FDI AND ECONOMIC GROWTH: EMPIRICAL EVIDENCE FROM PAKISTAN

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ABSTRACT

This paper investigates the relationship between FDI and economic growth. Two models have been used to analyze the time series data on Pakistan from 1970-2012. This paper contributes to the existing literature by examining the different empirical methods to estimate the relationship between FDI and economic growth. The vector error correction model results suggest that FDI depends on the economic growth but this relationship is not true *vice versa*. The second model showed that FDI, human capital and exports are important factors of economic growth. However, the negative relationship between interactive variables (FDI & human capital) and economic growth indicates that low level of human capital affect the economic growth of Pakistan.

Keywords: FDI, Economic Growth, Human Capital

INTRODUCTION:

Foreign direct investment is an important factor for economic growth. In particular, for those economies where financial constraints are higher for local firms which hinder their productivity. A domestic economy can increase its output (GDP) through the superior technology diffusion by MNEs. These multinational enterprises are more innovative and are well equipped with latest technologies and modern management practices result in knowledge spillovers (externalities); these spillovers improve the overall productivity of the domestic economy (Dasch and Kampik, 2010). These FDI spillovers (through demonstration effects, backward/forward linkages) have a significant impact on the economic growth. However, there is also a debate in the literature that the benefits of FDI are conditioned upon the absorptive capacity of the host economy. This states that a domestic economy with sufficient or higher absorptive capacity (human capital or R&D intensive) would likely to receive more benefits from FDI compared to an economy with low absorptive capacity (Borensztein *et al.* 1998). The absorptive capacity means that the ability of an economy to internalise the external knowledge from FDI.

To date, very few empirical studies (e.g., Iqbal *et al.* 2014; Khan *et al.* 2011) have been conducted to investigate the relationship between FDI and economic growth for Pakistan. For instance, the study of Iqbal *et al.* (2014) showed the statistically insignificant relationship between FDI and economic growth for Pakistan. On the other hand, the study of Khan *et al.* (2011) analyse the impact of FDI on economic growth sector wise and suggested that there is causality exist between FDI and economic growth by using panel data techniques. Nonetheless, Khan *et al.* (2011) study showed limitations in terms of analysis of the relationship between economic growth and human capital together with FDI. This empirical study is based on a time series analysis between 1970-2012 from UNCTAD (United Nation Conference for Trade and Development).

A unit root test has been used to investigate the stationarity of the variables such as economic growth (GDP per capita), FDI inflows and the error term. Augmented Dickey-Fuller test has rejected the null hypothesis and concluded that series is stationary. A cointegration test indicated that our least square residuals are stationary. We estimated Vector Error Correction model based on stationary variables such as economic growth, FDI and the error term. The model implied that in the context of Pakistan economy that higher economic growth would attract more FDI. Alternatively, this suggest that a stable and higher economic growth would provide confidence to the foreign investors for investing in the country. The second model showed that human capital, FDI and exports are the key determinants of economic growth.

The structure of the paper as follows: in the second section literature review has been provided on the expected link between FDI and economic growth. While, section 3 provides data sources and empirical analysis using unit root test for stationary and estimated models in subsection 3. Lastly section 4 present conclusion, policy implications and limitations of the study.

LITERATURE REVIEW:

FDI IMPACT ON ECONOMIC GROWTH:

A number of researchers investigated the positive and significant relationship between FDI and economic growth (Li and Liu, 2005; Chakraborty *et al.* 2008; Johnson, 2005; Choe, 2003). Foreign direct investment improves stock of knowledge in the host economy through labour training, skills acquisition and diffusion, and the introduction of modern management practices and organization arrangements (Li and Liu, 2005). Li and Liu (2005) examined the causal link between FDI and economic growth (GDP per capita) on a panel data of 84 developed and developing countries over the period 1970-99. Their study suggests that FDI interaction with human capital (secondary school attainment) have a strong positive impact on economic growth of developing countries. Overall, this study indicates the positive relationship between FDI and economic growth. Borensztein *et al.* (1998) states that human capital is prerequisite for higher productivity of FDI and its significant positive impact on the economic growth (GDP per capita). In other words, their study indicates that FDI contribute in the domestic economy only when the host economy has enough absorptive capacity. To attract FDI, an economy with sound macroeconomic environment (low inflation), low unit labour unit

cost, banking sector reforms and privatization are the major factors behind attracting FDI (Popescu, 2014). FDI is connected to other inputs in the host economy such as labour, domestic capital and exports which are important for economic growth: this indicates the positive link between FDI and economic growth (Popescu, 2014).

