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INNOVATION AND ECONOMIC GROWTH: EVIDENCE FROM FINANCIAL INSTITUTIONAL INNOVATION

Inovação e crescimento económico: evidência de inovação institucional financeira

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Abstract: Innovation is the key to bringing changes in the traditional financial system. Innovation in the financial system being new financial products, hybrid financial institutions and new rules and regulations to reform existing financial system. Evolvement of financial institutions in the economy help economy in performing a financial function more effective and efficiently and such performance of financial institution promotes economic growth. The aim of the study to assess the relationship between institutional innovation and economic growth of Bangladesh over the period from 1991 to 2015. During this study, we employ the various econometric model to established association ship between institutional innovation and economic growth. Study results revealed that all the variables are stationary at level and after first difference all the variables become non-stationary. Test of Cointegration results revealed that innovation in the financial system through non-bank financial institutions and the financial market can contribute long run and CPI and spread rate can contribute in short run in the economic growth of Bangladesh. While Granger Causality Test revealed that Capital flow and GDP shows unidirectional causality but financial market development and GDP shows the Bidirectional causal relationship in the economy. It is also observed from causality analysis that capital flow and financial market development shows bidirectional causality, which indicated that innovation either in a financial institution or financial market can cause both variables and eventually influence on economic growth. So policymaker should consider the interrelationship between institutional innovation and economic growth while the formulation of economic policy because policy should expedite the development process in the financial system by making robust financial sector through encouraging financial innovation with banks, non-banks financial institution and capital market as well. Robust financial development can cause positively in overall economic growth in Bangladesh.
Key Words: Innovation, Economic Growth, GDP, Financial institution,

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Resumo: A inovação é a chave para trazer mudanças no sistema financeiro tradicional. A Inovação no sistema financeiro como sendo novos produtos financeiros, instituições financeiras híbridas e novas regras e regulamentos para reformar o sistema financeiro existente. A evolução das instituições financeiras na economia ajudaria a economia no desempenho de uma função financeira mais eficaz e eficiente e tal desempenho da instituição financeira ajudaria a promover o crescimento econômico. O objetivo deste estudo foi avaliar a relação entre inovação institucional e crescimento econômico de Bangladesh durante o período de 1991 a 2015. Para essa finalidade, foram utlizados varios modelos econométrico procurando as relações entre entre inovação institucional e crescimento econômico. Os resultados revelaram que todas as variáveis são estacionárias ao nível e após a primeira diferença todas as variáveis tornam-se não estacionárias. Testes of Cointegration revelaram que a inovação no sistema financeiro através de instituições financeiras não-bancárias e o mercado financeiro pode contribuir a longo prazo e o CPI e taxa de spread podem contribuir a curto prazo no crescimento econômico do Bangladesh. Por outro lado o teste de Causlaidade de Granger Causality revelou que o fluxo de capital e o PIB mostra una causalidade unidirecional, enquanto que o desenvolvimento do mercado financeiro e o PIB mostram uma relação causal bidirecional na economia. Observa-se também a partir da análise de causalidade que o fluxo de capital e o desenvolvimento do mercado financeiro mostram causalidade bidirecional, o que indicou que a inovação, tanto em uma instituição financeira, quanto no mercado financeiro podem afectar ambas as variáveis e por tanto eventualmente influenciar o crescimento econômico. Assim, o policymaker deve considerar a inter-relação entre inovação institucional e crescimento econômico, enquanto a formulação da política econômica, deve acelerar o processo de desenvolvimento no sistema financeiro, tornando mais robusto, incentivando a inovação financeira com bancos, instituições financeiras não-bancárias e mercado de capitais também. Um desenvolvimento financeiro robusto pode ter um impacto positivo no crescimento econômico geral em Bangladesh.
Palavras-chave: Inovação, Crescimento Econômico, PIB, Instituição Financeira.

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INTRODUCTION

Innovation spurs economic growth and transformation of the financial system of a country. Innovation not only induces organizational changes but also changes in the rule of the game. During the last thirty years, innovation has become the synonym for the development of nations, technological progress and driver of business success. Innovation nowadays is not simply the "creation of something new" but also a panacea for the solution of a board range of problems. The term "innovation" is more and more often used - very frequently by policymakers, marketing specialists, advertising specialist and management consultants - not as a strictly scientific concept but as a metaphor, political promise, slogan or a buzzword (Kotsemir & Abroskin, 2013).

