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Foreign Direct Investment, Financial Development and Economic Growth: New Empirical Evidence from Pakistan

Samia Nasreen[a*], Fatima Mubashir[b], Muhammad Awais Anwar[c],
[a,b]Department of Economics, Lahore College for Women University Lahore, (Pakistan), [c]Department of Economics and Business Administration, University of Education, Lower Mall Campus, Lahore (Pakistan), Email: [a*]sami_lcu@yahoo.com, [b]fatimamubashir3@gmail.com, [c]awaisanwar007@yahoo.com

The main objective of the present study is to explore the effect of foreign direct investment (FDI) and financial development on economic growth in Pakistan using time-series data covering the period from 1986 to 2018. The role of financial development in FDI-growth nexus as well as contribution of FDI in finance-growth relationship is also examined. A composite measure of financial development index is constructed by utilising various indicators from banking sector development and stock market development. Existence of cointegration among variables has been checked using Johansen cointegration and Gregory-Hansen cointegration tests. Moreover, fully modified ordinary least square (FMOLS) and dynamic ordinary least square (DOLS) techniques have been employed to assess long run parameters. Findings of long run estimates indicate that FDI and financial development are positively related to economic growth. Moreover, the influence of FDI on growth is enhanced with the improvement in financial sector development. Empirical findings also support the view that FDI inflows contribute in augmenting the effect of financial development on economic growth. The findings of the present study offer some important implications to policy makers in Pakistan.

Keywords: *FDI; Financial Development; Economic Growth; Cointegration; Pakistan*

1. Introduction

Foreign Direct Investment (FDI) is considered to be a key driver for economic growth and development, particularly in emerging economies where capital is insufficient due to low domestic savings (Sarker & Khan, 2020). It involves transfer of money as well as transfer of financial and intangible assets like managerial skills, efficient management practices and technologies (Rizvi & Nishat, 2010). Its importance for developing countries is imperative because of their limited ability to deal with two main issues: lack of financial resources and advanced technology (Owusu-Antwi, Antwi, & Poku, 2013). Most developing countries experience capital shortages which is reflected in their saving-investment gap and import-export gap, and to fulfill this gap they require foreign capital inflow (Majeed & Ahmad, 2007). Hence, attracting FDI is one of the major goals of policymakers in developing economies. Moreover, FDI can stimulate host country's economic growth through three main channels: (i) FDI enhance production and income in host economy by raising amount of capital stock (Gherghina, Simionescu, & Hudea, 2019). (ii) It is a main source of technology transfer from developed to developing countries (Gheribi & Voytovych, 2018). (iii) It can enhance human capital through knowledge transfer via labour training and skill acquisition and increases the labour force through job creation (Sabir, Rafique, & Abbas, 2019).

Although theoretical literature suggests that FDI enhances growth, empirical studies on FDI-growth nexus have stated contradictory findings (Lasbrey, et al., 2018). Several studies have empirically supported the view that FDI accelerates economic growth (Mehic, Silajdzic, & Babic-Hodovic, 2013; Nistor, 2014; Hoang, Wiboonchutikula, & Tubtimtong, 2010), while others have failed to support this view and have reported negative and even insignificant association among FDI and economic growth (Durham, 2004; Naveed & Shabbir, 2006; Temiz & Gökmen, 2014). These inconsistent results might reflect the fact that FDI influence on the host economy depends on various country specific factors such as host country's absorptive capacity (Bahri, Nor, Sarmidi, & Nor, 2019). In other words, the impact of FDI varies as it depends on a country's ability to absorb the benefits provided by FDI (Fu, 2008; Yang & Lin, 2012). However, recent literature has highlighted the role of a host economy's financial development level in supporting the association among FDI and economic growth (Suliman & Elian, 2014; Nasreen & Anwar, 2014; Alzaidy, Ahmad, & Lacheheb, 2017; Sirag, SidAhmed, & Ali, 2018; Bahri, Nor, Sarmidi, & Nor, 2019). They have regarded financial development as an essential condition for realising the growth benefits of FDI.