Similarly, Chakraborty *et al.* (2008) investigated the causal relationship between FDI and economic growth (GDP) using panel data analysis of Indian economy[i]. Their findings suggest that Indian economy openness to trade would strengthen the linkages between foreign and domestic companies. In other words, FDI benefits the local entrepreneurs and human development across various sectors of the economy (Chakraborty *et al.* 2008). Likewise, Khan *et al.* (2011) examined the causal link between FDI and economic growth for Pakistan economy using sector level data from 1981-2008. Their findings are in line with Chakraborty *et al.* (2008) study, which suggest that FDI and GDP are co-integrated and causality exist between FDI and GDP. Another empirical study (used Cobb-Douglas production function) on the relationship between FDI and economic growth (GDP) Pakistan is conducted by Iqbal *et al.* (2014). However, this study failed to show the significant positive relationship between FDI and economic growth. This indicates the need for research on Pakistan economy. Choe (2003) examined the causal relationship between economic growth and FDI and GDI (gross domestic investment) in 80 countries over the period of 1971-95 using a panel vector autoregressive (VAR) model. The Granger causality test suggested that causality run bi-directional between economic growth and FDI, however, the results are stronger from growth to FDI than from FDI to growth (Choe, 2003). Their empirical results implies that rapid economic growth attract high FDI inflows.

In addition, Ramirez (2006) conducted a study of FDI flows on Mexican economy using time series analysis[ii] from 1960-2001. Their finding suggest that FDI have positive impact on the labour productivity of Mexican economy, which implies that foreign firms are superior in technology and with better managerial capabilities affect the productivity of host economy in a positive manner. Such foreign firms provide capital, mobilize labour and land productivity through superior technology transfer (Thompson, 2002; Borensztein, 1998). Thompson (2002) conducted micro analysis of Hong Kong firms and argued that clustered FDI is better in transferring technology to host economy than dispersed FDI. Clustered FDI implies higher knowledge spillovers through vertical and horizontal linkages in local economy than dispersed FDI. Another micro level of study (*e.g.,* Jordaan, 2008) on Mexican manufacturing firms shows that FDI generate positive externalities through backward linkages (input-output relation between FDI and domestic suppliers). Overall, Jordaan (2008) findings indicate that liberalization of local markets, small technology gap, and low trade barriers may improve the labour productivity of domestic firms. FDI by MNEs have advanced technologies and mostly are from developed economies, in particular, low income countries can benefits from their capital, knowledge and technologies (Chakraborty *et al.* 2008). Another reason to attract FDI by developing economies is that these countries have problem of saving-investment gap and FDI affect economic growth positively through improving their productivity, transferring latest technologies, jobs creation and increasing competition (Khan *et al.* 2011). In addition, Crespo and Fontoura (2007) identified five major channels of technological diffusion between FDI and host economy such as i) demonstration/imitation effect; ii) labour mobility; iii) exports; iv) competition; v) backward & forward linkages. For instance, the export capacity of domestic firms will have greater capacity to absorb superior technology of MNEs (Crespo and Fontoura, 2007).

Furthermore, foreign firms have specific advantages such as economies of scale, highly advance technology and managerial capabilities (Johnson, 2005; Popescu, 2014). These firms' specific advantages are closely connected to the knowledge capital (intangible assets). Knowledge capital consists of brand name, human capital, patents, trademarks and technology (Johnson, 2005). Multinational firms have higher knowledge capital than domestic firms and they operate profitably in the host economy. Overall, Johnson (2005) conducted a panel study of developing economies and found[iii] that technology spillovers by MNEs have a positive and statistically significant impact on the host country economic growth. It is clear that FDI is more productive than domestic investment because MNEs have more advance technologies, with higher R&D intensity, better management capabilities (Borensztein, 1998). The presence of foreign firms creates three types of productivity

spillovers: first the entry of MNCs increases competition in the domestic market. Second, knowledge spillover to host firms' through labour turnover. Third, multinational firms in domestic economy generate demonstration effects through imitation or new innovation through R&D (Ruhul *et al.* 2009). Ruhul *et al.* (2009) conducted a micro level study (using panel data techniques) and examined the impact of FDI spillovers on Indonesian manufacturing firms. Their results indicate that FDI spillovers have a positive and significant impact on the domestic firms.

