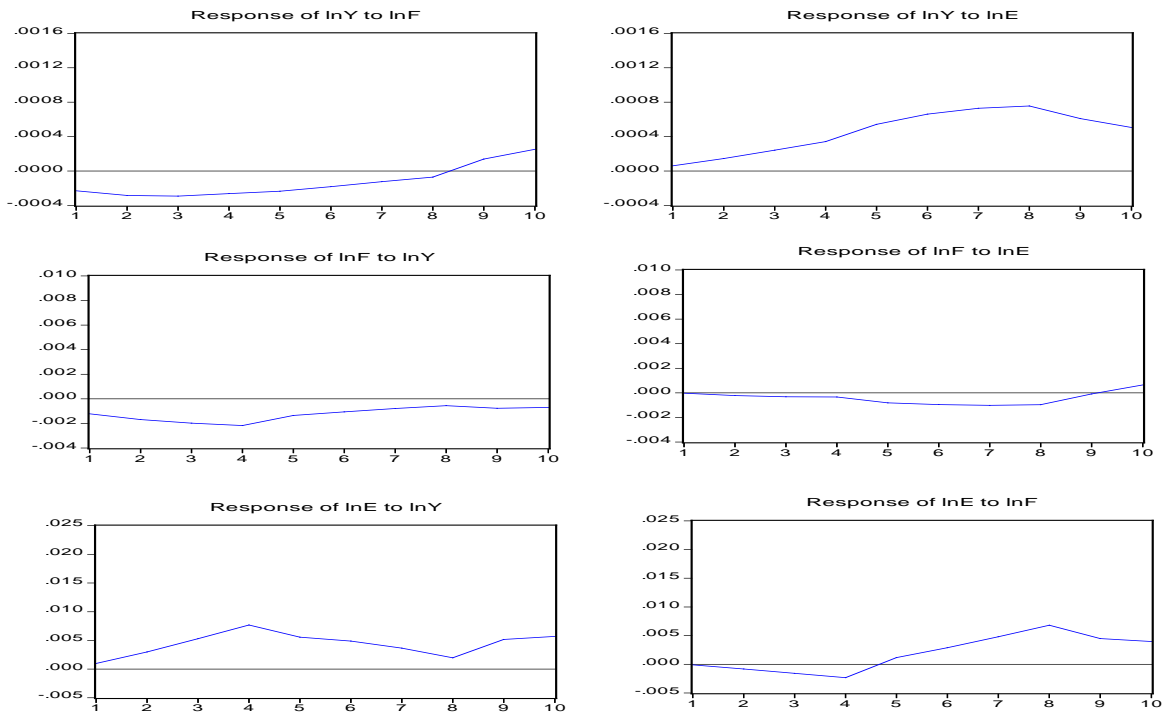


Figure-1.B: Impulse Response Function

Response to Generalized One S.D. Innovations

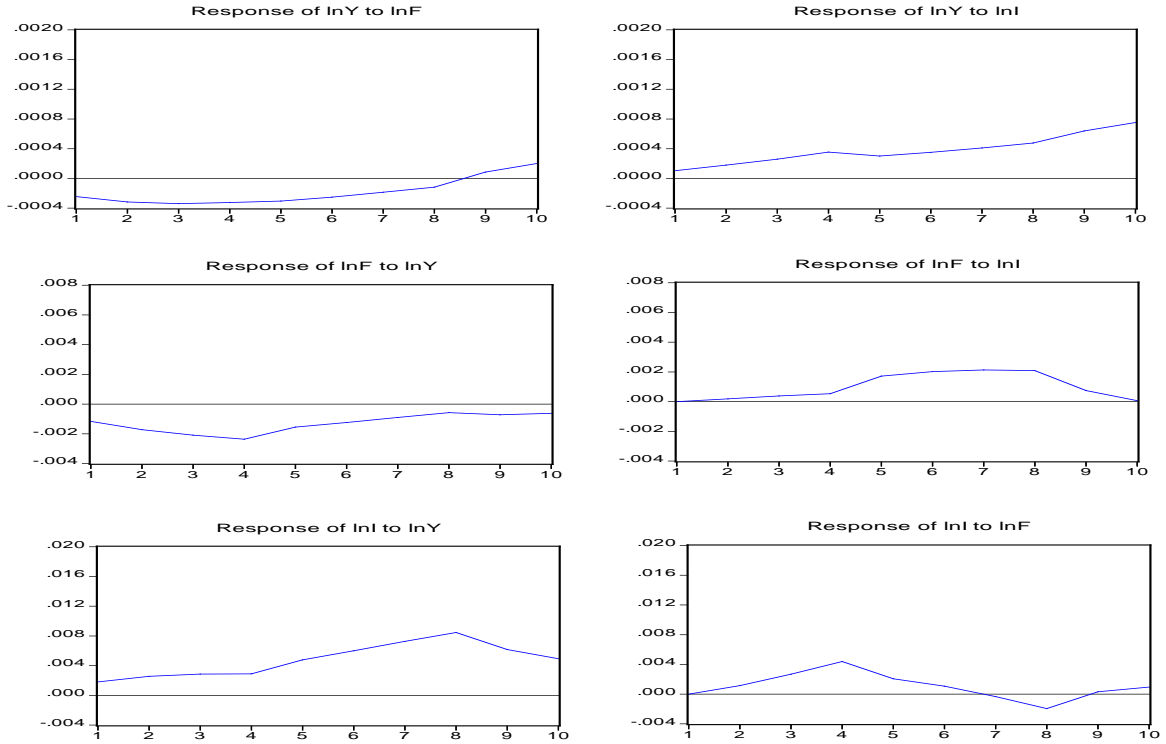
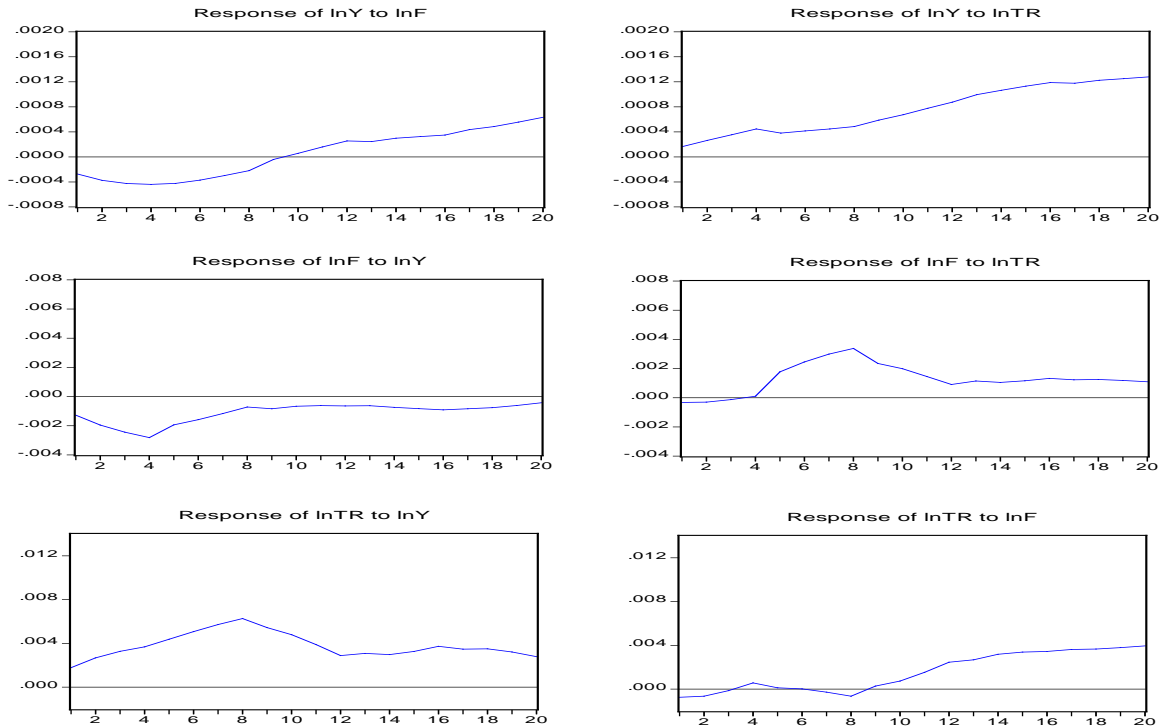