The modern financial system is characterized by adoption and emergence innovation because in the financial system innovation takes place with high pace (Błach, 2011). Innovation in the financial system not only change financial structure but also change financial business practice as a whole. Considering the importance of financial institutions, innovation impact and consequences should be a monitor on a priority basis because the performance of financial institutions significantly affect the entire financial system and eventually adversely affected the economic progression of the country.

The links between financial institutions and economic growth have concentrated a great deal of academic attention during the last fifteen years (Valverde, Paso, & Fernández, 2014). The impact of financial innovation and economic growth is an important public policy issue. A key issue is whether financial innovation spurs economic growth, or even is a prerequisite for economic growth? As is by now well established, financial innovation is an important facilitator of economic growth. Having well-functioning financial institutions (and markets) is considered important for the economy at large and the financing of corporations in particular. Also financial instruments – as manifestations of financial development – can be of considerable importance. This study aims to identify whether financial innovation causes economic growth in Bangladesh using Granger Causality test. The paper is organized as follows: Section II Literature Review, Section III presents in details the methodology, Section IV discusses the results, Section V. Concluding and policy recommendations

LITERATURE REVIEW

The contribution of innovation to the economy is multidimensional due to having direct and indirect input on the economy like capital accumulation and disbursement, act as a facilitator in both domestic and international trade and commerce, the introduction of new financial instruments, encourage people towards saving propensity. The relationship between financial innovation and economic growth presents a great interest among researchers as results the concept of financial innovation is a debated topic in financial literature. Financial institutions evolve predominantly at the national level of the economy but innovation processes are firmly embedded in sectoral technology regimes **(Block, 2002)**. The institutional framework might, therefore, be compatible with the requirements of firms in some but not all industries.

Pecea Pecea, Simonab, and Salisteanuc (2016) conduct study to identify whether long-term economic growth is influenced by the innovation potential of an economy or not. Study results show that a positive relationship between economic growth and innovation. **Chou Chou (2007)** explored the channels through which innovations in the financial sector lead to economic growth. The channels identified are the capital accumulation and technological innovation. **Glaeser Glaeser, Porta, Lopez-de-Silanes, and Shleifer (2004)** revealed that human capital is a more basic source of growth than are the institutions and a poor country can even get off from poverty through innovation of political institutions. Chang (2010) institutions that provide maximum business freedom and strongest protection of private property rights are the best for economic development also turns out to be very partial, conceptually fraught, and full of practical measurement problems.

Financial institutions have innovated to serve new or underserved populations with products and structures that include microfinance or another hybrid (Raffaelli & Glynn, 2013). Economists recognize that the quality of institutional arrangements plays a key role in explaining long-run economic performance (Jones. & Hall., 1999). Boot and Marinč (2010) found that there is a strong linkage between financial institutions development with the development of financial system in the economy which eventually enhances the development of the economy. Elmslie., Tebaldi, and Bruce. (2008) found that countries with institutional barriers that prevent or restrict the adoption of newly invented technologies will allocate a relatively small share of human capital in the R&D sector. Sunde (2013); Domeher, Frimpong, and Appiah (2014) development of financial institution significantly influence on economic activities through optimal utilization of economic resources in the economy.

According to ((Ndikubwimana, 2016); (Festre & EricNascia, 2009) financial institutions play a role of intermediating people, business companies or enterprises in need of funds (borrowers) with lenders. Apart from that institutional innovation impact of economic growth on the development of technological changes in the economy (Huang. & Xu., 1999). Silve & Plekhanov, (2010) revealed from their study that industries involving higher levels of innovation grow relatively faster in countries with better economic institutions and also concluded that industries involving higher levels of innovation grow relatively faster in countries with better economic institutions. Adusei (2013) found that an increase in the size of the financial intermediary sector undermines growth, while (Pecea et al., 2016) ensure a positive relationship between economic growth and innovation through extensive research and development (R&D) in the economy. Siddiqui and Ahmed (2009) Confirmed that financial Institutions and growth are cointegrated and thus exhibit a reliable long run relationship having no short run association. Gregersen and Johnson (1997) concluded that interactions between institutional, organizational and technical change as the basic source of growth. Financial institutions innovation prime focus to screen out potential entrepreneurs for profitable investment with minimum risk and also increase efficiency level of using capital (Laeven, Levine, & Levine, 2014).