In comparison, some researchers (*e.g.,* Crespo and Fontoura, 2007; Jordaan, 2008) investigated the negative impact on FDI on domestic economy. For instance, Jordaan (2008) investigated that negative externalities may occur from foreign direct investment. When multinational firms make entry into the domestic market, the level of competition increases and this competition forced local firms to produce at low volume and reduce their efficiency level (Jordaan, 2008). In other words, MNEs forces domestic firms to operate on less efficient scale, losses their significant market shares and increasing their average cost (Crespo and Fontoura, 2007). Alternatively, their finding suggests that domestic firms should have higher absorptive capacity (higher R&D investment) to benefit from MNEs or otherwise have negative impact. In particular, in developing countries there is view that multinational corporations monopolizes the domestic industry and may create unemployment (Bashir *et al.* 2014) Similarly, FDI with technology gap has a significant and negative impact on the economic growth of developing countries (Li and Liu, 2005). This finding suggests that in developed economies technology absorptive capability (technology gap) is high, this larger gap would help FDI in creating more benefits for economic growth, while, in developing economies this technology gap is low and have negative impact on their economic growth.

Another example is, if foreign firms finance its investment through borrowing in local financial market, this will put upward pressure on the interest rate causing the domestic investment to be crowded out (Johnson, 2005). This may result in FDI negative impact on economic growth. On the other hand, FDI flows may have reverse (negative) impact on the economic growth of a host country if MNCs get substantial tax or other benefits from the domestic country than local firms, and pose threat to domestic firms through intense competition, transfer of inappropriate technology or reverse flows of profits and dividends of such multinationals (Ramirez, 2006). Furthermore, Kinda (2010) investigated that physical infrastructure problems, financing constraints and institutional obstacles reduce FDI in developing countries. For instance, lack of access to internet, energy crisis, lack of access to credit, low skilled workers and so forth have negative and significant impact on the FDI of developing countries (Kinda, 2010; Bashir *et al.* 2014).

In summary, several macro and micro level studies (*e.g.,* Choe, 2003; Jordaan, 2008 examined the positive relationship between FDI and economic growth. FDI by MNEs improves the knowledge stock, human development, employment opportunities in the domestic economy. However, when a domestic economy has a low absorptive capacity; this may result in reverse effects. We conclude that FDI could have positive or negative impact on the economic growth.

DATA SOURCE AND EMPIRICAL ANALYSIS:

The data for Pakistan has been obtained from UNCTAD (United Nation Conference for Trade and Development) from 1970-2012. The data gathered on GDP per capita (used as measure of economic growth), inward FDI (million $) and exports (million $). Similarly, Pakistan Bureau of Statistics (PBS) provided data on adult literacy rate (15 years & above for both male & female) from 1981-2012. The literacy rate indicates the level of education (as proxy of human capital) in the country and will be used to analyse its impact on economic growth. Figure 1 shows the GDP per capita for Pakistan. We can observe that GDP per capita increased slowly between 1970-2012. In 2012, Pakistan GDP per capita stands at approximately US$ 1200 which indicates the low income country. Figure 2 provide information on inward FDI of Pakistan. Pakistan attracted significant amount of FDI after post-liberalisation era, which increased from US$ 216.2 million in 1990 to US$1524 million in 2005 (Khan *et al.* 2011). The major sector attracted the most FDI is the services sector (*e.g.,* Telecommunication) an approximately $1.63 billion during 2007-08 (State Bank of Pakistan). The reasons to attract such significant amount of FDI is because Pakistan has offered numerous fiscal and trade incentives to

foreign investors such as tax relief, financing facilities, low tariff, decentralization of management of foreign exchange, foreign currency account fully protected and so forth. However, FDI trend in Pakistan dropped after 2008 due to global recession, financial crisis, political instability (see Figure 2); in particular the growing concern about the security situation (*e.g.,* war on terrorism) of the country (Khan *et al.* 2011).

