

# **FDI and Economic Growth in Pakistan: A Sector Wise Multivariate Cointegration Analysis**

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## **Abstract**

Liberal economic policies have promoted economic growth via Foreign Direct Investment (FDI) around the globe. This paper investigates this proposition by resorting to sector-specific FDI and GDP to Vector Error Correction Model (VECM) within panel cointegration methodology using domestic investment, infrastructure, human capital and institutions as control variables. For this purpose, Pakistani economy is disaggregated into primary, secondary and tertiary sectors. For FDI and GDP of primary sector, various economic groups such as food, beverages, tobacco, sugar, paper and pulp, leather and leather products, rubber and rubber products are used. Similarly, for secondary sector, chemicals, pharmaceuticals and fertilizers, petro chemicals and petroleum refining, cement, basic metals, metal products, machinery other than electrical, electrical machinery, electronics, transport equipment, power, construction, mining and quarrying, oil and gas exploration economic groups are used. For tertiary sector, wholesale and retail trade, tourism, transport, storage and communication, financial businesses, social and private services are used. Moreover, infrastructural and institutional index is derived using Principle Component Analysis (PCA). Although, the panel approach signified both long run and short run relationship between FDI and GDP but sector wise relationships are dismal. Only FDI of primary sector showed short run relationship with respective GDP. Moreover, no cross sector spillover exists between primary, secondary and tertiary sectors of Pakistan.

**Keywords:** Foreign Direct Investment, Economic Growth, Time Series Model, Panel Data Model

**JEL Codes:** F23, O4, C31, C33

## **1. Introduction**

From last three decades, minimal trade barriers along with progressive liberalization economics policies have promoted globalization. Multinational enterprises (MNEs) defined by centralized authority, international operations and massive new knowledge have complement the evolution of international economy (Dunning, 1989). The liberal economic policies have expressively contributed in advanced economies (Tintin, 2012). This liberalized thinking was complemented by contemporary economic setup in these economies. Free trade via liberalized economic policies, massive physical and human capital was boosted achieving massive growth rates.

In 2000, 4.3% of global GDP was held by world's largest 100 MNEs. On the whole, the market value was 6.3 trillion US\$. The intrusion of FDI in developing world has also promoted economic growth. But the existing literature on economic growth highlights local structural composition as a hurdle in the path of their economic growth (Perez, 1985). Similarly, the dependency upon developed world's knowledge also complements the structural problem of developing economies. Moreover, the domestic absorptive capacity of developing economies remains a point of concern for new knowledge intake from developed world (Adler, 1965). To absorb new knowledge, efficient domestic human capital and infrastructure of the host economy is a necessary condition (Narula & Marin, 2003). These threshold requirements limit absorptive capability hindering the process of technology diffusion and growth in developing economies (Nelson & Phelps, 1966). The developing economies remain stuck in vicious circle of low growth rates, poor health of population, incompetent training and low work prospects. Therefore, primary sector is a central catalyst to growth. The primary sector consists of inefficient labor, minimal incomes and labor focused mechanisms for production (Lewis, 1954). Additionally, this

primary sector has an inadequate magnitude of land for production. Therefore, this dependence upon primary sector leads to skeptical growth in developing economies.

The inefficient traditional sector also hinders the growth of other sectors. The provision of cheap raw materials to secondary sector becomes limited mainly due to inefficient primary sector. An inefficient primary sector also burdens secondary sector via excessive unproductive labor supply. Therefore, the up gradation of primary sector is necessary for developing economies. It can promote new industries along with expansion of prevailing ones. This expansion of secondary sector also expand traditional sector because the demand for raw materials grows significantly over time. Similarly, this growth also links with tertiary sector because the demand for services in both these sectors would have a significant impact on tertiary sector. To generate this linkage between sectors, the provision of FDI is pivotal for developing economies. Because it can assist via new knowledge, improved capability of human capital and increased production capability etc. The interconnection between sectors can be promoted the provision of foreign capital. The primary sector of developed economies received 157 billion US\$ as FDI in 2005 (FAO Investment Centre). The stable inflow of investment in primary sector also enhances capital flow to secondary sector (Lewis, 1954). But African and Asian economies received very meager amount of FDI in comparison of advanced ones. Over the last decade, advanced economies recorded more FDI inflows to secondary against primary sector. This shift of investment towards secondary sector is accordance to Lewis (1954) description of linkage with between primary. The similar pattern of FDI was also recorded by African and Asian economies. The shift to secondary sector comes due to growth of primary sector. As primary sector grows, the greater availability of cheap inputs encourages finished goods and services.