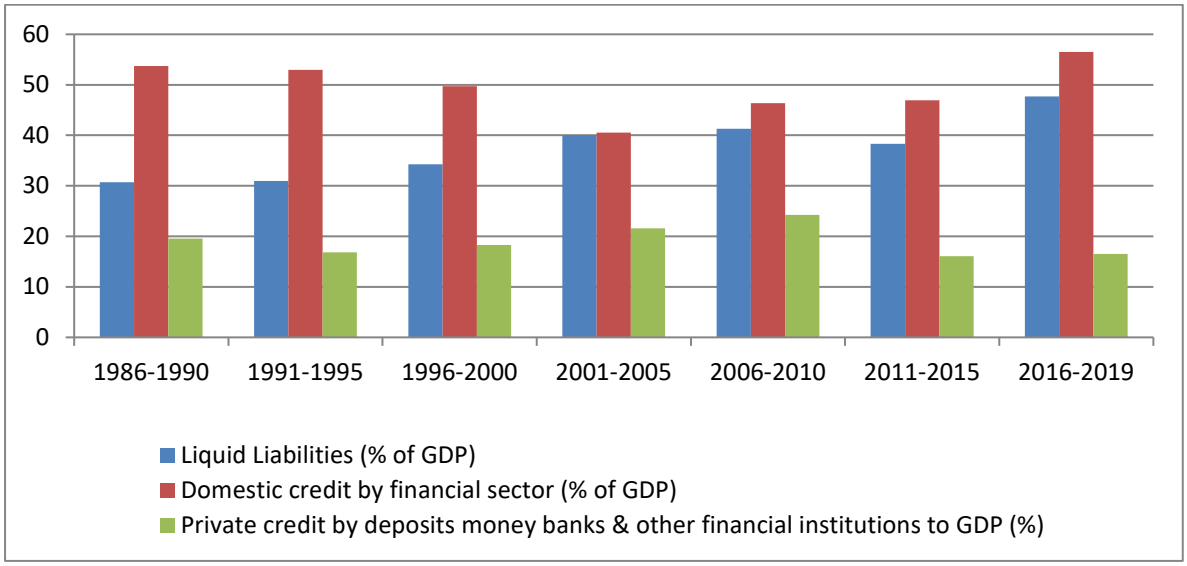
Financial development is generally defined as the development of size, stability and efficiency of financial institutions as well as improved access to financial institutions (Guru & Yadav, 2019). The role of well-developed financial systems in stimulating growth has been widely documented in the literature. A well-functioning financial sector encourages capital accumulation, facilitates transactions, diversifies risk, mobilises savings and assigns resources to the most productive uses (Levine, 1997). By performing these functions, financial institutions may influence savings and investment decisions, can attract more deposits and thus

allocate more resources efficiently and thereby foster growth (Fowowe, 2011). In literature, numerous channels have been identified through which host country may benefit efficiently from FDI in the presence of a well-developed financial system. According to Hermes et al. (2003), a financial system allocates resources efficiently and thus improves a host country's ability to benefit from foreign capital flows. Financial development enhances the process of technological diffusion in the host country associated with foreign direct investment (Hermes & Lensink, 2000). With a well-developed financial system, provision of more credit facilities enables credit-constrained entrepreneurs to adopt and implement new technologies and hire skilled labour (Ang, 2009). It also permits multinational enterprises to expand their innovative activities in the host economy which in turn provides technological spill overs to domestic firms (Choong, 2012). Thus, FDI may encourage the financial development level of a host country and augment the relationship among financial development and growth.

Pakistan is a low-income developing economy and has experienced uneven growth patterns since its inception (Hussain & Malik, 2011). Persistent economic issues including low savings, rapid population growth and corruption which have constricted sustained economic growth. It is evident that the GDP growth rate over the period has been fluctuating. The highest average annual GDP growth of 5.79% was observed in 1986-1990 while lowest GDP growth of 3.27% was seen in 1996-2000[1]. Examination of FDI-growth nexus and its association with financial development level is imperative for a capital scarce economy like Pakistan. In recent decades, Pakistan's financial sector has experienced tremendous growth and development but its contribution towards promoting growth in a real sector is not very encouraging (Uppal & Mangla, 2018). The financial sector of Pakistan is dominated by commercial banks. For the last two decades, the banking sector of Pakistan has been growing at faster rate (Hamza & Khan, 2014). Figure 1 reports the performance of the banking sector development indicators over the period 1986-2019. From the statistics, it is evident that all the indicators have shown improvement with the passage of time.

[1] WDI (2019)

Figure 1: Performance of Banking Sector Development Indicators



Source: World Development Indicators

Attracting foreign investment is the major concern for all governments especially in developing economies (Bhatti, 2011). Like other developing nations, Pakistan is struggling to attract foreign direct investments and create a favourable environment for foreign investors. Developed financial markets allow efficient allocation of resources and enhance the absorptive capacity of a country to FDI inflows but Pakistan doesn't perform well in this regard. As discussed above, FDI inflows to Pakistan do not exhibit an attracting pattern. During the financial year 2007-2008, Pakistan received FDI inflows worth US$5,200 million which accelerated growth to a great extent (Chaudhry, 2015). In 2010, FDI inflows to Pakistan decreased by 14%. However, in the same period, FDI inflows increased globally by 5% and for the first-time, half of the FDI inflows were directed to developing economies. In 2018, FDI inflows to developing countries rose by 2% but Pakistan experienced a decline of 27% in FDI inflows during the same year. Therefore, in such a situation there is a dire need to introduce policies and reforms in order to restore the confidence of foreign investors and provide a favourable environment for foreign investment. However, a well-developed financial sector increases a host country's ability to benefit from foreign capital inflows. Pakistan financial sector is dominated by banks as they comprise an 84% share of the total financial sector. In recent decades, the economy's financial sector has shown a significant improvement but has not contributed meaningfully towards promoting growth in the real sector (Uppal & Mangla, 2018).