Figure 3: shows the combine line graphs of GDP per capita and FDI inflows. These two line graphs suggest that there is co-integration exist between GDP per capita and FDI inflows. This could be confirmed through cointegration analysis. Before cointegration test, we need to examine the stationarity of variables. In order to test whether these variables are stationary or non stationary we used unit root test for stationarity (subsection 3.1).

Figure 1: GDP per capita (in US$) of Pakistan

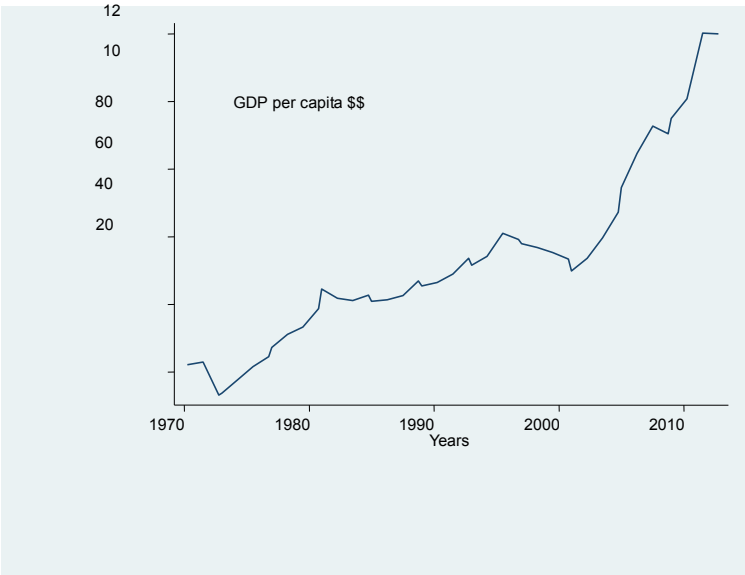


Figure 2: FDI inflows (in million $) of Pakistan

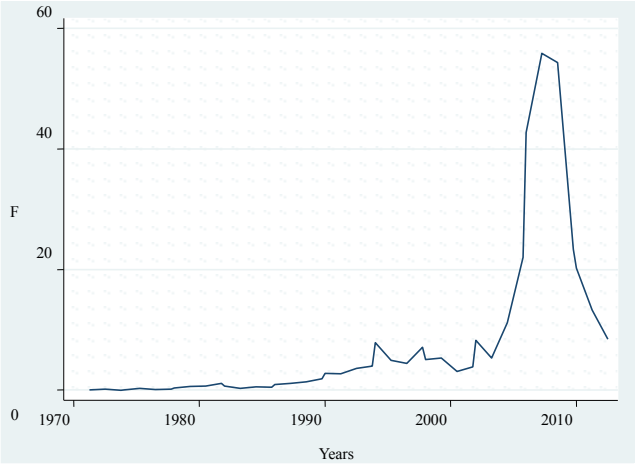
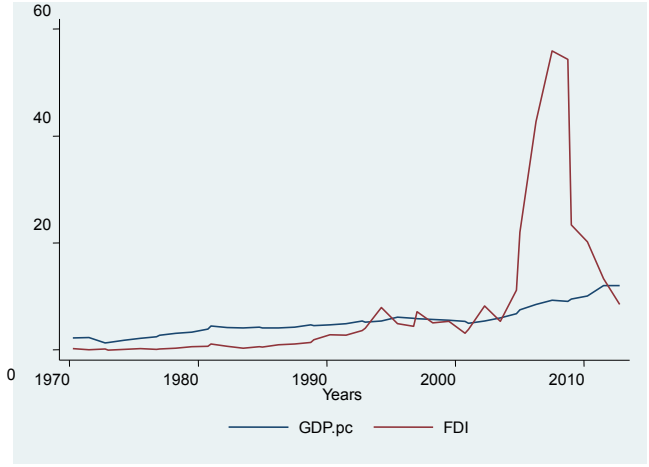


Figure 3: GDP per capita and FDI of Pakistan



UNIT ROOT TEST FOR STATIONARITY:

In order to investigate the stationarity of GDP per capita and FDI inflow, we use Augmented Dickey-Fuller test to show that these two variables are stationary process. Using non-stationary time-series variables should not be used in regression model, to avoid the problem of spurious regression (Hill *et al.* 2007).