Financial institutions accumulated fund by taking deposits and disbursed among different economic agents in the economy which eventually enhance the economic progress as a whole (Michael, Ojiegbe, & Peter, 2015). Sustainable economic development requires optimal reallocation of economic resources among economic agents, which only can possible through innovation of financial institutions. Financial institution innovation like non-bank financial institution significantly influences on economic growth both in the long and short run (Islam & Osman, 2014). According to (Błach, 2011), sustainable financial innovations are required, as they enhance the efficiency of the financial system and by this, they can improve the economic growth and increase the social wealth. However, some of the financial innovations can have some negative side-effects upon the financial system, offering benefits to the single participants and simultaneously being harmful to others. It has been already demonstrated that economic institutions are the major source of economic growth across countries (Rodrik, 2007). Financial institutions have a decisive influence on investments in physical and human capital, technology, and industrial production. It is also well-understood that in addition to having a critical role in economic growth, economic institutions are also important for resource distribution.

Institutes can not perform stand alone but appear as a part of the wider financial system (Ogilvie & Carus, 2014). The financial system is consists of financial institutions, financial market, and financial regulatory authority. A financial institution, consists of banks and non-banks financial institutions, have an impact on economic growth. According to (Cheng & Degryse, 2008), bank loans exert a statistically and economically significant positive impact on local economic growth. Economic growth and financial market system and financial innovation in the economy promotes economic growth in long run. it is also manifested that technological and business innovation variables have a positive impact on economic growth (Ndako, 2010)&(Saad, 2014). For sustainable economic development financial development is required but not a sufficient condition for stimulating economic growth that the economy has been experiencing in the past decade (Bwirea & Musiime, 2015).

Financial intermediation has a significant impact on economic growth (Shittu, 2012)&(Johnson & Kwak, 2012)&(Djoumessi, 2009). Financial intermediation enhances further development in the financial sector which leads economy towards sustainable economic development through mobilization of economic resources thus augmenting investment toward improving efficiency and thereby higher economic productivity (Estrada, Park, & Ramayandi, 2009). While (Bakang, 2015) explained that financial development has significant effects on GDP.

It is empirically agreed by the researchers that intuitional innovation in the financial system contributes significantly on financial system reformation through the emergence of new rules and regulation, the introduction of new financial products and different financing sources in the economy like financial market development, the emergence of Microfinance Institute (MFIs). Changes in the financial structure bring positive impact in the economy. With this study, we try to explore in-depth knowledge regarding how financial institutional innovation contributing towards the economic growth of Bangladesh. Because empirical findings show that there is no such research been conducted in past considering innovation impact on Bangladesh economy. This research gap induced us to get insight about financial institutional innovation impact on economic growth.

METHODOLOGY OF THE STUDY

1.DATA AND DATA SOURCES

This research focused on assessing financial innovation impact on economic growth over research period from 1991 to 2015. We segregate institutional innovation in two broad categories by the consideration of institutions prime functions in the economy. First, political institutions refer to those institutions who act as a watchdog in the financial system like, regulatory authority, the central bank, financial performance monitoring agencies etc. Second, financial institutions, are those institutions who act as prime actor in the mobilization of economic resources among economic agents such as accumulation of deposits from surplus units and assist to investors of capital accumulation by giving a loan.During this study (see table – 1), we select four independent variables as a representative for financial innovation and one dependent variable of development representative. Independent variables are;

Table – 1: Research Variables

Variables	Indicators
Input/explanatory	Market Capitalization
	Capital flow in the economy
	CPI
	Spread rate
Output/Dependent	Economic Growth (Real GDP)

Research data were collected from different published sources such as Bangladesh Bank, Security, and exchange commission, financial market statistical reports, World Development indicator (WDI), IMF, and Bureau of statistics, in an unconsolidated manner and we make them a consolidated form for research purpose.