Keeping in view the significance of FDI and financial development, the present study attempts to explore whether financial development and FDI contributes to enhancing the effect of FDI and financial development on the economic growth of Pakistan respectively in the long run. Investigating the extent of association among FDI, financial development and growth is necessary to formulate best policies in order to benefit from foreign capital flows and financial

development. Up till now, numerous studies have empirically investigated the effect of FDI on economic growth and financial development on economic growth. However, there are limited studies that have analysed the role of FDI in promoting a finance-growth relationship in the case of Pakistan. The present study differs from the aforementioned studies in many ways: Firstly, this study investigates the influence of FDI on growth conditional on financial development as well as contribution of FDI in finance-growth relationship in the case of Pakistan. Secondly, this study employs FMOLS and DOLS technique to estimate long run parameters which to the best of our knowledge has not been employed in such scenarios in the case of Pakistan. Thirdly, none of the existing studies have investigated the structural break in FDI-financial development and growth nexus in Pakistan. However, the present study investigates the existence of a structural break through Zivot-Andrews unit root test and the Gregory-Hansen cointegration test. The present study is an attempt to fill these gaps as it examines FDI-growth nexus conditional on financial development level as well as finance-growth nexus contingent on the amount of FDI inflows.

2. Data Explanation

To empirically examine the association among FDI, growth and financial development, the present study employs time series data of thirty-two years from 1986 to 2018. Data for empirical analysis has been extracted from World Development Indicators (WDI) and the Global Financial Development Database (GFDD). Economic growth literature emphasises that the FDI–growth nexus relies on the quality of the financial system. In particular, the positive effect of FDI inflows on the economic growth of the host country is conditioned by a high level of financial development. On the other hand, one may argue that the level of FDI inflows could influence the finance–growth relationship[2]. These hypotheses are testable through the following multiplicative interaction model. Keeping in view existing literature where two empirical models have been derived given as below

$$Gr_t = \lambda_o + \lambda_1 FDI_t + \lambda_3 FinD_t + \lambda_4 X_t' + \xi_t \quad (1)$$

$$Gr_t = \gamma_0 + \gamma_1 FDI_t + \gamma_2 FinD_t + \gamma_3 FDI_t \times FinD_t + \gamma_4 X_t' + \xi_t \quad (2)$$

In above models, Gr_t represents growth rate, FDI_t refers to foreign direct investment, $FinD_t$ indicates financial development, $FDI_t \times FinD_t$ is multiplicative interaction term, X_t' represents control variables and ξ_t is the error term. Control variables used in the study include trade openness (Tr), gross fixed capital formation (Gcf) and population growth (pop). Effect of FDI and ($FinD_t$) on growth will be assessed through equation 1 while Equation 2 involves

[2] Borensztein et al. (1998)

multiplicative interaction term which allows us to capture influence of FDI on (Gr) contingent on the level of ($FinD_t$) and the impact of ($FinD_t$) on (Gr) conditional on the amount of FDI inflows. For detail see Table 1.

Table 1: Variable Description and Data Sources

Variable	Description	Data Source	Variables used in literature
Gr	GDP per capita[3] (constant 2010 US$)	WDI	Suliman & Elian (2014), Bahri et al. (2017), Alzaidy, Ahmad, & Lacheheb (2017)
FDI	FDI inflows (% of GDP)	WDI	Jahfer & Inoue (2014), Alzaidy et al. (2017), Yeboua (2019)
FinD	Financial Development Index	Described below	
Control Variables			
Tr	Trade (% of GDP)	WDI	Omran & Bolbol (2003), Nasreen et al. (2014), Sirag et al. (2018),Yeboua (2019), Acheampong (2019)
Gcf	Gross Capital Formation (annual percent growth)	WDI	Alfaro et al. (2009), Jayaraman, choong, & Ng (2017), Alzaidy et al. (2017)
pop	Population Growth (annual growth)	WDI	Agbloyor et al. (2014), Sirag et al. (2018), Yeboua (2019)

Choosing an appropriate indicator for financial development is a difficult task as it is a vast concept. However, in literature, various indicators of financial development have been employed and there is no consensus which one indicator is most appropriate. Hence, based on literature, the present study utilises six indicators to measure financial development. Table 2 reports financial indicators employed along with their description and data source. These indicators are expressed as a percentage of GDP.

[3] GDP per capita is used in log form.

