

## **FINANCIAL DEVELOPMENT, TRADE OPENNESS AND ECONOMIC GROWTH IN DEVELOPING COUNTRIES Recent Evidence from Panel Data**

NABILA ASGHAR and ZAKIR HUSSAIN\*

**Abstract.** The study investigates the causal relationship between financial development and economic growth in developing countries over the period of 1978-2012. The study empirically explores the channels through which financial development may influence economic growth more specifically in the context of Foreign Direct Investment (FDI) and trade openness. The financial development index is constructed and panel co-integration tests are applied to check the existence of long-run relationship between the variables of interest. The findings of the study show that there are strong evidences of the long-run relationship between financial development and economic growth in developing countries. There exists bi-directional causation between financial development and FDI. Furthermore, trade openness has impact on financial development in all the countries, which calls for the introduction of effective policy measures to promote trade between countries.

**Keywords:** Financial development, Economic growth, Panel causality analysis, Panel cointegration

**JEL classification:** C10, F43, G21

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\*The authors are, respectively, Ph.D. (Economics) Scholar and Vice-Chancellor at the Government College University, Faisalabad (Pakistan).  
Corresponding author e-mail: nabeelakhan83@gmail.com

## I. INTRODUCTION

Finance-growth nexus can be traced back to Bagehot (1873) and Schumpeter (1911) who strongly believed that well organized financial systems could surely spur innovation and future real growth with respect to identification and funding of productive investment. These models support supply-leading view by demonstrating that financial development reduces informational friction and improves resource allocation efficiency. Furthermore, the empirical evidence related to importance of financial system to long-run economic growth was substantiated by Goldsmith (1969), Hicks (1969), Fry (1978), Levine *et al.* (2000), Ndikumana (2000), and King and Levine (1993; 2003; 2005) among others. Endogenous growth theories postulate that saving behaviour directly influences not only equilibrium income level but also growth rate and highlight the role of financial development in promoting economic growth (*see for example*, Obstfeld, 1992; Bencivenga *et al.*, 1995; Greenwood and Smith, 1997; Saint-Paul, 1992; Pagano, 1993).

Several empirical studies that have analyzed the finance growth nexus are available in the existing literature. These studies end up with mixed results due to several reasons including the use of variety of estimation techniques and proxies of financial development measures in the analysis. The existing literature has identified various channels through which financial development may promote economic growth. Levine (2004) argues that financial development encompasses enhancements in the production of *ex ante* information about possible investments, monitoring of investments, trading, pooling of savings and mobilization, and exchange of goods and services. These factors may influence investment and trade in an economy. Through these channels, financial development causes economic growth indirectly. However, existing literature mainly ignores these potential channels while studying finance-growth nexus.

This study is highly important as it intends to fill the existing gap in the literature by taking the advantages of recent development in non-stationary heterogeneous panel data techniques. It fills the gap in several ways. First, this study employs relatively more comprehensive measures of financial development in scope and methodology. Second, this study uses most appropriate estimation methodology to quantify the linkages between financial development and economic growth such as panel causality tests and panel cointegration tests. Third, this study explores the channels through which financial development exerts impact on economic growth. It includes foreign direct investment, trade openness and other related variables in the model. Lastly, the main concern of this study is to observe whether

developing countries included in the sample have benefited in terms of economic growth from financial development or otherwise.

This study is organized as follows. Following the introduction, section II presents review of literature. Section III is the description of dataset, model specification and econometric methodology. Section IV establishes empirical results and interpretations and last section concludes the study with policy implications.

## II. REVIEW OF LITERATURE

### EVIDENCE FROM TIME SERIES DATA

Since the 1990s, the relationship between financial development and economic growth has received considerable amount of attention of the researchers and policy makers. Using time series data several studies have analyzed the finance growth nexus over time and end up mixed results (*see* for example, Wachtel and Rousseau, 1995; Demetriades and Luintel, 1996; Arestis and Demetriades, 1997; Rousseau and Wachtel, 1998; Luintel and Khan, 1999; Shan *et al.*, 2001; Arestis *et al.*, 2001; Calderon and Liu, 2003; Thangavelu *et al.*, 2004; among others).

Most of the studies conclude the existence of positive relationship between financial development and economic growth (*see* for example, Wachtel and Rousseau, 1995; Khan *et al.*, 2006; Yang and Yi, 2008; Sindano, 2009; Atif *et al.*, 2010; among others) while Kar and Pentecost (2000) fail to find any relationship between financial development and economic growth.

Some studies find bi-directional causality between financial development and economic growth. Al-Yousif (2002) examines the nature and direction of the relationship between financial development and economic growth using both time-series and panel data of 30 developing countries for the period of 1970-1999. The empirical results strongly support the existence of bi-directional causality between the variables.

Some studies point out the mixed results regarding the causal relationship between the variables. Alrayes (2005) empirically investigates the hypothesis of causality between financial development and economic growth in seven Middle East and North African (MENA) countries using time series data. The results of the study provide evidence of uni-directional and bi-directional causality between financial development and economic growth in four cases, no causality in two cases, and no significant relation between financial development and economic growth in one case.