Table – 2: Descriptive statistics of Research Variables

	GDP	CPI	Capital outflow	MKTCAP	Sp_rate
Mean	303292.48	106.53	160407.916	68275.054	6.1972
Median	237101	86.82906	84027.6	10576.34	5.93
Maximum	824532	221.78	574599.3	270187.56	7.880
Minimum	132522	49.59	17822.9	1004.76	4.86
Std. Dev.	195420.532	51.969	168405.37	94717.341	0.878
Skewness	**1.684**	**0.886**	**1.217**	**1.110**	**0.211**
Kurtosis	**4.77**	2.602	**3.192**	2.496	1.743
Jarque-Bera	15.116	3.442	6.212	5.401	1.830
Probability	0.000	0.178	0.044	0.067	0.400
Observations	25	25	25	25	25

Source: Author Calculation

Some of the descriptive statistics of research variables are exhibited in Table - 2. It is obvious that all the variables, except Sp_rate, are highly skewed towards right direction having skewness value greater than +1. Another measurement of data shape is kurtosis. As skewness involves the third moment of the distribution, kurtosis involves the fourth moment. The outliers in a sample, therefore, have even more effect on the kurtosis than they do on the skewness and in a symmetric distribution, both tails increase the kurtosis, unlike skewness where they offset each other. As per kurtosis coefficient of research variables among those GDP and capital, flow variables show leptokurtic distribution and CIP, Market capitalization and Sp_rate platykurtic distribution respectively.

Table – 03: Correlation Matrix

	CPI	Capital outflow	GDP	MKTCAP	Sp_rate
CPI	1				
Capital outflow	0.989	1			
GDP	0.947	0.959	1		
MKTCAP	0.934	0.95	0.867	1	
SPREAD_RATE	-0.698	-0.692	-0.604	-0.696	1

Correlation ranges between -1 and +1 and quantifies the direction and strength of the linear association between the two variables. The sign of the correlation coefficient indicates the direction of the association. The magnitude of the correlation coefficient indicates the strength of the association. A correlation above 0.8 between explanatory variables signifies high correlation of the variables. It is apparent (see table – 3) that all the variables are strongly correlated with positive direction but spread rate has a negative relation with another variable over time.

2.MODEL SPECIFICATION:

The empirical model employed for this study was adapted from an improved (Dritsaki et al. 2005) and Beck and Levine (2004) which is specified as follows:

$$Y = \int (V_1\, V_2\, V_3\, V_3\, V_4 \dots\dots\dots\dots\dots\dots\dots V_N) \dots\dots\dots\dots\dots\dots\dots\dots (1)$$

$$LogY = \int \alpha + \beta logV1 + \gamma logV2 + \delta logV3 + \theta logV4 + \pi logV5 + \cdots . \tau logVn + \varepsilon \dots\dots\dots\dots\dots (2)$$

Where: α= intercept or constant term of the relationship; β, δ, γ, π, θ= coefficients of the repressor and the apriori expectations are β, δ, γ, π, θ > 0. ε= random disturbance/error term which takes care of the measurement errors that would have resulted in the collection and processing of the data. Logline arising the model in order to interpret the results in an elasticity and degree of responsiveness yields:

3.METHODOLOGIES

3.1. UNIT ROOT TEST:

The purpose of unit root test is to check whether the data is stationary or not. The data is said to be stationary if it means, variance and covariance remain constant over time. Considering AR (1) model:

$Y_T = \emptyset Y_{t-j} + \varepsilon$..... (3)

The stationary condition is:

Case 1: $\emptyset < 1$ the data is stationary

Case 2: $\emptyset > 1$ the series explodes

Case 3:$\emptyset = 1$, the data shows unit root and non-stationary.