A) DICKEY-FULLER TEST WITH CONSTANT AND WITH TREND:

As we observe in Figure 3 both FDI and GDP per capita are fluctuating or wandering around a linear trend, so the test equation is $\Delta y_t = \alpha + \gamma y_{t-1} + \lambda t + v_t$: ..... (i)

Δy_tShows change in GDP per capita or change in FDI in time *t*, α is constant, y_{t-1} represent GDP per capita or FDI are lagged one period, while γ,λ are parameters with trend *t* and $v_t$denote error term in time *t*. The null hypothesis is $H_0: \gamma = 0 \; against \; H_1: \gamma < 0$. If do not reject the null hypothesis that γ=0 (ρ=1), we conclude that the series is non stationary. If we reject the null hypothesis γ=0 we conclude that the series is stationary (Hill *et al.* 2007).

Table 1 provide information on the stationarity of variables. We examined that FDI and GDP per capita have trend. We rejected the null hypothesis using Dickey-Fuller test and conclude that variables have stationary properties. Lagged in GDP per capita and FDI one period have 10% and 1% significance levels.

Table 1: Dickey-Fuller Test for Unit Root

$\Delta GDPper\ capita$	Coefficients	*t*-values
$GDPpc_{t-1}$	0.1892* (0.0812)	2.33
Trend (t)	-0.7255 (0.8900)	-0.81
Constant α	-27.792 (37.616)	-0.58
ΔFDI		
FDI_{t-1}	-0.7526*** (0.1171)	-6.42
Trend (t)	9.5925** (4.0279)	2.38
Constant α	-354.317 (315.541)	-1.12
n=42		

*/**/*** indicates 10/5/1 % significance levels Standard errors are reported in parentheses.
In addition, cointegration test suggest that when dependent and independent variables share similar stochastic trends, and, since the difference of error term e_t is stationary, they do not deviate too far from each other. In order to test whether y_t & x_t are cointegrated is to test whether the error term $e_t = y_t - b_1 - b_2 x_t$stationary by using Dickey-Fuller test (Hill *et al.* 2007). The test for stationarity of the residuals is based on the test equation.
$\Delta \hat{e_t} = \gamma \hat{e_{t-1}} + v_t$.....(ii)
$\Delta \hat{e_t}$ Shows the change in error terms, while γ is parameter and $\hat{e_{t-1}}$ is lagged one period in error term: one period lagged is introduced to correct the autocorrelation; v_t is new error term. The null and alternative hypotheses in the test for cointegration are,
H_0:The series are not cointegrated⇔ residuals are nonstationary.
H_1: The series are cointegrated ⇔ residuals are stationary.
Table 2 shows the cointegration test of error terms for variables GDP per capita and FDI inflows. We can observe that augmented Dickey-Fuller test has rejected the null hypothesis of no conintegration at 5% significance level.

Table 2: Cointegration Test of Error Terms Using Augmented Dickey-Fuller test

$\Delta \hat{e_t}$	Coefficient	t-value
$\hat{e_{t-1}}$	-0.6079** (0.1954)	-3.11
constant	7.2185 (42.3950)	0.17
R^2	0.3462	

Critical Values for the Cointegration Test			
Model	1%	5%	10%
$y_t = \beta x_t + e_t$	-3.39	-2.76	-2.45

**Indicates at 5% significance level
Standard errors are presented in parentheses.

Further, the *tau statistic* value is -3.11 which is less than the critical value of -2.76 (see Table Thus we conclude that least square residuals are stationary. This implies that economic growth (GDP per capita) and FDI inflows are cointegrated. This suggests that there is fundamental relationship between these two variables and the estimated regression relationship between them is valid and not spurious.
This result-that economic growth and FDI are cointegrated has significant economic implication. It means that when the govt attracts foreign direct investment, the economic growth also changes. In other words, this result implies that FDI positively influence the economic growth of a country or important determinant of economic growth.