The above-mentioned literature reveals that the time series studies present contradictory results. Furthermore, the results of time series data are not much reliable because of short length of data set, inappropriate estimation technique and biases brought about by omitted variables.

### **EVIDENCE FROM CROSS-SECTION DATA**

Various studies have used cross section data and most of the studies support positive relationship between financial development and economic growth after accounting for potential biases brought about by simultaneity, omitted variables and unobserved country specific effects (for example, King and Levine, 1993*a*; 1993*b*; Demetriades and Hussein, 1996; Levine and Zervos, 1998; Rajan and Zingales, 1998; Khan and Ssnhadji, 2000; Lensink, 2001; Dawson, 2003; Liu and Hsu, 2006; among others).

Hermes and Lensink (2003) argue that well developed financial system is essential for Foreign Direct Investment (FDI) to have positive impact on economic growth. The study concludes that the development of financial system plays an important role in enhancing the positive relationship between foreign direct investment and economic growth in developing countries.

Law and Demetriades (2005) use cross-country and dynamic panel data techniques on 43 developing countries for the period of 1982-2000 and observe that if a country's borders are simultaneously open to both capital flows and trade help financial development to enhance. The study points out that institutional quality is robust and statistically significant determinant of financial development.

Alfaro *et al.* (2004) use simple OLS cross-country regressions and analyze the effect of FDI on economic growth. The study finds the support for the countries with well-developed financial markets gain significantly from FDI via total factor productivity (TFP) improvements.

One of the important drawbacks of cross-section studies is that these studies are helpless in discussing integration and cointegration properties of data. Furthermore, these studies cannot examine the direction of causality between financial development and economic growth.

### **RECENT DEVELOPMENT: PANEL DATA ANALYSIS**

Recent panel data studies provide evidence of positive relationship between financial development and economic growth. These studies appear to be more authentic and reliable as these studies attempt to overcome the possible drawbacks of time series and cross section studies. Luintel and Khan (1999)

examine the relationship between financial development and economic growth by using a sample of ten less developed countries and find a bi-directional causality between financial development and growth.

Levine *et al.* (2000) use panel techniques to support the existence of a causal relationship from financial development to economic growth. Using a panel of 77 countries for the period of 1960-1995, the study finds that higher levels of banking sector development produce faster rates of economic growth and TFP growth. The study concludes that the strong positive relationship between financial development and output growth can be partly explained by the impact of the exogenous components like finance development on economic growth.

Christopoulos and Tsionas (2004) examine the long-run relationship between financial development and economic growth for 10 developing countries using panel cointegration analysis and confirm uni-directional causality from financial development to economic growth.

Deidda (2006) concludes that when financial development is sustainable, the credit market becomes more competitive and more efficient over time, and it eventually contributes to economic growth.

Kiran *et al.* (2009) investigate the long-run relationship between financial development and economic growth for a panel of 10 emerging countries over the period of 1968-2007 by employing the panel unit roots tests and Pedroni's panel cointegration techniques. The results support that financial development has a positive and statistically significant impact on economic growth.

Memon *et al.* (2011) analyze the empirical links between financial development and economic growth in South Asian Association of Regional Cooperation (SAARC) countries for the period of 1980-2009. The results support the point of view that financial development through the channel of financial liberalization affects economic growth significantly in SAARC countries.

In summary, above-mentioned studies support the existence of positive relationship between financial development and economic growth. These studies have used different estimation techniques for analyzing the relationship between financial development and economic growth. The panel data studies, which have used latest estimation techniques, are limited in numbers. These studies only consider the impact of financial development on economic growth through direct channels and ignore the channels, which influence economic growth indirectly. This study tries to analyze the impact

of financial development on economic growth in a panel of 15 developing countries through direct and indirect channels using recent advances in dynamic modeling.

### III. THE DATA, MODEL SPECIFICATION AND ECONOMETRIC METHODOLOGY

#### THE DATA

This section provides information related to the data set and variables used in the model for observing the long-run association and causal relationship between financial development and economic growth through panel cointegration and panel causality techniques.

The study uses panel data set of 15 developing countries over a period of 1978-2012. The secondary annual data has been taken from World Development Indicators (WDI) published by World Bank and Penn World Table Version 8.0. Besides other variables, the study uses financial development index constructed through principal component analysis (PCA) by using three different indicators of financial development mostly used in literature. These indicators include (i) ratio of  $M_2$  to GDP, (ii) ratio of domestic credit provided by banking sector to GDP and (iii) ratio of domestic credit to private sector to GDP.

The rationale of using financial development index is that single proxy of the measure of financial development fails to capture the overall impact of financial development and it brings up the need of using cluster of variables for capturing the impact of financial development on economic growth.

The financial development index is based on the following formula:

$$FDI_i = \alpha_i A + \beta_i B + \gamma_i C \quad (1)$$

Where  $A$ ,  $B$ ,  $C$ , represent weights of the first component of each financial indicator and subscript “ $i$ ” denotes country. Sign of parameters  $\alpha_i$ ,  $\beta_i$ ,  $\gamma_i$  are very important in the construction of financial development index. The sign of  $\alpha_i$ ,  $\beta_i$ ,  $\gamma_i$  are expected to be positive as these measures of financial development have positive impact on economic growth. The weights assigned to different measures are presented in Table 1.