This paper consider The Augmented Dickey-Fuller (ADF), ADF: Augmented Dickey-Fuller test; DF-GLS: Dickey-Fuller test with GLS; KPSS: Kwiatkowski-Phillips-Schmidt-Shin test; and Phillips-Perron (PP) Unit Root Tests are employed to test the integration level and the possible cointegration among the variables (Dickey and Fuller 1981; Phillips and Perron 1988). The determination of lag length is based on Akaike Information Criterion (AIC) and Schwartz Bayesian Criterion (SBC). Three possible forms of these tests as follows;

$\Delta Y_T = \gamma Y_{t-1} + \sum_{i=1}^{p} \beta_i \Delta Y_{t-i} + \varepsilon_t$..... (4)

$\Delta Y_T = \alpha_0 + \gamma Y_{t-1} + \sum_{i=1}^{p} \beta_i \Delta Y_{t-i} + \varepsilon_t$ ..... (5)

$\Delta Y_T = \alpha_0 + \gamma Y_{t-1} + \alpha_1^t + \sum_{i=1}^{p} \beta_i \Delta Y_{t-i} + \varepsilon_t$..... (6)

Where β, γ andα, are slope coefficient, t is a linear time trend and ε_t is the error term. The null hypothesis can be expressed as

$$H_0: \gamma = 0, on\ the\ other\ hand, alternative\ hypothesis\ is\ as\ H_0: \gamma < 0$$

The Akaike Information Criterion (AIC) is defined as

$AIC(P) = T \ln\left(\frac{RSS}{n-p}\right) + 2p$..... (7)

Where,
T = total sample size
RSS = residual sum of square
N = Lag length
P = total no of estimation parameters

3.2 JOHANSEN TEST OF CO-INTEGRATION

The cointegration test determines if the integrated variables are cointegrated. Cointegration regressions measure the long-term relationship between the dependent and the independent variables. The Johansen maximum likelihood procedure in a vector autoregressive framework introduced by (Johansen, 1988) is an essential tool for the estimation of models that involves time series data. The Johansen cointegration approach is preferred in this study as it allows the researcher to estimate a dynamic error correction specification, which provides estimates of both the short and the long run dynamics. The approach has also been found to be the most reliable and appropriate for small sample properties. Johansen (1990 developed two likelihood ratio tests: the Trace Test and the Maximum Eigenvalue Test. The two procedures test for the presence of cointegrating vectors between financial development and economic growth.

According to Johansen (1988), multivariate cointegration model is based on the error correction representation given by:

$$\Delta Y_T = \mu + \sum_{i=1}^{P-1} \alpha_i \Delta Y_{I-t} + \beta Y_{T-1} + \varepsilon_t \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (8)$$

Where Y_t is a (nx1) column vector of ρ variables, μ is a (nx1) vector of constant terms, **α**, and **β** captured coefficient matrices, Δ is a difference operator, and et ~ IID(0,). The coefficient matrix **β** is known as the impact matrix, and it contains information about the long-run relationships. Johansen's methodology requires the estimation of the VAR equation (3) and the residuals are then used to compute two likelihood ratio (LR) test statistics that can be used in the determination of the unique cointegration vectors of Y_t. The cointegration rank can be tested with two statistics: the trace test and the maximal eigenvalue test

3.3.GRANGER CASUALTY TEST UNDER VECM

The order of vector Autoregression of order p in the error-correction model is determined by minimizing the Akaike information criterion (AIC) and Schwartz Bayesian criterion (SBA). The granger causality test is used to check the causality among the variables. The granger causality test based on the following Vector Error Correction Models (VECM):

$$\Delta \ln GDP_t = \delta_1 + \sum_{i=1}^{n-1} \alpha \Delta LGDP_{t-i} + \sum_{i=0}^{m-1} \beta_{1i} \Delta LCAPF_{t-i} + \sum_{i=0}^{j-1} \gamma_{1i} \Delta LMKTCAP_{t-i} + \sum_{i=0}^{k-1} \rho_{1t} \Delta LCPI_{t-i} + \sum_{i=0}^{z-1} \pi_{1i} \Delta LSPRATE_{t-i} + \emptyset_1 ETC_{t-1} + \omega_{1t} \dots\dots (9)$$