As secondary sector grows, it is complemented by tertiary sector (Berman, Bound, & Griliches, 1994). The first stage of value chain requires research and development (R&D) activities followed by retailing and repairs etc. Tertiary sector provides wide-ranging activities like transportation, education, financial services, trade, information and technology etc. used by manufacturers during production. In 2008, half of the business services were used by secondary sector. While in 2011, the services intensity for electronic products raised to 48% which was only 25% in 2008. Moreover, in 2010, tertiary sector recorded 268 billion US\$ of FDI in advanced economies, while Asia and Africa only received 9 billion US\$. Despite massive influx of FDI in all three sectors, developed economies maintained a growth rate of 2% by 2012 whereas; developing economies showed a growth rate of 4% (World Development Indicators (WDI)). These growth rates indicate that foreign capital has improved the domestic capabilities in developing economies (Agmon & Hirsch, 1979).

For 2012, Pakistan recorded an impressive growth rate of 4.4% (KPMG, 2013). Pakistan is a top liberal economy in South Asia. With an open economy having rapid paced private sector, Pakistan allows 100% foreign equity in its secondary sector. However, the primary sector provides employment to 45% labor force but tertiary sector has a massive share of 58% in Pakistan's GDP. Still, the primary sector is the driving force of the economy. In 2013, primary sector had a growth rate of 3.3%, 3.5% of secondary sector and 3.7% of tertiary sector. Similar to other economies, FDI inflows in tertiary sector has shown a massive increase as compared to other sectors of Pakistan's economy. Like other developing economies, the primary sector of Pakistan's economy is characterized by low productivity, inefficient labor, energy deficiencies and fewer enticements. The secondary sector is composed of automotive, infrastructure, commercial machinery, construction, pharmaceuticals, textiles and electronics. Like the global

economy, tertiary sector have also grown rapidly in last decade. Pakistan's tertiary sector consists of trade, financial services, oil and gas exploration and technology. In 2012, the financial sector had assets of 10 billion rupees. Oil and gas exploration received FDI of 570 million US\$. While infrastructure has a share of 11% in total GDP. The IT sector received 12 billion US\$ of investment in last seven years.

Pakistan continuously promotes investor friendly policies to attract MNEs. Pakistan facilitates foreign investors via full repatriation of profits, dividends and capital gains. In terms of legal protection, Foreign Private Investment Act 1976 and Protection of Economic Reforms Act 1992 focuses on removing equity caps on financial services, unnecessary regulations, ensures transparency and quality inputs to foreign investors. However, the existing literature on FDI in Pakistan is contemptuous. The studies by Iqbal, Shaikh, and Shar (2010), Ghazali (2010), N. Ahmad, Hayat, Luqman, and Ullah (2012), M. H. Ahmad, Alam, Butt, and Haroon (2003) and Dutta and Ahmed (2004) provides empirical evidence of role of FDI in Pakistan but a concrete evidence is still missing. The study by Khan and Khan (2011) used similar approach as used in this paper but estimated bivariate and gross effect estimation which isn't a comprehensive analysis of FDI growth nexus in case of Pakistan. The paper targets three major issues: first, FDI-growth nexus in case of Pakistan by panel data approach. Second, how primary, secondary and tertiary sectors are affected by their share of FDI? Last, to investigate the existence of cross sector between Primary, Secondary and Tertiary sector. For this purpose, the time span of 1997-2013 is targeted because of data availability of industry specific FDI and GDP at State Bank of Pakistan (SBP). This study also uses domestic investment, human capital, infrastructure and institutions as other explanatory variables.