#### MODEL SPECIFICATION

For digging out the causal association between financial development and economic growth King and Levine (1993), work has been followed with modification regarding augmentation of explanatory variables for the

TABLE 1

## Normalized Weights of Financial Development Indicators

Countries	Weight of M <sub>2</sub> to GDP	Weight of Domestic Credit to Private Sector to GDP	Weight of Domestic Credit by Banking Sector to GDP
Bangladesh	0.3343	0.3324	0.3333
Chile	0.3058	0.3760	0.3182
China	0.3324	0.3334	0.3342
Egypt	0.3820	0.3260	0.2919
India	0.3335	0.3339	0.3326
Indonesia	0.3507	0.2974	0.3519
Jordan	0.3400	0.3219	0.3381
South Korea	0.3289	0.3359	0.3352
Malaysia	0.3249	0.3290	0.3461
Mauritius	0.3311	0.3315	0.3372
Pakistan	0.3511	0.3972	0.2517
Philippine	0.2961	0.3423	0.3615
Sri Lanka	0.3638	0.3834	0.2528
Syria	0.3478	0.3909	0.2613
Thailand	0.3209	0.3351	0.3441

selected developing countries. For analyzing the relationship between the variables, the following model has been used.

$$RGDP_{it} = \delta_i + \gamma_i FD_{it} + \lambda_i C_{it} + \varepsilon_{it} \quad (2)$$

Where

$i = 1, 2, \dots, N$ ,  $t = 1, 2, \dots, T$ ,  $i$  – refers to number of countries,  $t$  – refers to time period.

$RGDP_{it}$  — Real gross domestic product used to measure economic growth in country “ $i$ ” over the period “ $t$ ”.

$\delta_i$  — Fixed effect parameters or country specific intercepts which are allowed to vary across individual countries.

$FD_{it}$  — Financial development index in country “ $i$ ” over the period “ $t$ ”.

$\gamma_i$  and  $\lambda_i$  — Slope coefficients which are also allowed to vary across various countries in order to take into account possible channels of heterogeneity related to panel of countries.

$C_{it}$  — Set of control variables on country “ $i$ ” over the period “ $t$ ”.

$\varepsilon_{it}$  — Idiosyncratic errors or error term in country “ $i$ ” over period “ $t$ ”.

More precisely, equation (2) can be restated as:

$$RGDP_{it} = \delta_i + \gamma_i FD_{it} + \lambda_i TO_{it} + \alpha_{it} FDI_{it} + \beta_{it} HC_{it} + \chi_{it} GCF_{it} + \phi_{it} R + \varepsilon_{it} \quad (3)$$

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Where

$RGDP$  — proxy used for economic growth.

$FD$  — Index of financial development based on three indicators, *i.e.* M<sub>2</sub>/GDP, domestic credit to private sector/GDP and domestic credit provided by banking sector/GDP.

$TO$  — Trade openness calculated as ((exports + Imports) / GDP).

$FDI$  — Foreign direct investment as a percentage of GDP proxy used for financial openness.

$HC$  — Human capital index, Index of human capital per person, based on years of schooling (Barro and Lee, 2012) and returns to education (Psacharopoulos, 1994).

$GCF$  — Gross capital formation as a percentage of GDP a proxy used for gross domestic investment.

$R$  — Real interest rate (%).

The expected sign of the coefficients of variables are presented in parenthesis.

## ECONOMETRIC METHODOLOGY

For conserving the time and space the study will not present the book material related to econometric methodology. The study presents only brief introduction related to the Panel unit root tests, Panel cointegration tests and Panel causality tests, which have been used for empirical analysis. Several unit root tests based on panel data are available in econometric literature. However, this study uses IPS (Im, Pesaran and Shin, 2003) and ADF-Fisher panel unit root (proposed by Maddala and Wu (1999) tests for the present analysis.



IPS test is considered more advanced unit root test because it rejects the assumption of homogeneity of autoregressive coefficient and is based on average of Augmented Dickey Fuller (ADF) test computed for each country in the panel by assuming that error term  $\varepsilon_{it}$  is serially correlated.

ADF-Fisher test presented by Maddala and Wu (1999) like IPS unit root test assumes heterogeneous auto-regressive coefficient and is based on p-values of unit root computed for each cross-sectional unit either through ADF regression or through other unit root tests equations.

For analyzing the cointegrating relationship between financial development and economic growth in 15 developing countries, the study employs two panel cointegration tests. First one is Pedroni panel cointegration test which is residual-based and the second one is likelihood-based panel cointegration test derived on the principle of Johansen cointegration technique. For estimating the values of long-run coefficients, the study uses panel FMOLS estimation technique.