$$\Delta \ln CAPF_t = \delta_1 + \sum_{i=0}^{n-1} \alpha \Delta LGDP_{t-i} + \sum_{i=1}^{m-1} \beta_{1i} \Delta LCAPF_{t-i} + \sum_{i=0}^{j-1} \gamma_{1i} \Delta LMKTCAP_{t-i} + \sum_{i=0}^{k-1} \rho_{1t} \Delta LCPI_{t-i} + \sum_{i=0}^{z-1} \pi_{1i} \Delta LSPRATE_{t-i} + \emptyset_1 ETC_{t-1} + \omega_{2t} \dots\dots (10)$$

$$\Delta \ln MKTCAP_t = \delta_1 + \sum_{i=0}^{n-1} \alpha \Delta LGDP_{t-i} + \sum_{i=0}^{m-1} \beta_{1i} \Delta LCAPF_{t-i} + \sum_{i=1}^{j-1} \gamma_{1i} \Delta LMKTCAP_{t-i} + \sum_{i=0}^{k-1} \rho_{1t} \Delta LCPI_{t-i} + \sum_{i=0}^{z-1} \pi_{1i} \Delta LSPRATE_{t-i} + \emptyset_1 ETC_{t-1} + \omega_{3t} \dots\dots (11)$$

$$\Delta \ln CPI_t = \delta_1 + \sum_{i=0}^{n-1} \alpha \Delta LGDP_{t-i} + \sum_{i=0}^{m-1} \beta_{1i} \Delta LCAPF_{t-i} + \sum_{i=0}^{j-1} \gamma_{1i} \Delta LMKTCAP_{t-i} + \sum_{i=1}^{k-1} \rho_{1t} \Delta LCPI_{t-i} + \sum_{i=0}^{z-1} \pi_{1i} \Delta LSPRATE_{t-i} + \emptyset_1 ETC_{t-1} + \omega_{4t} \dots\dots (12)$$

$$\Delta \ln SPRATE_t = \delta_1 + \sum_{i=0}^{n-1} \alpha \Delta LGDP_{t-i} + \sum_{i=0}^{m-1} \beta_{1i} \Delta LCAPF_{t-i} + \sum_{i=0}^{j-1} \gamma_{1i} \Delta LMKTCAP_{t-i} + \sum_{i=0}^{k-1} \rho_{1t} \Delta LCPI_{t-i} + \sum_{i=1}^{z-1} \pi_{1i} \Delta LSPRATE_{t-i} + \emptyset_1 ETC_{t-1} + \omega_{5t} \dots\dots (13)$$

In equations, Δ is the difference operator,

ETC_{t-1} = One period lagged value of the error correction term.

DATA ANALYSIS AND INTERPRETATION

1.Unit root test

Empirical analysis based on secondary data require substantial attention due to non-homogeneous nature especially data from secondary sources need to testify for identification of data characteristics. In an econometric research analysis, there are no of the test being used over the year among those test of stationary is widely acceptable. Unit root test satisfies weather data do have a stochastic effect or not.

Table – 4: Results of model variables unit root test

Methods	None		1st difference	
	Intercept	Trend & intercept	Intercept	Trend & intercept
Levin, Lin & Chu	3.54981 (0.9998)	-2.39246 (0.0084)**	-5.56982 (**0.0000**)**	-13.2854 (**0.0000**)**
Im, Pesaran and Shin W-stat	3.18996 (0.9993)	0.47821 (0.6838)	-2.16581 (**0.0152**)**	-1.29660 (**0.0174**)**
ADF - Fisher Chi-square	12.1307 (0.5958)	11.7486 (0.6265)	29.9928 (**0.0076**)**	28.0226 (**0.0141**)**
PP - Fisher Chi-square	18.5202 (0.1841)	25.5506 (0.0295)**	42.9420 (**0.0001**)**	29.2864 (**0.0096**)**

Note: ** rejected at 1% level of significant, * rejected at 10% level of significant

Source: Author Calculation

In order to testify data properties, we go for group unit root test rather individual variable unit root test. Test statistics shows that at level (see table -4) all the variables are not stationary because the associated P-value of each coefficient is insignificant which P-value is greater than 5% under all methods. It is observed after first differentiation of original data that all the variables become stationary regardless of assumption as well as applied methods for unit root testing. The outcome of first difference unit root test shows that associated p-value of each methods coefficient is significant which less than 5% is. Such result ensures and satisfies that data can be used for advance econometrical analysis which is the prime concern for research.