B) VECTOR ERROR CORRECTION (VEC) MODEL:

In subsection (a), we examined that all variables change in GDP per capita, FDI inflows and the error term are stationary: FDI and economic growth are cointegrated. The previous results implied that FDI is linked with economic growth. To ascertain how much FDI will respond to economic growth, we estimate the vector error correction (VEC) model. The easiest method to use VEC model is to carry out two-step least square procedure. First, we estimated the lagged residuals $\hat{e_{t-1}}$ for conintregration relationship. Then use these least squares to estimate the equations. The estimated vector error correction (VEC) model for FDI and economic growth (GDP per capita) is,

$$\Delta GDP\ pc_t = \alpha_0 + \alpha_1 \hat{e_{t-1}} + v_t^{GDPpc} \quad (1)$$
$$\Delta FDI_t = \beta_0 + \beta_1 \hat{e_{t-1}} + v_t^{FDI} \quad (2)$$

$\Delta GDPpc_t, \Delta FDI_t$ Shows the change in GDP per capita and change in FDI in time t, $\hat{e_{t-1}}$ is estimated error terms lagged one period in both equations and α, β are coefficients, while v_t is the error terms for

GDP per capita and FDI in the equations.

Table 4: Vector Error Correction Model of FDI and Economic Growth (GDP per capita)

$\Delta GDPpc$	Coefficients	*t-values*
$e^{\wedge}_{t-1}$	-0.0704 (0.0874)	-0.81
Constant	8.0138 (12.458)	0.64
R^2	0.0751	
$\underline{\Delta FDI}$		
$e^{\wedge}_{t-1}$	3.1489** (1.1938)	2.63
Constant	6.1396 (314.848)	0.02
R^2 N=42	0.3090	

**indicates 5% significance level
Robust standard errors are presented in parentheses.

In table 4, the first equation shows the insignificant result which suggests that economic growth does not depend on foreign direct investment. In second equation the significant outcome at 5% implies that FDI more depend on economic growth than economic growth dependent on foreign direct investment. In other words our results imply that a country with higher economic growth can benefit and attract more from foreign direct investment than a country with lower economic growth. Our results of this model implies that Pakistan require consistent and higher economic growth to boost up its foreign direct investment in the country.

C) ECONOMIC GROWTH AND HUMAN CAPITAL:

In subsection c, we analyze the impact of FDI, exports and human capital (literacy rate used as proxy) on economic growth. We added domestic exports in our model because exports are important channel for technology diffusion from FDI to domestic firms. We introduce the following log-log econometric model for analysis of these important variables for Pakistan. The purpose of log-log model is to achieve the constant elasticity model and minimizing the variances (Wooldridge, 2003).

$$logGDP_{Per\ capita,t} = \alpha + \beta_1 logFDI_t + \beta_2 Lit_t + \beta_3 log(FDI * Lit)_t + \beta_4 logexp_t + u_t \quad (3)$$

GDP per capita is a measure of economic growth in time t, FDI is foreign direct investment in time t, Literacy rate[1] in time t and exp shows the exports of the country in time t. The error term is u in time t. Here an interactive variables shows that FDI with human capital (literacy rate) have a significant impact on economic growth. This suggests that a country with higher human capital attract more FDI and could have a positive impact on the economic growth. Alternatively, the negative outcome implies that low human capital attract lower FDI and have a negative impact on the economic growth. In summary, FDI is conditioned upon the human capital of a country. Additionally, we introduced host economy exports (measured in $) in the model based on a study of Crespo & Fontura (2007). This suggests that domestic firms engage in exporting would increase their absorptive capacity through superior technology of MNEs. Table 5 provide summary statistics (mean, standard deviation, minimum and maximum values) of variables used in the model 3 without logged values. We can observe in Table 5 that mean values and standard deviation shows certain skewness issues. Our logarithmic transformation of model 3 is a good choice for correcting skewness (Laukkanen and Olander, 2014).

[1] We have not logged literacy rate because of already lower values, if we do so we lose this important variable from the model.

Table 5: Summary Statistics

Variables	Obs.	Mean	Std.Dev	Min	Max
GDP per capita	43	526.013	261.168	131.961	1202.09
FDI	43	768.625	1342.12	-4	5590
Literacy Rate	32	43.1565	12.5132	25.73	60
FDI*Literacy	32	55067.2	85335.0	805.436	318630
Exports	43	7788.70	6893.37	448.526	25382.6

Table 6: present the relationship between economic growth and human capital, foreign direct investment and exports. For detecting serial autocorrelation in the model we use Breusch-Godfrey Lagrange Multiplier (LM) test. This test examines the serial autocorrelation and stronger than Durbin-Watson test. As we can see in our table that this test accepted the null hypothesis which means that there is no serial autocorrelation in our model. The probability value which is 0.1540 is greater than 1 or 5 % significance level. In model 3 if the explanatory variables are correlated with the error term then least square estimators are biased and inconsistent (Hill and Adkins, 2008). This problem is also called endogeneity. However, in most of the cases the correlation between explanatory variables and the error terms are lower ($\rho_{(x,u)} < 0.20$), which indicates that the model estimates are consistent and unbiased.