#### **PANEL CAUSALITY TEST**

This study uses more advanced version of Granger causality test developed by Hurlin and Venet (2001) for analyzing the causality between the variables. This test considers the following cases:

1. Homogenous non-causality hypothesis (HNS)
2. Homogenous causality hypothesis (HC)
3. Heterogeneous non-causality hypothesis (HENC)

### **IV. EMPIRICAL RESULTS AND INTERPRETATION**

#### **UNIT ROOT TEST RESULTS**

For applying the panel, unit root tests, the visual inspection of the data have been utilized which shows the presence of a time trend in each case of the variables included in the model. The results of both unit root tests show that all the selected series GDP, FD INDEX, FDI, OPENESS, GCF, HC and INTR are stationary in first difference form with either an intercept or with both intercept and trend, *i.e.* all the variables are I(1). The results are presented in Tables 2 and 3.

#### **PANEL COINTEGRATION TEST RESULTS**

Having confirmed the order of integration by applying panel unit root tests, the next step is to calculate the long-run linear relationship among variables.

For this purpose, Pedroni cointegration test and Larsson *et al.* (2001) likelihood based panel and FMOLS cointegration tests have been applied on panel.

TABLE 2  
Results of IPS Unit Root Test

Level				
Variables	Intercept	P-Values	Trend & Intercept	P-Values
LGDP	6.1221	1.0000	0.5317	0.7025
FD INDEX	0.7679	0.7787	0.1176	0.5468
FDI	-1.0416	0.1488	-0.7435	0.2286
OPENESS	0.4382	0.6694	0.0530	0.5211
GCF	-1.1710	0.1208	-0.9418	0.1731
HC	2.9060	0.9982	-0.4590	0.3231
INTR	-0.1744	0.4308	-0.8856	0.1879
1st Difference				
Variables	Intercept	P-Values	Trend & Intercept	P-Values
$\Delta$ LGDP	-8.8479*	0.0000	-8.4308*	0.0000
$\Delta$ FD INDEX	-8.0195*	0.0000	-6.0436*	0.0000
$\Delta$ FDI	-12.369*	0.0000	-10.360*	0.0000
$\Delta$ OPENESS	-12.041*	0.0000	-11.059*	0.0000
$\Delta$ GCF	-20.782*	0.0000	-19.174*	0.0000
$\Delta$ HC	-1.6775**	0.0467	-2.3695*	0.0089
$\Delta$ INTR	-12.660*	0.0000	-10.985*	0.0000

Note: \* and \*\* denote rejection of null hypothesis at 1% and 5% significance level.

**TABLE 3**  
Results of ADF-Fisher Unit Root Test

Level				
Variables	Intercept	P-Values	Trend & Intercept	P-Values
LGDP	13.7087	0.9952	33.0426	0.3207
FD INDEX	34.3601	0.2667	25.7937	0.6856
FDI	33.7448	0.2911	23.2861	0.8033
OPENESS	36.8228	0.1824	29.3164	0.5010
GCF	33.0222	0.3216	30.0758	0.4618
HC	25.9560	0.6774	38.0608	0.1482
INTR	32.6192	0.3393	36.6549	0.1874
1st Difference				
Variables	Intercept	P-Values	Trend & Intercept	P-Values
$\Delta$ LGDP	137.756*	0.0000	124.690*	0.0000
$\Delta$ FD INDEX	123.411*	0.0000	90.8969*	0.0000
$\Delta$ FDI	209.855*	0.0000	162.153*	0.0000
$\Delta$ OPENESS	192.790*	0.0000	164.674*	0.0000
$\Delta$ GCF	348.884*	0.0000	322.172*	0.0000
$\Delta$ HC	65.4755*	0.0002	72.2671*	0.0089
$\Delta$ INTR	209.763*	0.0000	170.837*	0.0000

Note: \* denotes rejection of null hypothesis at 1% significance level.

### **Pedroni Panel Cointegration Test Results**

Pedroni (2001) presented seven statistics to test the null hypothesis of no cointegration against the alternative hypothesis of cointegration among

variables. For the rejection of null hypothesis, calculated value of panel  $\nu$ -statistic must be positive and statistically significant while other values of test statistics must be negative and statistically significant. The results of Pedroni panel cointegration test are presented in Table 4. The results show that there is strong cointegrating relationship between financial development and economic growth at 1% and 5% significance level.

TABLE 4  
Results of Pedroni Cointegration Test

Panel Statistics	Test Statistics	P-value
Panel $\nu$ -statistic	2.197707**	0.0357
Panel $\sigma$ -statistic	-3.831625*	0.0003
Panel $\rho\rho$ -statistic	-16.04384*	0.0000
Panel ADF-statistic	-7.267838*	0.0000
Group Statistics		
Group $\sigma$ -statistic	-2.185700**	0.0366
Group $\rho\rho$ -statistic	-15.43676*	0.0000
Group ADF-statistic	-8.341782*	0.0000

All tests reported here are distributed as  $N(0, 1)$ . \* and \*\* denote significance at 1% and 5% level respectively.