Table 2: Financial Development Indicators and Data Sources

Indicator	Description	Data Source	Indicators used in Literature
Liq	Liquid liabilities (% of GDP). It is broadest indicator as it includes all banks and non-banking financial institutions	GFDD	Choong (2012), Agbloyor et al. (2014), Alzaidy et al. (2017), Yeboua (2019), Lenka et al. (2020)
Cfs	Domestic credit provided by financial sector (% of GDP)	WDI	Hassan et al. (2011), Kandil et al. (2015), Swamy et al. (2019)
Pc	Private credit by deposit money banks and other financial institutions to GDP (%)	GFDD	Alfaro et al. (2004), Agbloyor et al. (2014), Ghosh et al. (2020)
Sc	Stock market capitalisation to GDP (%)	GFDD	Agbloyor et al. (2014), Kandil et al. (2015), Ghosh et al. (2020)
St	Stock market turnover ratio (%)	GFDD	Omran & Bolbol (2003), Barajas et al. (2013), Agbloyor et al. (2014), Kandil et al. (2015)
Stv	Stock market total value traded to GDP (%)	GFDD	Omran et al. (2003), Mitra (2017), Kandil et al. (2015)

3. Results and Interpretation

Table 3 reports findings of principal component analysis in which principal components along with their respective eigenvalues, proportion of variation explained by each component and eigenvector values are presented. The Eigenvalue of the first principal component is 3.31 and explains about 55.2% variation in the dependent variable. While the second component's eigen value is 1.36 and explains 22.7% variation. The rest of the components have eigenvalues less than one and have minimal explanatory power. Therefore, in the present analysis Pc 1 and Pc 2 are selected and their respective eigenvectors values are used as weights for the construction of composite measures of financial development, as they together explain 77.9% variation in the dependent variable and are denoted as (*FinD*).

Table 3: PCA for Financial Development Index

Component	Eigenvalue	Difference	Proportion	Cumulative
Pc 1	3.311	1.947	0.552	0.552
Pc 2	1.364	0.632	0.227	0.779
Pc 3	0.731	0.399	0.122	0.901
Pc 4	0.331	0.113	0.055	0.956
Pc 5	0.219	0.175	0.037	0.993
Pc 6	0.044	-	0.007	1.000

Principal Components (Eigenvectors)						
Variables	Pc 1	Pc 2	Pc 3	Pc 4	Pc 5	Pc 6
Pc	0.379	-0.168	0.769	-0.353	0.190	0.274
Cfs	-0.356	0.461	0.458	0.594	0.311	0.040
Liq	0.405	0.449	-0.297	-0.218	0.677	-0.203
Sc	0.348	0.623	-0.075	0.015	-0.506	0.479
St	0.422	-0.413	-0.234	0.598	0.239	0.427
Stv	0.517	0.006	0.224	0.341	-0.311	-0.686

Table 4 reports descriptive statistics and pair-wise correlation among variables. First, Table 4 provides information regarding mean or average value of variables in the data set. Then it provides information about the mean, maximum and minimum values of variable. A correlation matrix suggests that FDI, (*FinD*) and (*Gcf*) are positively related to growth while (*Tr*) and (*pop*) are negatively related to economic growth. Correlation analysis indicates that FDI and (*FinD*) are positively correlated.

Table 4: Descriptive Statistics & Correlation Matrix

Variable	*Gr*	*FDI*	*FinD*	*Tr*	*Gcf*	*pop*
Mean	6.781	1.047	0.321	33.265	3.447	2.526
Median	6.717	0.764	0.248	33.333	3.945	2.417
Maximum	7.088	3.668	1	38.909	18.495	3.227
Minimum	6.502	0.331	0	25.306	-9.190	2.055
Gr	1.0000					
FDI	0.317	1.0000				
FinD	0.392	0.645	1.0000			
Tr	-0.420	0.134	-0.2788	1.0000		
Gcf	0.163	0.196	0.132	-0.032	1.0000	
pop	-0.548	-0.301	-0.534	0.613	-0.102	1.0000

Table 5 presents findings of the diagnostic test. First, it provides findings of the Anderson-Darling test. It is a goodness of fit test meant to determine whether the data follows a normal distribution. As P-values for all the series are insignificant we can accept the normality hypothesis i.e. the sample follows a normal distribution. After that the Jarque Bera test is applied on all series. Findings show that the series are normally distributed as the P-values are greater than 5 %. To test whether error terms are homoscedastic, a white heteroscedasticity test is applied. Findings indicate that there is no problem of heteroscedasticity as the P-values for all the series are greater than 0.05.