This paper is divided into five sections. The second section represents the literature review. The third section is of data and methodology used in this research. The fourth section shows empirical outcomes. The last section represents conclusion and policy implication of this research.

## **2. Literature Review**

The presence of foreign direct investment (FDI) can be found even in 2500BC. Back then, Sumerian merchants controlled their overseas commerce through foreign men. The expansion of East India Company in 1600 and the existence of Virginia Company by 1606 at Jamestown, the first foreign direct investment in America explain the presence of foreign investment as a concept in human history (Wilkins, 1970). The industrial revolution prompted the need of foreign investment and trade to increase production efficiency (Hussain, 2004).

By 19<sup>th</sup> century, European firms became well-known in Asia, Latin America and Africa. European industries moved their capital abroad for cheap raw materials and higher returns (Hobson, 1914). The neo-classical trade theory based on Heckscher and Ohlin model also explains the capital movement for higher returns. This traditional theory of investment is linked with ‘differential rate of return hypothesis’. The higher expectation of capital return motivates foreign investment in a developing economy (Hufbauer, 1975; Nurkse, 1935). In addition, cheap availability of raw materials for higher returns is complemented by ‘market size hypothesis’. A firm increases investment in response to expected sales in a developing economy (Markowitz, 1959; Tobin, 1958). The creation of multinational enterprises (MNEs) is primarily linked to economies of scale, nonmarketable technology, management and diversification of production limiting competition in host economies (Hymer, 1976). Another justification of foreign investment can be done through ‘product cycle hypothesis’. An innovating firm in accordance to

demand at home produces new product. Then, this new product is exported to other host economies because the maturity of a new product at home forces a firm to invest overseas (Agmon & Hirsch, 1979; Vernon, 1966). MNEs create new knowledge and upgrades domestic labor, reducing cost of production in host economies (Buckley & Casson, 1976).

On the other hand, host economies prefer resource and efficiency seeking FDI in their labor intensive economy. It improves technical skills of domestic labor along with infrastructure (Conner, 1991). Moreover, MNEs prefer regions having social, political and economic uniformity (Dunning, 1980). These united markets provide common communication infrastructure, trade patterns, availability of cheap raw materials and networking structure to MNEs. The MNEs of Europe followed this regional pattern in Latin America, Africa and Asia to exploit low-cost inputs for global integration (Dunning, 1998). The customary factors did play a critical role in the progress of FDI (Reuber, 1973) but tax regulation and political stability also influenced investment decisions especially in developing world (Dunning & Enterprises, 1993). The unprecedented growth of globalization marginalized idiosyncratic factors such as cheap inputs and regional uniformity against poor political situation and economic policies of developing world (UNCTAD, 1997). In terms of low trade barriers, MNEs frolicked significant share in the growth of developing economies. During 1991-1996, 100 economies adopted 599 liberalizations while only in 1997, 151 liberalizations changes accrued in 76 economies, mostly Asian. This increase in trade liberalization policies demanded sufficient infrastructure, steady administrative and economic milieu, skilled human capital, low-cost inputs, and rule of law as prerequisites (UNCTAD, 1997). Ultimately, MNEs have to extemporize in new markets to race with their opposing investors. This promotes growth and creates value addition. This economic activity increases wages and competition. Eventually, MNEs look for more FDI destinations with

similar prerequisites (Jawahar & McLaughlin, 2001). The recurrence of this cycle will result in latest locations, creating new rivalries along with the probe of new prospective regions for investment.