### Likelihood-Based Panel Cointegration Test

There is a growing criticism on Pedroni panel cointegration test. For obtaining results that are more reliable the study uses LLL test developed by Larsson *et al.* (2001) which is considered more advanced panel cointegration test. This test describes more than one cointegrating relationships. For estimating this panel cointegration test, Johansen cointegration test is employed at individual level and then on the basis of test results, Larsson *et al.* (2001) panel cointegration test is estimated. First of all, Johansen cointegration test is employed on individual level and on the basis of test results, Larsson panel cointegration test is used. The estimated results of individual country cointegration tests for developing countries are presented in Appendix 'A'. The likelihood ratio test-statistic is then used for examining the existence of cointegration at individual level.

The results of the study show that all the countries included in the sample have more than one cointegrating vectors and the estimated results exhibit that unique cointegrating relationship exists among the variables because the likelihood ratio test-statistic is greater than 5% critical value of 150.5585. For Malaysia there exist four cointegration relationships but in case of Indonesia, Korea, Bangladesh, Chile, Egypt, India, Jordan, Mauritius, Pakistan, Philippine and Sri Lanka the range of cointegrating rank is five and six.

While in case of China and Syria, the results show 7 cointegrating relationship at 5% level of significance. The study concludes that selected variables (LGDP, FDINDEX, FDI, GCF, OPENESS, HC and INTR) are cointegrated in all the countries which indicates the existence of long-run relationship between financial development and economic growth in the presence of conditional variables in the countries.

The results of Larsson likelihood-based panel cointegration test are presented in Table 5.

TABLE 5  
Panel Cointegration Results

Hypotheses	Likelihood ratio	5% critical value
$R = 0$	100.6407	1.645
$R \leq 1$	69.50955	
$R \leq 2$	53.02721	
$R \leq 3$	42.74064	
$R \leq 4$	35.31253	
$R \leq 5$	27.8361	
$R \leq 6$	22.66487	

Note: L.R. test indicate one cointegrating equation at 5% significance level.

Estimated results show that panel cointegration test statistic is greater than critical value of 1.645 at 5% level of significance, which indicates that seven cointegrating relationships exist at panel level. The results reveal the existence of the long-run relationship between financial development and economic growth in the countries included in the sample.

### Panel FMOLS Results

Table 6 presents the results of panel FMOLS for the countries included in the sample. The results show that financial development has a positive and significant impact on GDP. The coefficient shows that 1 unit increase in financial development is associated with 0.0068 units increase in GDP. This shows that financial development has a low impact on economic development in these countries due to the reason of not having well-developed and well functional financial system.

TABLE 6  
Estimation Results of FMOLS  
Dependent Variable: GDP

Variables	Developing Countries
FD	0.0068* [19.546]
FDI	0.0091* [3.9215]
Openness	0.0030* [9.2224]
GCF	0.00197* [5.7749]
HC	1.662* [53.696]
INTR	-0.0034* [-3.7402]

Note: \* represents rejection of null hypothesis at 1% significance level.

Openness has a positive and statistically significant impact on economic growth. The estimated results are in line with the studies of Vamvakidis (2002), Harrison (1996), Yacel (2009), Hassan and Islam (2005), Soukhakian (2007), Katircioglu, Kahyalar and Benar (2007), and Tsen (2005). This calls for the introduction of effective policies of trade and financial openness for achieving higher economic growth.

Human capital has a positive and significant impact on economic growth in these countries which means investment in human capital is growth enhancing. This finding is in line with Barro (1991). FDI has a positive and significant impact on GDP in these countries. This indicates that human capital as well as physical capital in term of foreign or domestic investment is essential for achieving rapid economic growth at all stages of development. Interest rate has a negative and significant impact on GDP in all the countries. The possible reason behind opposite contribution of interest

rate to the economic development is the high average interest rate and low returns on investment in developing countries.

**RESULTS OF PANEL CAUSALITY TEST**

**Homogenous Non-Causality**

The results of homogenous non-causality (HNC) are presented in Table 7. The results suggest that there exists bi-directional causality between GDP and financial development in selected panel which indicates that these counties further need to formulate and implement sound policies relating to financial sector and strengthen their financial institutions to achieve higher growth. Bi-directional homogenous non-causality also exists between trade openness, FDI, Gross Capital Formation (GCF), human capital and interest rate. The mutual interdependence of all variables reveals the importance of all segments of economy in enhancing the financial development and economic growth.

TABLE 7  
Homogenous Non-Causality Results

Dependent Variable	GDP	FD	FDI	OPENESS	GCF	HC	INTR
GDP	–	Causality exist*	Causality exist*	Causality exist*	Causality exist*	Causality exist*	Causality exist*
FD INDEX	Causality exist*	–	Causality exist*	Causality exist*	Causality exist*	Causality exist*	Causality exist*
FDI	Causality exist***	Causality exist***	–	Causality exist***	Causality exist***	Causality exist***	Causality exist*
OPENESS	Causality exist*	Causality exist*	Causality exist*	–	Causality exist*	Causality exist*	Causality exist*
GCF	Causality exist*	Causality exist*	Causality exist*	Causality exist*	–	Causality exist*	Causality exist*
HC	Causality exist*	Causality exist*	Causality exist*	Causality exist*	Causality exist*	–	Causality exist*
INTR	Causality exist*	Causality exist*	Causality exist*	Causality exist*	Causality exist*	Causality exist*	–

**Homogenous Causality**

After testing the homogeneous non-causality hypothesis, the next step is to test the homogeneous causality hypothesis, which imposes strict homogeneity of the relationship between financial development and economic

growth. It indicates the existence of bi-directional causal relationship between the variables as presented in Table 8. Homogenous causality hypothesis is also accepted in all cases (GDP, FD, FDI, OPENESS, GCF, HC and INTR) at 1% significance level. These estimated results are similar to the results of the homogenous non-causality hypothesis discussed above. These findings also confirm the homogeneity of countries included in the sample, which means more or less all countries follow same policies relating to financial development and economic growth.