Table 5: Diagnostic Test

	Gr	*FDI*	*FinD*	*Tr*	*Gcf*	*pop*
Anderson Darling Test	0.527	0.893	0.803	0.424	0.221	0.698
P-values	0.832	0.762	1.00	0.935	0.983	0.893
Jarque Bera Test	1.987	2.906	3.203	2.212	1.233	3.440
P-values	0.346	0.538	0.483	0.630	0.278	0.599
White Hetro	1.335	1.465	1.131	1.725	1.545	2.374
P-values	0.308	0.369	0.181	0.162	0.228	0.110

To get meaningful results, it is very important to analyse the stationarity properties of the data. Therefore, ADF and DF-GLS unit root tests are employed to find series order of integration. Table 6 reports the findings of the ADF test. In Table 6, the ADF test statistic with intercept as well as with intercept and trend are reported at level and first difference. As evident from the findings, all the series are non-stationary at level. However, after taking first difference they become stationary and therefore are integrated of order one *I(I).*

Table 6: Findings of ADF test

Variable	Level		First Difference		Order of Integration
	Intercept	Trend & Intercept	Intercept	Trend & Intercept	
Gr	0.6901	-2.364	-3.210**	-3.277***	I (1)
FDI	-2.5718	-2.768	-3.688**	-3.667**	I (1)
FinD	-1.861	-1.731	-3.127**	-3.154***	I (1)
FDI × *FinD*	-2.224	-2.900	-3.034**	-3.008**	I (1)
Tr	-1.717	-2.900	-6.660*	-6.628*	I (1)
Gcf	-2.493	-2.455	-3.286**	-3.247**	I (1)
pop	-2.608	0.124	-3.23***	-3.948**	I (1)

(*) indicates stationary at 1 %, (**) indicates stationary at 5 % and (***) indicates stationary at 10 %.

Table 7 reports findings of DF-GLS test. DF-GLS test statistic is mentioned with intercept as well as with intercept and trend at both level and first difference. Findings of DF-GLS test suggests that all series are stationary at first difference and hence are integrated of order one *I(1).*

Table 7: Findings of DF-GLS test

Variable	Level		First Difference		Order of Integration
	Intercept	Trend & Intercept	Intercept	Trend & Intercept	
Gr	0.801	-2.582	-3.074*	-3.264**	I (1)
FDI	-1.59	-2.87	-3.75*	-3.79*	I (1)
FinD	-1.493	-1.839	-3.173**	-3.239**	I (1)
FDI × *FinD*	-1.538	-2.281	-3.085*	-3.111***	I (1)
Tr	-1.278	-2.449	-4.416*	-4.133*	I (1)
Gcf	-1.555	-2.575	-3.314*	-3.358**	I (1)
pop	-0.899	-1.445	-2.99**	-4.451*	I (1)

(*) indicates stationary at 1 %, (**) stationary at 5 % and (***) stationary at 10 %.

In addition to traditional unit root tests, Table 8 represents the unit root test with structural break which is also applied to check for the presence of unknown structural break in the series. As the data set comprises more than thirty annual observations, there is a possibility for the existence of endogenous structural break. Therefore, the present study employs the Zivot-Andrews unit root test and the findings are reported in Table 8. From findings it is visible that all the series are non-stationary at levels as the value of t-statistics lies below the critical values. However, after taking first difference they become stationary as the t-statistics lie above the critical values. Hence, the Zivot-Andrews test validates the findings of traditional unit root test.

Table 8: Findings of Zivot Andrews Test

Level				
Variable	Intercept	B.D	Trend	B.D
Gr	-3.899	1997	-3.304	2002
FDI	-4.084	2011	-3.813	2008
FinD	-3.651	2008	-3.412	2005
FDI × *FinD*	-4.574	2011	-4.056	2007
Tr	-3.730	2005	-3.106	2012
Gcf	-3.850	2013	-3.947	2012
pop	-2.996	2003	-2.315	2008
First Difference				
Gr	-4.865**	1993	-3.549	1994
FDI	-4.941**	2008	-4.651**	2006
FinD	-5.876*	2006	-4.227**	2000
FDI × *FinD*	-5.796*	2008	-3.600	2005
Tr	-7.464*	2001	-6.649*	1999
Gcf	-6.317*	2012	-5.740*	2010
pop	-5.068**	1998	-4.475**	2004

B.D represents break date and (*), (**),(***) indicate significant at 1%, 5% and 10% level

As all series under consideration are integrated of order one therefore to check the existence of a meaningful relationship among variables, the Johansen and Gregory-Hansen test of cointegration is applied. Table 9 reports findings of Johansen test for Equation 1. Trace and maximum eigenvalue statistics indicates that three cointegrating equations exist. P-values of both tests' statistics are significant at 5%. Hence, we can reject the null hypothesis of no cointegration and conclude that there is long-run relationship among variables.