Given the conceptual understanding, post liberalization period of developing economies empirically proves FDI led growth nexus (Blonigen & Wang, 2004; Khawar, 2005; Lim, 2001; Lipsey, 2004). This optimistic view is supported by certain threshold levels; efficient domestic labor, infrastructure and law and order situation etc. As various spillovers are associated with FDI, these thresholds complement the growth path of developing economies (Borensztein, De Gregorio, & Lee, 1998). Recent studies showed the existence of FDI-growth nexus in developing economies (Basu, Chakraborty, & Reagle, 2003; Hansen & Rand, 2006; Tadesse & Ryan, 2005). Being a composite bundle, the impact of FDI is manifold in developing economies (Balasubramanyam, Salisu, & Sapsford, 1996; De Mello, 1999). But various empirical studies did focus upon export promotion due to FDI led growth (Rahmaddi & Ichihashi, 2012; Tadesse & Ryan, 2005). Although, which sector's exports should increase is debatable but most empirical studies stress upon manufacturing and services exports due to FDI (Castejón & Woerz, 2006; Ramasamy, Yeung, & Laforet, 2012) because, manufacturing and services are expected to produce finished goods and services as compared to primary sector in developing economies. Most developing economies are dependent upon primary sector. Being characterized by abundance labor, lower efficiency and low wages, primary sector provides raw materials to secondary sector (Lewis, 1954). It also provides numerous opportunities for FDI. FDI inflows to primary sector tend to increase productivity through processed food items (Gow & Swinnen, 1998; Hawkes & Hawkes, 2005). It also results in output and yield increase. The expansion of primary sector does affect secondary sector as well (Wachter, Gordon, Piore, & Hall, 1974). As

primary production increases, more cheap raw materials are available to secondary sector. Then, the influx of FDI to secondary sector raises domestic market's productivity and thus economic growth (Banga, 2004; Elu & Price, 2010; Vahter, 2010). The MNEs have to transfer knowledge to its domestic counterparts in order to capture new market. At first, domestic producers might not be able to compete with MNEs but, knowledge transfer will help the natives to compete in the long run (Javorcik, 2004). This knowledge transfer will increase the manufacturing productivity through new production techniques and decreased factor prices creating a direct linkage between primary and secondary sector. As domestic manufacturing market become technology intensive to compete with MNEs by investing in R&D activities, more FDI takes place (Guo, Gao, & Chen, 2013; Park, 2004; Simões & Simões, 1988). On the other hand, services sector is also embedded in manufacturing value chain (Weill, 1992). The manufacturing sector stresses upon sourcing of inputs and marketing through electronic media, creating interdependence with services sector. Moreover, the linkages with manufacturing sector are important for sustainable employment in the economy (Park, 2004). This growth of services sector attracts FDI creating more linkages with manufacturing sector (Kolstad & Villanger, 2008). FDI to services can complement manufacturing sector's growth. As services grow, it raises manufacturing sector's productivity through R&D activities, operational management such as production and distribution services (Carree & Thurik, 2003).

Being a developing economy, Pakistan adopts investor attractive policies, offering complete return on capital and profits. MNEs are revered with Foreign Private investment Promotion and Protection act of 1976 and Protection of Economic Reforms act of 1992. Pakistan focuses on minimizing process of doing business, provision of business infrastructure and tax liberties for foreign investors (KPMG, 2013). The existing literature about the role of FDI in

Pakistan mainly targets trade (Dutta & Ahmed, 2004; Iqbal et al., 2010). Moreover, the literature shows a long run relationship between of FDI inflows and economic growth of Pakistan (Ahmad et al., 2003, Mughal, 2008, Khan & Khan, 2011, Zeb et al., 2013, Aqeel & Nishat, 2004, Rahman, 2014, Younus et al. (2014), Abdullah et al., 2015 & Dar et al., 2015). FDI inflows also promote domestic investment and exports of Pakistan. (Ahmad et al., 2012; Ghazali, 2010). The influx of FDI along with financial development also promotes economic growth (Shahbaz & Rahman, 2012). Similarly, FDI collaborates with domestic investment to promote economic growth (Dar et al., 2015). On the other hand, Falki (2009), Shaheen et al. (2013) & Saqib et al. (2013), showed a negative relationship between FDI and economic growth in case of Pakistan. The existing studies on Pakistan are of time series dimension, targeting an overall impact of FDI on trade, domestic investment and economic growth. This study tends to focus on a new dimension of analyzing FDI-growth nexus. This study targets the FDI led growth hypothesis by sector wise analysis of Pakistan.