TABLE 8  
Homogenous Causality Results

Dependent Variable	GDP	FD	FDI	OPENESS	GCF	HC	INTR
GDP	–	Causality exist*	Causality exist*	Causality exist*	Causality exist*	Causality exist*	Causality exist*
FD INDEX	Causality exist*	–	Causality exist*	Causality exist*	Causality exist*	Causality exist*	Causality exist*
FDI	Causality exist	Causality exist*	–	Causality exist*	Causality exist*	Causality exist*	Causality exist*
OPENESS	Causality exist*	Causality exist*	Causality exist*	–	Causality exist*	Causality exist*	Causality exist*
GCF	Causality exist*	Causality exist*	Causality exist*	Causality exist*	–	Causality exist*	Causality exist*
HC	Causality exist*	Causality exist*	Causality exist*	Causality exist*	Causality exist*	–	Causality exist*
INTR	Causality exist*	Causality exist*	Causality exist*	Causality exist*	Causality exist*	Causality exist*	–

### Heterogeneous Non-Causality

The results of heterogeneous non-causality are presented in Table 9. The study finds a bi-directional relationship between financial development and economic growth in case of four countries: Bangladesh, Indonesia, Mauritius, Philippines. It means higher economic growth effects the development of financial system in these countries while a sound financial system is attributing to the higher economic growth. This result is supported by Greenwood and Smith (1997) and Levine and Zervos (1998) among others. The evidence of uni-directional relationship between financial development is also found. In case of Jordan, Malaysia, Pakistan and Syria, financial development causes GDP while in Chile, China, Egypt, Sri Lanka and Thailand, GDP has causal impact on financial development. In two countries, India and South Korea, we reject the hypothesis of any causal relationship between financial development and economic growth.



TABLE 9  
 Financial Development-Growth Nexus:  
 Evidence from Heterogeneous Non-Causality

Causation	Countries
Bi-directional: FD ↔ GDP	Bangladesh, Indonesia, Mauritius, Philippines
Uni-directional: FD → GDP	Jordan, Malaysia, Pakistan, Syria
Uni-directional: GDP → FD	Chile, China, Egypt, Sri Lanka, Thailand
No Causation	India, South Korea

From the results of heterogeneous non-causality analysis, it can be concluded that GDP causes financial development in most of the developing countries. This is consistent with the financial structure of the countries included in the sample. As in these countries, financial institutions are not fully developed and higher economic growth helps in building a sound financial system.

When the causation between financial development and FDI is explored, it is evident that there is bi-directional causation in most of the countries. This result suggests that sound financial system attracts more FDI and in turn, FDI results in a healthy financial system (*see* Table 10).

TABLE 10  
 Financial Development-FDI Relation:  
 Evidence form Heterogeneous Non Causality

Causation	Countries
Bi-directional: FD ↔ FDI	Bangladesh, Chile, China, Jordan, South Korea, Malaysia, Pakistan, Thailand
Uni-directional: FD → FDI	Egypt, Mauritius, Sri Lanka, Syria
Uni-directional: FDI → FD	India, Indonesia, Philippines
No Causation	—

Financial development and trade openness causes each other in most of the countries (*see* Table 11). Furthermore, uni-directional causation in which

trade openness effects financial development appears to be prominent. This indicates that in these developing countries, a sound financial system is needed to trade with rest of the world, and more trade openness enhances the financial structure of the trading countries.

TABLE 11  
Financial Development-Openness Relation:  
Evidence from Heterogeneous Non Causality

Causation	Countries
Bi-directional: $FD \leftrightarrow OPN$	Chile, China, India, Jordan, South Korea, Mauritius, Philippines
Uni-directional: $FD \rightarrow OPN$	Pakistan
Uni-directional: $OPN \rightarrow FD$	Bangladesh, Egypt, Indonesia, Malaysia, Sri Lanka, Thailand
No Causation	Syria

## V. CONCLUSION

Most national economies in the world have experienced decline in economic growth after the financial crisis of 2007-08. It has raised the need for analyzing the impact of financial development and economic growth for protecting the countries from those problems that may come up from the market imperfections of financial sector. The present study is an attempt to analyze the causal relationship between the variables in developing countries using recent advances in dynamic modeling. Both the panel unit root tests confirm that all the variables included in the model are integrated of order one, *i.e.*  $I(1)$ . Two panel cointegration tests are used for observing the cointegrating relationship between the variables under consideration. Panel causality tests developed by Hurlin and Venet (2001) confirm the existence of causal relationship between the variables for all the countries.