Table 9: Findings of Johansen Test (Equation 1)

Hypothesised No. of Cointegrating Equations	Eigenvalue	Trace Statistic/ Max-eigen Statistic	5% Critical Value	P-value
Trace Test				
None*	0.902093	191.9728	95.75366	0.0000
At most 1*	0.874143	119.9369	69.81889	0.0000
At most 2*	0.656058	55.68592	47.85613	0.0077
At most 3	0.406131	22.60014	29.79707	0.2663
At most 4	0.133218	6.446161	15.49471	0.6428
At most 5	0.062907	2.014169	3.841466	0.1558
Maximum Eigenvalue Test				
None*	0.902093	72.03588	40.07757	0.0000
At most 1*	0.874143	64.25097	33.87687	0.0000
At most 2*	0.656058	33.08578	27.58434	0.0088
At most 3	0.406131	16.15398	21.13162	0.2160
At most 4	0.133218	4.431992	14.26460	0.8112
At most 5	0.062907	2.014169	3.841466	0.1558

Note: (*) indicates rejection of null hypothesis at 5%

Table 10 reports the findings of the Johansen test for Equation 2. The Trace test indicates that four cointegrating vectors exist while a maximum eigenvalue test suggests that three cointegrating vector among Gr, FDI, $FinD$, $FDI \times FinD$ (interaction term), Tr, Gcf and pop exist. So, we can reject null hypothesis and conclude that the variables are cointegrated in the long run.

Table 10: Findings of Johansen Test (Equation 2)

Hypothesised No. of Cointegrating Equations	Eigenvalue	Trace Statistic/ Max-eigen Statistic	5% Critical value	P-value
Trace Test				
None*	0.972879	283.7062	125.6154	0.0000
At most 1*	0.908410	171.8756	95.75366	0.0000
At most 2*	0.758796	97.77199	69.81889	0.0001
At most 3*	0.554905	53.68649	47.85613	0.0128
At most 4	0.513679	28.59301	29.79707	0.0683
At most 5	0.123697	6.245545	15.49471	0.6665
At most 6	0.067070	2.152193	3.841466	0.1424
Maximum Eigenvalue Test				
None*	0.972879	111.8306	46.23142	0.0000
At most 1*	0.908410	74.10357	40.07757	0.0000
At most 2*	0.758796	44.08550	33.87687	0.0022
At most 3	0.554905	25.09347	27.58434	0.1008
At most 4*	0.513679	22.34747	21.13162	0.0336
At most 5	0.123697	4.093351	14.26460	0.8494
At most 6	0.067070	2.152193	3.841466	0.1424

Note: (*) indicates rejection of null hypothesis at 5%

At this point, the Gregory-Hansen Cointegration test is applied as it allows for structural break. Table 11 reports the findings of the Gregory-Hansen test with level shift for Equation 1 and 2. In the case of Equation 1, the null hypothesis of no cointegration can be rejected at 5 % level as ADF and Z_t test statistic both are higher than 5% critical value. So, we can conclude that there exists a long run relationship among variables with one break. The Gregory-Hansen test suggests a significant break in the year 2009. This break coincides with the global financial crisis of 2008-2009 that adversely affected not only the economy's growth but also worsened current account and fiscal deficits (Usman, 2010). Real GDP growth is declined by 2.9% in 2009 as compared to 2008. FDI inflows witnessed a decline of 32% in 2009. FDI to financial sector fall by US$548 million (Pakistan Economic Survey, 2009-10). Foreign capital inflows in the form of equities fell by 0.7% while bond related inflows dropped by 0.5% in 2009 compared to 2007.[4] The Pakistani rupee depreciated by 25%. Moreover, Pakistan's stock market value (measured by MSCI index in U.S dollars) declined by 75% in January 2009 as compared to January 2008 (Shabbir, 2010).

[4] Pakistan Economic Survey (2009-10)

In considering the findings of Gregory-Hansen test for Equation 2, we can reject the null hypothesis of no cointegration in this case also as both ADF and Z_t t-statistics lie above 5% and 1% critical values respectively. Hence, we can conclude that variables are cointegrated in the long run with one break. In the case of Equation 2, a significant break is identified in year 2013. This might be due to an acute energy shortage, ongoing war against terrorism, or it might be due to uncertainty surrounding political transition for the most part of the year. In such economic and political environments, investment to GDP ratio declined by 0.7%.[5] Moreover, a substantial drop was observed in foreign bank operations in Pakistan as they registered a decline of 23.25% in their assets/liabilities.[6] In both cases (Equation 1 & 2), the findings of the Gregory-Hansen test are consistent with the Johansen cointegration test.

Table 11: Gregory-Hansen Cointegration test

Gregory-Hansen Test	Model 1		Model 2	
	Test Statistic	B.D	Test Statistic	B.D
ADF	-5.32**	2009	-5.87**	2013
Z_t	-5.28**	2009	-5.52*	2013
Z_α	-24.22	2009	-22.81	2013

(*) and (**) indicates rejection of null hypothesis at 1% and 5% level respectively.