### **3. Data and Methodology**

For years, FDI has been a premier source of investment in Pakistan. It out spaces portfolio investment and directly impacts the economic growth of Pakistani economy (Ghazali, 2010). Post liberalization period show huge influx of FDI in all sectors of Pakistan (Khan & Khan, 2011). Although, primary sector had a significant share in Pakistani national income but, it was used to facilitate secondary sector during different government regimes. Having a direct linkage between them, both sectors received FDI respectively. But being a developing economy, influx of FDI also recorded steep decline halting growth, mainly due to multidimensional uncertainties in Pakistan (Khan & Khan, 2011). This study records Pakistani economy into three sectors; primary, secondary and tertiary sector. Each sector is comprised of different economic

groups. For primary sector, food, sugar, beverages and tobacco, paper and pulp, rubber and rubber products and leather and leather products are included. For secondary sector, chemicals, pharmaceuticals and fertilizers, petro chemicals and petroleum refining, cement, basic metals, metal products, machinery other than electrical, electrical machinery, electronics, transport equipment, power, construction and mining and quarrying with oil and gas exploration are included. For tertiary sector, financial businesses, tourism, transport, wholesale and retail trade, storage and communication, social and private services are included. The selected sample period is 1997-2013. While, the data used was collected from State Bank of Pakistan (SBP), Economic Survey of Pakistan (2012-2013), Pakistan Bureau of Statistics (PBS), World Governance Indicators (WGI) and United Nation Development Program (UNDP) reports.<sup>1</sup>

#### **(a) Variable Definitions**

The definitions of different variables used in this research are defined below:

- (i) Gross Domestic Product (GDP): GDP is a measure of economic activity of an economy. For a specific period of time, it highlights the total market value of both goods and services within geographical boundary of an economy. Here, it is subdivided into primary, secondary and tertiary sectors of Pakistani economy.<sup>2</sup>
- (ii) Foreign Direct Investment (FDI): It represents a long term relationship between the direct investor and resident entity. The direct investor of home economy owns ten percent or more of the ordinary shares or voting power in resident entity of host economy. It includes flows of funds, reinvestment of profits, intercompany debt transactions, property patents and technology transfer etc.<sup>3</sup>
- (iii) Domestic Investment (DI): Gross Fixed Capital Formation (GFCF) is used to explain domestic investment. It represents new and existing resources by households, firms

- and governments. But, it shows a gross value as it excludes disposals of fixed assets within an economy. It only includes net improvement in land value but, excludes mineral reserves, water forests and subsoil assets etc.
- (iv) Infrastructure (INF): Infrastructure can be defined as the basic facilities required for the working of any economy. It can be categorized into physical and organizational services to enhance efficiency of an economy. For primary sector, we have used total cropped area, credit disbursement (in million rupees), water availability to crops, import of insecticides, production of tractors, number of tube wells, fertilizers off take and energy consumption such as petroleum, gas and electricity for primary production as infrastructural indicators. For secondary sector, energy consumption such as electricity, gas and petroleum for secondary production are used. For tertiary sector, education expenditure (% of GNI), health expenditure (% of GDP), total number of mobile phones, law and order expenditures (in million rupees), quantity of buses and length of roads was used as infrastructural indicators.<sup>4</sup>
- (v) Human Capital (HC): Human Capital represents the skills possessed by individuals such as knowledge and experience etc. Here, Human Development Index (HDI) is used as Human Capital. While, HDI is the combination of knowledge, standard of living and life expectancy at birth.
- (vi) Institutions (INST): Institutions are defined as formal rules and informal norms that structure human interaction through legitimate enforcement mechanism. Where, human defined constraints are formal rules while, informal norms are imbedded cultural norms of a society. Institutions ensure all kinds of transactions which help to

preserve life. For an institutional index, indicators such as political stability, control of corruption, voice and accountability and rule of law were used.<sup>5</sup>

(b) Approach

Although, the contemporary hypothetical and pragmatic literature has emphasized on feedback mechanism between FDI and economic growth in both long run and short run dynamics, but empirical evidence on sector wise analysis is unfounded in case of Pakistan. In addition, existing literature does not focus on FDI led growth in detail. On this basis of time series analysis, the unit root characteristics in panel data can subject to spurious regression. A comprehensive analysis is needed to complement policy structure regarding FDI through cointegration between FDI and economic growth in both long run and short run in case of Pakistan.