The results of the study point out low impact of financial development on economic growth. It may be due to the absence of well-developed and efficient financial system in these countries. Furthermore, the financial system in these countries is not backed by well-enforced financial institutions and weak financial institutions provide rooms for misallocation of resources which leads to poor economic growth. This suggests that an efficient and healthy financial system is needed to put the developing

countries on the path of rapid economic growth. Trade and financial openness appeared as important factors, which effect economic growth positively and it in turns pave the way for financial development. Trade openness is expected to face competitiveness, which stimulates productivity by realizing the economies of scale, and it leads to rapid economic growth. This brings up the need for effective policies related to trade openness in these countries.

The results of the study confirm that human capital and foreign direct investment (FDI) both exert strong impact on economic growth. Foreign direct investment accompanied with technological innovations and new products help in building of a better financial system. It helps in reviving the confidence of investors through facilitating them to invest in these countries. Foreign direct investment can be attracted through perusing the policies, which lead to political stability, conducive environment for foreign investment and consistency in development policies. It may be possible only through the proper financial openness policies introduced in the setup of these countries.

The study finds a bi-directional relationship between financial development and economic growth in the case of four countries: Bangladesh, Indonesia, Mauritius and Philippines. It means higher economic growth effects the development of financial system in these countries while a sound financial system is attributing to the higher economic growth. Uni-directional relationship between financial development to economic growth has been observed in Jordan, Malaysia, Pakistan and Syria, while in Chile, China, Egypt, Sri Lanka and Thailand, GDP has causal impact on financial development. In two countries, India and South Korea, the study fails to find any casual relationship between financial development and economic growth.

## **POLICY IMPLICATIONS**

The policy implications of the general results of this study point out that financial development appeared as the policy variable for accelerating economic growth in developing countries. For maintaining sustainable economic growth, government has to deepen the financial sector and undertake essential measures in strengthening the long-run relationship between financial development and economic growth. These measures include more financial integration and increasing the status of financial institutions.

Apart from these measures, the macroeconomic environment needs to be stabilized in order to foster the development of financial sector. The efficient and accountable institutions tend to broaden appeal and confidence in

investment that may become gradually more attractive as political risk is reduced over time. Therefore, the development of good quality institutions can affect the attractiveness of investment and may lead to financial development, which in turn enhances economic growth. Furthermore, regulation and supervision of the financial system should be strengthened as they play a significant role in determining both stability and the extent of services provided. Lastly, the IMF and World Bank policy interventions aimed at reducing regulatory structures in financial reforms should be minimized. This may help in making optimal decisions, increasing access to external finance and resulting in investment that is more productive. Furthermore, for the revival of the confidence of private investors there is a need to establish a set up that may help in strengthening the relationship between financial development and economic growth.

The impact of financial development can be channeled through FDI and trade openness. These two channels have strong policy implications for developing countries especially. It is important to introduce reforms in external sector to attract more FDI and boost external trade. These reforms not only promote economic growth directly but also indirectly through developing financial sector.

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APPENDIX 'A'  
Country-wise Results of Cointegration

Country	Hypotheses	Likelihood ratio	5% critical value	P-value
Bangladesh	$R = 0$	492.1500	150.5585	0.0000
	$R \leq 1$	283.3129	117.7082	0.0000
	$R \leq 2$	179.6089	88.80380	0.0000
	$R \leq 3$	108.7814	63.87610	0.0000
	$R \leq 4$	60.23320	42.91525	0.0004
	$R \leq 5$	27.71492	25.87211	0.0292
	$R \leq 6$	11.49399	12.51798	0.0737
Chile	$R = 0$	481.4794	150.5585	0.0000
	$R \leq 1$	263.7106	117.7082	0.0000
	$R \leq 2$	149.2862	88.80380	0.0000
	$R \leq 3$	99.74677	63.87610	0.0000
	$R \leq 4$	58.53863	42.91525	0.0007
	$R \leq 5$	29.87731	25.87211	0.0150
	$R \leq 6$	8.123460	12.51798	0.2417
China	$R = 0$	381.4120	150.5585	0.0000
	$R \leq 1$	253.3560	117.7082	0.0000
	$R \leq 2$	168.6788	88.80380	0.0000
	$R \leq 3$	120.6490	63.87610	0.0000
	$R \leq 4$	76.32056	42.91525	0.0000
	$R \leq 5$	38.74243	25.87211	0.0007
	$R \leq 6$	15.32137	12.51798	0.0165
Egypt	$R = 0$	401.0410	150.5585	0.0000
	$R \leq 1$	268.7429	117.7082	0.0000
	$R \leq 2$	178.6710	88.80380	0.0000
	$R \leq 3$	112.0965	63.87610	0.0000
	$R \leq 4$	59.42513	42.91525	0.0005
	$R \leq 5$	30.45360	25.87211	0.0125
	$R \leq 6$	9.747567	12.51798	0.1391
India	$R = 0$	236.2036	150.5585	0.0000
	$R \leq 1$	168.4432	117.7082	0.0000
	$R \leq 2$	110.2246	88.80380	0.0006
	$R \leq 3$	77.75726	63.87610	0.0022
	$R \leq 4$	48.90258	42.91525	0.0113
	$R \leq 5$	26.93330	25.87211	0.0368
	$R \leq 6$	9.858191	12.51798	0.1337