After testing for cointegration, long run relationships among variables are estimated by applying FMOLS. DOLS is applied as a robustness test. Table 12 reports the findings of FMOLS and DOLS for Equation 1 where (D_{09}) represents the dummy variable. As in the case of Equation 1, structural break is identified in 2009 by the Gregory-Hansen test. Therefore, to capture that, a dummy variable (D_{09}) is incorporated in the model that takes on value '0' for year 2008 and preceding years and a value of '1' otherwise. In line with economic theory, findings of FMOLS propose positive and significant long-run association among *FDI* and *lGr*. The results indicate that a 1% increase in FDI leads to an average increase of 0.20% in *lGr* . This implies that FDI is a significant determinant of long-term growth and besides raising capital stock, it promotes human resource development via labour training, skill acquisition and technology transfer. Findings of DOLS also suggest positive association between FDI and *lGr* . Analogous findings have been reported by Mehic et al., (2013); Nistor, (2014); Pegkas, (2015); and Raza et al., (2019).

The coefficient of composite measure of financial development is positive and significant which indicates a positive association between growth and financial development. Findings reveal that a 1% increase in *FinD* will lead to an increase of 0.56% in *lGr* . The findings

[5] Pakistan Economic Survey (2012-2013)
[6] SBP publication 2013 titled "Statistics on Scheduled Banks in Pakistan"

suggest that financial development encourages an economy's growth as it diversifies risk, promotes capital accumulation, mobilises savings and allocates funds to productive investment projects. These findings are in accordance with Zhang et al., (2012); Nasreen et al., (2014); and Rahman et al., (2020). As evident from the findings, gross capital formation has a positive and significant impact on growth. This implies that gross capital formation enhances growth as physical capital accumulation raises productivity and promotes growth. Findings of FMOLS suggest that a 1% increase in *Gcf* will bring about an average increase of 0.019% in G_r. This finding is supported by Topcu et al., (2020); Ongo & Vukenkeng, (2014); and Jayaraman et al., (2017).

The coefficient of trade openness is negative and significant as indicated by FMOLS estimators which suggest a 1% increase in *Tr* will lead *lGr* to decline by 0.01%. This negative association might be due to a deficit in balance of payment as imports of Pakistan are comprised of mostly finished goods, while most of its exports include raw or mediating goods. This finding is consistent with Hye, (2012); Zafar et al., (2016); and Sirag et al., (2018). Results of FMOLS indicate that population and growth are negatively related and that increased population is detrimental for growth. FMOLS estimators reveal that a 1% increase in *pop* causes *lGr* to fall by 0.39%. This negative association might reflect the fact that as population increases, per capita income falls and, in developing economies like Pakistan, increased population puts further strain on limited resources. These findings are consistent with Afzal, (2009); Yeboua, (2019); and Ahmed & Ahmed, (2016). The coefficient of dummy variable D_{09} is negative but insignificant in both cases. This implies that the structural break of 2009 doesn't have a significant impact on growth.

Table 12: Findings of DOLS & FMOLS (Equation 1)

Variable	FMOLS		DOLS	
	Coefficient	Prob.	Coefficient	Prob.
FDI	0.204372	0.0002	0.110698	0.0520
FinD	0.562340	0.0000	0.305731	0.0620
Gcf	0.019380	0.0838	0.084700	0.0002
Tr	-0.009352	0.0036	-0.379085	0.0137
pop	-0.387096	0.0000	-0.404581	0.0001
D_{09}	-0.003472	0.8996	-0.021738	0.1127
C	7.080943	0.0000	9.146897	0.0000

Table 13 reports the findings of FMOLS and DOLS for Equation 2, where D_{13} is the dummy variable that takes on value '0' for year 2012 and preceding years and value of '1' otherwise.

As the multiplicative interaction term is incorporated in Equation 2, coefficients of interaction term no longer represent average or marginal impact on growth (Brambor, Clark, & Golder, 2006). Therefore, in accordance with Sirag et al. (2018), marginal effects along with standard errors have been computed as pointed out by (Brambor et al., 2006). The lower part of Table 13 reports the marginal impact of FDI on *lGr* is conditional on *FinD* and the marginal impact of *FinD* on *lGr* s iconditional on FDI. It suggests that impact of FDI on *lGr* improves with an improvement in the financial development level as at lower levels of financial development the impact of FDI on growth is however positive but is not statistically significant. With an increase in financial development level, the impact of FDI on *lGr* improves as is visible by computed marginal effects which become positive and statistically significant at higher financial development levels (i.e. at mean and maximum). This implies that an increase in an economy's financial development level augments the influence of FDI on growth. This reflects the fact that, besides ensuring efficient allocation of capital, the financial sector promotes the process of technological diffusion related with FDI inflows and enables MNC's to extend their innovative activities in the economy which in turn paves the way for technological spill overs to local enterprises. Similar findings have been observed by Ang, (2009); Alzaidy et al., (2017); and Sirag et al., (2018).