We formulate a panel framework based on three cross sections (primary, secondary and tertiary) with seventeen time dimensions. Our empirical analysis is based on three steps (Basu et al., 2003). Beginning from stationarity of variables, the existence of unit root prompted to check for long run cointegration between respective variables (Pedroni, 2004). Given the existence of long run cointegration across the panel, we look for error correction model to uncover granger causality in the third step of our estimation. Comparing with the existing literature, our analysis of panel data points out a major new dimension about FDI led growth hypothesis for Pakistan but, it also has certain limitations as well. A steady series of sector specific FDI data is only available for time period 1997-2013. Relatively shorter time dimension might not be enough to fully capture the long run impact of FDI. But, given the data restriction, our focus is on attribution only (Clements & Taylor, 2003).

Meanwhile, our analysis focuses on multivariate framework by including auxiliary variables (domestic investment, infrastructure, human capital and institutions), for a detailed explanation of FDI-growth link (Chakraborty & Nunnenkamp, 2008). One significant contribution is the heterogeneity of our link across three sectors via panel cointegration framework. By this way, we also tend to identify other growth determinants as well for Pakistan. Lastly, the long run cointegration is a necessary condition for checking long run causality. Therefore, we rely on standard granger causality procedure as compared to Toda and Yamamoto's test which don't rely on pre-testing because it is appropriate for sector specific panel cointegration framework (Chakraborty & Nunnenkamp, 2008). The unit root property of panel analysis was examined using Levin, Lin & Chu (LLC), Im, Pesaran & Shin (IPS) and Madala & Wu (MU) unit root tests. LLC mainly is an extension of Dickey Fuller (DF) test. It allows for both unit specific fixed effect and unit specific time trend. It assumes cross sectional independence of individual processes. IPS test assumes for same time periods for all cross sections. It means that IPS test is ideal for balanced panel data analysis. IPS test is based upon the average of individual unit root test statistics. MU test is ideal for unbalanced panel data analysis. It does not allow for average of DF statistics. In order to test for unit root in time series analysis, Augmented Dickey Fuller (ADF) test is used. It includes a lagged term of dependent variable to remove autocorrelation. For panel cointegration, we resort to Pedroni cointegration test which allows for multivariate cointegration analysis in panel data. It consists of seven statistics in which four are based on pooling along within dimension while three are based on between dimension. The within dimension means an average test statistic of cointegration across different cross sections and between dimension means average is done in pieces for each cross section. These statistics are as follows:

(i) Panel v-statistic

$$T^2 M^{3/2} Z_{vNMT} = \frac{T^2 M^{3/2}}{\left( \sum_{i=1}^M \sum_{t=1}^T L_{11i}^{-2} \boldsymbol{\varepsilon}_{it}^2 \right)} \dots\dots\dots (i)$$

(ii) Panel ρ-statistic

$$T\sqrt{M} Z_{\rho NT} = \frac{T\sqrt{M} \left( \sum_{i=1}^M \sum_{t=1}^T L_{11i}^{-2} (\boldsymbol{\varepsilon}_{it-1}^2 \delta \boldsymbol{\varepsilon}_{it}^2 - \lambda_i) \right)}{\left( \sum_{i=1}^M \sum_{t=1}^T L_{11i}^{-2} \boldsymbol{\varepsilon}_{it}^2 \right)} \dots\dots\dots (ii)$$

(iii) Panel t-statistic (non-parametric)

$$Z_{iMT} = \sqrt{\sigma_{MT}^2 \sum_{i=1}^M \sum_{t=1}^T L_{11i}^{-2} \boldsymbol{\varepsilon}_{it-1}^2 \left( \sum_{i=1}^M \sum_{t=1}^T L_{11i}^{-2} (\boldsymbol{\varepsilon}_{it-1}^2 \delta \boldsymbol{\varepsilon}_{it}^2 - \lambda_i) \right)} \dots\dots\dots (iii)$$