Country	Hypotheses	Likelihood ratio	5% critical value	P-value
Indonesia	$R = 0$	359.7648	150.5585	0.0000
	$R \leq 1$	227.5401	117.7082	0.0000
	$R \leq 2$	156.7783	88.80380	0.0000
	$R \leq 3$	91.49926	63.87610	0.0001
	$R \leq 4$	43.76665	42.91525	0.0410
	$R \leq 5$	23.08074	25.87211	0.1071
	$R \leq 6$	5.000029	12.51798	0.5964
Jordan	$R = 0$	331.3820	150.5585	0.0000
	$R \leq 1$	199.2445	117.7082	0.0000
	$R \leq 2$	128.3158	88.80380	0.0000
	$R \leq 3$	87.55437	63.87610	0.0002
	$R \leq 4$	54.30635	42.91525	0.0025
	$R \leq 5$	29.24950	25.87211	0.0183
	$R \leq 6$	11.74157	12.51798	0.0672
Korea Republic	$R = 0$	304.1026	150.5585	0.0000
	$R \leq 1$	207.1294	117.7082	0.0000
	$R \leq 2$	145.1158	88.80380	0.0000
	$R \leq 3$	97.66033	63.87610	0.0000
	$R \leq 4$	54.62818	42.91525	0.0023
	$R \leq 5$	22.75772	25.87211	0.1164
	$R \leq 6$	10.19114	12.51798	0.1188
Malaysia	$R = 0$	427.7583	150.5585	0.0000
	$R \leq 1$	239.6334	117.7082	0.0000
	$R \leq 2$	135.5522	88.80380	0.0000
	$R \leq 3$	79.23405	63.87610	0.0015
	$R \leq 4$	39.41129	42.91525	0.1073
	$R \leq 5$	19.51799	25.87211	0.2513
	$R \leq 6$	4.867587	12.51798	0.6155
Mauritius	$R = 0$	448.5532	150.5585	0.0000
	$R \leq 1$	313.4119	117.7082	0.0000
	$R \leq 2$	184.9421	88.80380	0.0000
	$R \leq 3$	108.0003	63.87610	0.0000
	$R \leq 4$	59.36740	42.91525	0.0006
	$R \leq 5$	27.74342	25.87211	0.0289
	$R \leq 6$	9.838949	12.51798	0.1347

Country	Hypotheses	Likelihood ratio	5% critical value	P-value
Pakistan	$R = 0$	421.3765	150.5585	0.0000
	$R \leq 1$	294.8945	117.7082	0.0000
	$R \leq 2$	199.2563	88.80380	0.0000
	$R \leq 3$	127.7704	63.87610	0.0000
	$R \leq 4$	82.25525	42.91525	0.0000
	$R \leq 5$	41.34696	25.87211	0.0003
	$R \leq 6$	10.07088	12.51798	0.1240
Philippine	$R = 0$	353.0631	150.5585	0.0000
	$R \leq 1$	245.4169	117.7082	0.0000
	$R \leq 2$	170.2821	88.80380	0.0000
	$R \leq 3$	111.0288	63.87610	0.0000
	$R \leq 4$	67.17479	42.91525	0.0000
	$R \leq 5$	33.95030	25.87211	0.0040
	$R \leq 6$	11.85463	12.51798	0.0644
Sri Lanka	$R = 0$	431.4782	150.5585	0.0000
	$R \leq 1$	266.9281	117.7082	0.0000
	$R \leq 2$	161.5780	88.80380	0.0000
	$R \leq 3$	108.2204	63.87610	0.0000
	$R \leq 4$	59.94668	42.91525	0.0005
	$R \leq 5$	28.53469	25.87211	0.0228
	$R \leq 6$	11.66655	12.51798	0.0691
Syria	$R = 0$	378.6041	150.5585	0.0000
	$R \leq 1$	266.1481	117.7082	0.0000
	$R \leq 2$	183.7999	88.80380	0.0000
	$R \leq 3$	119.9244	63.87610	0.0000
	$R \leq 4$	74.36551	42.91525	0.0000
	$R \leq 5$	37.92659	25.87211	0.0010
	$R \leq 6$	14.52612	12.51798	0.0228
Thailand	$R = 0$	109.3331	50.59985	0.0000
	$R \leq 1$	93.69993	44.49720	0.0000
	$R \leq 2$	51.25215	38.33101	0.0010
	$R \leq 3$	44.20600	32.11832	0.0011
	$R \leq 4$	17.91552	25.82321	0.3837
	$R \leq 5$	13.03050	19.38704	0.3256
	$R \leq 6$	5.829059	12.51798	0.4823

Note: \* denotes rejection of null hypothesis at 5% significance level.