2. TEST OF COINTEGRATION

Assessment of long run or short run association between dependent and independent variables is one of the prime concern in the most econometrical analysis. In order to analysis relationship, a test of Johansen cointegration is widely acceptable with the specification of whether there is a short run association or long run association among the variables.

Table – 5: Test of cointegration

Unrestricted Cointegration Rank Test (Trace)						
	Eigenvalue		Trace Statistic		Critical Value (P-value)	
Null Hypothesis	Trace	Max Eigenvalue	Trace	Max Eigenvalue	Trace Statistics	Max Eigenvalue
r = 0	0.999	0.999605	127.746	101.8683	47.85613 (0.0000)	27.58434 (0.0000)
R<=1	**0.726**	**0.726898**	**25.877**	**16.87281**	**29.79707 (0.1324)**	**21.13162 (0.1781)**
At most 2	0.496	0.496428	9.005	8.918366	15.49471 (0.3649)	14.26460 (0.2930)
At most 3	0.006	0.006648	0.086	0.086714	3.841466 (0.7684)	3.841466 (0.7684)

Source: Author Calculation

Table -5: exhibits test of cointegration results. By the consideration of both coefficient with an associated p-value of trace statistics and maximum Eigenvalue, it is satisfied that there is at most one cointegration equation is between dependent and independent variables.

Long run cointegration equation of financial innovation impact on economic growth is;

$$GDP = \underset{(0.06628)}{(2.35129 * Capitla\ Flow)} + \underset{(0.06794)}{(1.0603 * Market\ Captalization)} + \underset{(1147.71)}{(10944.13 * Sp_{rate})} + \underset{(171.784)}{(799.9438 * CPI)}$$

It is seen from cointegration coefficient (see table -5) of research variables that both capital flow from non-bank financial institutions (-2.3519) and earnings of financial institutions (-10944) have long run impact whereas market capitalization (+.1.0603) and CPI (+799.94) has a short run impact on economic growth. Considering the impact of economic growth for sustainable, government of Bangladesh should take necessary initiatives to the development of the Non-bank financial institution and encourage more innovation in this sector and also formulate economic policy to properly manage the earning of financial institutions in the financial system. Between two long run effect variables, capital flow from non-bank financial institutions have a greater impact due to coefficient associated p-value is significant.

CASUALTY TEST

Identification of directional cause-effect relationship among research variables assists to make an economic decision while the formulation of future economic policy which eventually expedites economic development in the economy. In order to examine directional impact among all variables, we employed an econometrical model of pairwise granger causality test. Table - 6: exhibits pairwise granger causality outcome having either unidirectional or Bi-directional relationship exist among each pair. Bi-directional signifies cause – effect through one way but unidirectional signifies both variables influence in long run on each other.

Table – 6: Pairwise granger causality test

	F-statistics	P-value	Decision	Outcome
Capital Flow>>> GDP	**14.0277**	****0.0005**	**Ho is rejected**	**Unidirectional**
GDP >>>> **Capital Flow**	2.45113	0.1148		
CPI >>> GDP	**6.61465**	****0.0075**	**Ho is rejected**	**Unidirectional**
GDP >>>> CPI	1.07985	0.4322		
SPREAD_RATE >>> GDP	1.45775	0.2932		
GDP >>>>Spread_Rate	1.00680	0.4662		
Mktcap >>>> GDP	**147.913**	****2.E-08**	**Ho is rejected**	**Bidirectional**
GDP >>> Mktcap	**9.28422**	****0.0023**		
CPI >>>>> **Capital Flow**	1.48020	0.2867		
Capital Flow>>>>> CPI	1.30874	0.3413		
Spread_Rate>>>>> Capital Flow	2.82817	0.0833		
Capital Flow>>>>>> Spread_Rate	1.02717	0.4565		
Mktcap >>>>>> Capital Flow	**22.3913**	****8.E-05**	**Ho is rejected**	**Bidirectional**
Capital Flow>>>> Mktcap	**8.90161**	****0.0027**		
Spread_Rate >>> CPI	6.44100	****0.0082**	**Ho is rejected**	**Unidirectional**
CPI >>>>> Spread_Rate	0.58202	0.7141		
Mktcap >>>> CPI	**3.54077**	****0.0479**	**Ho is rejected**	**Unidirectional**
CPI >>>> Mktcap	2.41591	0.1184		
Mktcap>>>> Spread_Rate	0.90972	0.5154		
Spread_Rate >>>> Mktcap	2.08413	0.1597		