Table 6: Regression analysis of model 3

Log GDP per capita	Coefficients	*t-value*
Log FDI	3.6521*** (0.5318)	6.87
Literacy rate	0.0759*** (0.0122)	6.21
Log (FDI*Literacy rate)	-3.6482*** (0.5273)	-6.92
Log Exports	0.6368*** (0.0732)	8.69
Constant	10.9318*** (1.4193)	7.70
Robust standard errors are in parenthesis		
R^2 =0.9539. *** indicates significant at 1%. Adj. R^2=0.9471 N=32 Breusch-Godfrey Lagrange Multiplier test for Autocorrelation: **x^2=2.032** **(0.1540)** H0: No Serial Autocorrelation		

In Table 6 FDI shows positive and statistically significant impact on economic growth. This finding confirms the previous research studies of Li and Liu (2005) and Ramirez (2006). This suggests that foreign firms are superior in technology and increase the stock of knowledge in the domestic economy. Similarly, we identified the positive relationship between human capita (measured as literacy rate) and economic growth. This finding indicates that a country with higher human capital would likely to have higher economic growth. However, interestingly, human capital interaction with FDI showed negative impact on the economic growth. This apparently suggests that Pakistan has low level of human capital (< 60% literacy rate) and cannot benefits from FDI at maximum level. Alternatively, this finding has failed to confirm the study of Borensztein *et al.* (1998) which stated that human capital is prerequisite

for FDI and has significant impact on economic growth. In the case of Pakistan where low level of FDI and human capital signals that more efforts are needed to improve the human capital of the country. A country with higher human capital will likely to attract and benefit more FDI. Lastly, the positive relationship between exports and economic growth suggest that exports are the important determinant of economic growth. In other words, this outcome implies that transfer of knowledge of MNEs through demonstration effects in the host market would improve the export behaviour of domestic firms. Similarly, the exports capacity of domestic firms will have higher ability to absorb the superior technology of MNEs (Crespo and Fontura, 2007).

CONCLUSION:

The paper has contributed to the existing literature by adopting new analysis approach for Pakistan using time series analysis. We examined that FDI is important determinant for economic growth. FDI benefits the domestic economy through demonstration and imitation of knowledge spillovers from MNEs to local firms. The first vector error correction model concluded that FDI is dependent on the economic growth but economic growth is not dependent on the FDI. This indicated that a stable economic growth would attract more FDI for Pakistan. The second model showed that FDI, human capital and exports determined the economic growth of Pakistan. However, the poor human capital reduced the economic growth and FDI.

This empirical study implies that Pakistan should improve its economic growth. The robust policies are required to increase the literacy rate of the country. Higher human capital will attract more FDI into the economy and may reduce the unemployment. This would increase the national output of the country and their national income level. Presently, Pakistan is going through war on terror and foreign firms are reluctant to invest. A stable and secure business environment will ultimately inject foreign direct investment into Pakistan. In contrast, the limitations of this empirical paper are as follows: it would be better to use secondary school enrolment (%) to measure human capital instead adult literacy rate. Similarly, the non availability of R&D data on Pakistan limited the scope of our paper to measure the role of absorptive capacity of domestic and its relationship with FDI. The results of this paper are specifically related to Pakistan and cannot be generalized to other countries.

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[i] This study has used co-integration analysis, unit root test and Granger causality to analyze the 15 Indian industries. The empirical study identified that FDI and economic growth is co-integrated, which suggest that FDI and economic growth have positive association. The Granger causality test showed that FDI and economic growth has two way relationships (bi-directional). For econometric model see paper.

[ii] This study has tested the unit root (non-stationary) augmented Dickey-Fuller test (ADF). Similarly, Johansen co integration test is used over Engle-Granger because of presence of more than two independent variables. For estimation error correction models (ECM) was used. For detail see paper.

[iii] In regression model an interactive variable FDI*SCHOOL (average year of schooling) have been introduced to capture the effects of absorptive capacity (technology spillovers) of host country. The result showed that absorptive capacity has positive relationship with economic growth.