Table 13: Findings of FMOLS & DOLS (Equation 2)

Variable	FMOLS		DOLS	
	Coefficient	Prob.	Coefficient	Prob.
FDI	-0.147453	0.0329	-0.662400	0.0406
FinD	0.667180	0.0553	0.701777	0.0299
$FDI \times FinD$	0.261101	0.0008	0.261875	0.0292
Gcf	0.018720	0.2235	0.004639	0.0746
Tr	-0.240866	0.0094	-0.542585	0.0371
pop	-0.391634	0.0000	-0.402796	0.0108
D_{13}	-0.008522	0.7649	-0.048814	0.0446
C	8.605913	0.0000	9.780030	0.0075
Marginal Effect of (*FDI*) on (*lGr*)				
Min.	0.057905 (0.039205)		0.018594* (0.005632)	
Mean	0.249538* (0.080823)		0.241181* (0.035298)	
Max.	0.49900* (0.1142)		0.468339*** (0.239350)	
Marginal Effect of (*FinD*) on (*lGr*)				
Min.	0.060023* (0.011329)		0.01596 (0.01010)	

Mean	0.307086* (0.080823)	0.111219** (0.043151)
Max.	0.685940*** (0.349720)	0.463575* (0.134578)

A similar outcome has been observed in the case of marginal effect of *FinD* on *lGr* conditional on amount of FDI inflows. At low levels of FDI, the impact of *FinD* on *lGr* is however positive and statistically significant but is comparatively smaller in magnitude than at mean and maximum levels. This indicates that as FDI inflow increases, the impact of *FinD* on *lGr* also improves. It suggests that an increase in foreign investments results in more cash inflows which affects the deposits held by financial institutions and rising deposits in turn permits financial institutions to provide more domestic credit. This finding has been empirically supported by Sirag et al., (2018); and Siddikee & Rahman, (2020). The coefficient of *Gcf* is positive and significant as suggested by findings of DOLS which implies that *lGr* and *Gcf* are positively related in the long run. This implies that *Gcf* promotes *lGr* as physical capital accumulation encourages investment and creates employment by increasing production bases. As a result, higher savings are generated through increased employment which further permits the undertaking of larger investments and this effect in turn promotes growth. The findings of DOLS indicate that a 1% increase in *Gcf* will be required on an average to raise *lGr* by 0.005% respectively. However, findings of FMOLS suggest a positive but insignificant association among *Gcf* and *lGr* .

The coefficient of trade openness is negative which indicates that *Tr* and *lGr* are negatively associated in the long run. The findings of FMOLS reveal that a 1% increase in *Tr* will cause *lGr* to decline by 0.24%. As mentioned above, this negative association might be associated with a balance of payment deficit. The findings suggest a negative and statistically significant association among population growth and *lGr* in the long run. As mentioned above, overpopulation is detrimental for growth of developing economies as an increase in population leads to a decrease in per capita income and puts strain on the economy's sparse resources. The findings of FMOLS indicate that a 1% increase in *pop* will cause *lGr* to decline by 0.39%. The coefficient of the dummy variable is negative but insignificant, as indicated by findings of FMOLS. However, it is negative and statistically significant as is visible from the findings of DOLS. This implies that the structural break of 2013 affected the economy's growth adversely.

4. Conclusion and Policy Implication

The present study adds to the existing literature on FDI, financial development and economic growth in the case of Pakistan. We have applied Johansen and Gregory-Hansen cointegration tests to check the existence of long-term relationships. Long run parameters have been estimated using FMOLS and DOLS. Marginal impacts of FDI on growth contingent on the level of financial development as well as the marginal impact of financial development on growth conditional on the FDI inflows have been computed. The Johansen cointegration test

suggested that all the variables are cointegrated in the long run in both cases. The Gregory-Hansen cointegration test confirmed the findings of the Johansen test and suggested a significant break in the year 2009 in the case of Equation 1 and 2013 in the case of Equation 2. To capture structural breaks, dummy variables are introduced in both models. In the case of model 1, the findings of FMOLS and DOLS reveal that both FDI and financial development are positively related to economic growth in long run. In the case of Equation 2, the findings of FMOLS and DOLS reveal that a marginal effect of FDI and financial development on growth increases with an increase in financial development level and amount of FDI inflows respectively.

The Empirical evidence suggested that the state should also provide incentives to domestic investors and try to resolve the issues faced by domestic investors and address their insecurities in order to encourage domestic private investment in the economy as it is unrealistic to expect investment from foreign investors when a country's own private sector is reluctant to invest. In order to provide improved access, financial institutions can simplify their procedures, offer suitable products, advertise the products and services offered by running a proper campaign and extend small loans to people from unprivileged areas at subsidised rates.

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