Source: Author calculation

In long run, GDP will be affected due to causes of capital flow from non-bank financial institutions and CPI in the economy but changes of GDP does not have any impact on Capital flow in the economy and level of CPI in long run, meaning that there is a Bi-directional relationship among GDP, Capital flow, and CPI. Whereas, we observe a unidirectional relationship between GDP and Market capitalization meaning that in long run both market capitalization and GDP both causes each other in either direction, which is meaning that there is unidirectional causality, apart from this we also observed that market capitalization and capital flow causes each other by same way as GDP and market capitalization. Considering the unidirectional causality among GDP, Market capitalization, and Capital flow, we can conclude that fluctuation in one of the three variables in either in short run or long run all three variables will be affected either direct or indirect way. So formulation of any policy for any variable, policymakers should pay more attention in this regard. We also observed that both spreading rate and market capitalization can cause CPI in long run but CPI only cause on GPD. So in overall, it can be concluded that all the explanatory variables may cause economic growth either direct or indirect way.

CONCLUSION

Innovation increased economic activity in most developing countries through promoting financial inclusion, mobile money transfers and enabling remittances, which in turn has an impact on economic growth (Bara et al., 2016). Financial innovation presents opportunities for financial sector growth in Bangladesh. Financial development is the prerequisites for sustainable economic development. In the economy, financial development is a positive function of real wealth (Saqib, 2015) because the inadequate functioning financial system can obstruct economic growth. Over the year, economists established that financial innovation in the financial system not only restructure financial system but also act as a catalyst for financial development which eventually expatiates economic growth process in both long run and short run.

The empirical estimations carried out in this study show that financial innovation generally has a positive effect on economic growth in the short run and a long run on Bangladesh economy. Although the effects vary with the variable used to measure financial innovation. In addition, a test of Cointegration shows that financial innovation has long run association with economic growth. Granger causality test suggest that In long run GDP will be affected due to causes of capital flow from non-bank financial institutions and CPI in the economy but changes of GDP does not have any impact on Capital flow in the economy and level of CPI in long run, meaning that there is Bi-directional relationship among GDP, Capital flow, and CPI. Whereas, we observe a unidirectional relationship between GDP and Market capitalization meaning that in long run both market capitalization and GDP both causes each other in either direction, which is meaning that there is unidirectional causality, apart from this we also observed that market capitalization and capital flow causes each other by same way as GDP and market capitalization.

The implication of causality findings is that the on-going innovation in financial sectors of Bangladesh, though with positive effects, does have a significant impact on economic growth. The results also suggest that economic growth does influence or drive financial innovation. Implicitly, there is potential to increase financial innovation in the economy without being constrained by the country's growth.

The positive relationship between financial innovation and economic growth support recommendations of increasing financial innovation in Bangladesh, which need to develop their financial sectors in order to enhance financial innovations that support economic growth. In framing policies, governments have to balance the distinctive priorities of promoting financial sector development, financial innovation, and financial inclusion; at the same time limiting risks to financial sector stability (Mlachila, 2013). While receiving assistance for promoting access to financial services, the target should be towards enhancing innovation-based platforms (Napier, 2014). Financial innovation needs to be anchored on both capital market and the non-banking sector as it has the net effect reaching out to the unbanked at the same time enhancing depth, access, and convenience to the already banked. Only government initiative is too small to support or attract huge investment in financial infrastructure that supports continuous financial innovations. As such, the government should formulate economic policy in such a way which promote co-operation in the development of infrastructure, technology, and innovations within the financial integration framework.

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