Figure-1.C: Impulse Response Function

Response to Generalized One S.D. Innovations



Imports contribute to economic growth positively and response of financial development is positive due to standard deviation stemming in imports. Imports respond positively due to one standard deviation arise in economic growth and financial development contributes in imports till 7th time horizon then response of imports is fluctuating. Economic growth responds positively due to trade openness. Financial development contributes to trade openness after 4th time horizon. Trade openness responds positively due to one standard deviation in economic and financial development (after 9th time horizon).

5. Conclusion and policy implications

This study examines the relations between financial development, trade openness and economic growth in Bangladesh over the period of 1975Q1-2011Q4. We make use of the structural break stationarity test to examine the integrating properties of the variables, the ARDL bounds testing approach to test for cointegration and the innovative accounting approach to test for causality. We find that the series are cointegrated. The innovative accounting approach confirmed that supply-side hypothesis exists, i.e. economic growth is caused by financial development in Bangladesh. This findings is consistent for Bangladesh, as external financial openness has a positive impact on growth through financial deepening and longterm investment. This similar evidence also claimed by Habib (2002) and Hye and Islam (2012) using different econometric techniques. The second findings is that the unidirectional causality is running from financial development and economic growth to exports. The explanation of this findings is that the liberalization of the domestic credit system to private sector support export oriented industries through investment. Bangladesh implemented the financial liberalization through IMF structural adjustment policy. Our results show that economic growth causes imports that implies Bangladesh has been following a gradual trade liberalization policy to promote imports in order to support exports and hence improve the trade balance. Therefore, the government should take a consistent trade policy to support investment, production, and backward linkage industries in order to improve the trade balance and GDP growth in Bangladesh (Hoque and Yusop, 2010). The feedback effect between trade openness and economic growth also supports to adopt supplementary trade liberalization policies to reap optimal fruits of trade openness to sustain long run economic growth. The adoption of financial liberalization policies is also necessary to make trade openness and economic growth nexus sound as financial sector development leads exports and trade openness promotes economic growth and same is true from opposite side.

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Appendix

Descriptive Statistics and Pair-wise Correlations

Variables	$\ln F_t$	$\ln Y_t$	$\ln E_t$	$\ln I_t$	$\ln TR_t$
Mean	3.5817	3.9047	3.6731	3.6266	3.8248
Median	3.6322	3.9255	3.6927	3.6257	3.8392
Maximum	3.8450	4.0388	3.8341	3.7820	3.9827
Minimum	3.1373	3.7492	3.5100	3.4472	3.6904
Std. Dev.	0.1752	0.0819	0.0997	0.0925	0.0945
Skewness	-0.7714	-0.2886	-0.0235	0.0559	0.0882
Kurtosis	2.8093	1.8996	1.7810	1.7041	1.6302
$\ln F_t$	1.0000				
$\ln Y_t$	0.5915	1.0000			
$\ln E_t$	0.4726	0.5502	1.0000		
$\ln I_t$	0.7850	0.2073	0.1336	1.0000	
$\ln TR_t$	0.3868	0.4459	0.5872	0.5786	1.0000