(iv) Panel t-statistic (parametric)

$$Z_{iMT} = \sqrt{\sigma_{MT}^{*2} \sum_{i=1}^M \sum_{t=1}^T L_{11i}^{-2} \boldsymbol{\varepsilon}_{it-1}^{*2} \left( \sum_{i=1}^M \sum_{t=1}^T L_{11i}^{-2} (\boldsymbol{\varepsilon}_{it-1}^{*2} \delta \boldsymbol{\varepsilon}_{it}^{*2} - \lambda_i) \right)} \dots\dots\dots (iv)$$

(v) Group ρ-statistic (parametric)

$$T\sqrt{M} \bar{Z}_{\rho NT} = T\sqrt{M} \frac{\sum_{t=1}^T (\boldsymbol{\varepsilon}_{it-1}^2 \delta \boldsymbol{\varepsilon}_{it}^2 - \lambda_i)}{\sum_{i=1}^M \left( \sum_{t=1}^T \boldsymbol{\varepsilon}_{it-1}^2 \right)} \dots\dots\dots (v)$$

(vi) Group t-statistic (non-parametric)

$$\sqrt{M} \bar{Z}_{iMT} - 1 = \sqrt{M} \sum_{i=1}^M \left( \sqrt{\sigma_i^2 \sum_{t=1}^T \boldsymbol{\varepsilon}_{it-1}^2} \right) \sum_{t=1}^T (\boldsymbol{\varepsilon}_{it-1}^2 \delta \boldsymbol{\varepsilon}_{it}^2 - \lambda_i) \dots\dots\dots (vi)$$

(vii) Group t-statistic (parametric)

$$\sqrt{M} \bar{Z}_{iMT}^* - 1 = \sqrt{M} \sum_{i=1}^M \left( \sqrt{\sigma_i^{*2} \sum_{t=1}^T \boldsymbol{\varepsilon}_{it-1}^{*2}} \right) \sum_{t=1}^T (\boldsymbol{\varepsilon}_{it-1}^{*2} \delta \boldsymbol{\varepsilon}_{it}^{*2}) \dots\dots\dots (vii)$$

Given the existence of cointegration between the variables, Fully Modified Ordinary Least Square (FMOLS) is used for long run cointegration vectors. It corrects the common problems that prevail in long run relationship in the form of serial correlation and endogeneity of

regressors. Similarly, it is unbiased and fully efficient asymptotically (Philips & Hansen, 1990).

A general FMOLS model is as follows:

$$B_{FM} = \left[ \sum_{i=1}^N \sum_{t=1}^T (xit - \bar{x}t)' \right] \left[ \sum_{i=1}^N \left( \sum_{t=1}^T (xit - \bar{x}i) \hat{y}_{it} + T \hat{\Delta}_{\mu\nu} \right) \right] \dots\dots\dots(viii)$$

Similarly, for time series analysis, bivariate analysis is estimated using Engle-Granger cointegration approach. It is better in the sense that it provides an unbiased relationship between the variables of interest.

#### 4. Empirical Outcomes

(i) Unit root test

The provision of cross section effects with heterogeneity across panel has provided weight to unit root testing in panel data analysis. For model selection, no intercepts with any trends, heterogeneous intercepts and with no trends are optional. Here, using heterogeneous intercepts with no trends (M<sub>1</sub>) and heterogeneous intercepts with trends (M<sub>2</sub>) models, we test for the null hypothesis of nonstationarity for the referred variables. For this purpose, four residual based tests are used given by Levin, Lin, and Chu (2002), Im, Pesaran, and Shin (2003) and Maddala and Wu (1999) shown in table 1. Whereas, Levin, Lin, Chu & Shang statistics assumes homogeneous unit root process while, remaining statistics assume heterogeneous unit root process.

For both heterogeneous intercepts with no trends (M<sub>1</sub>) and heterogeneous intercepts with trends (M<sub>2</sub>), all the variables show the rejection of null of nonstationarity at first difference. Therefore, we can conclude that all referred variables have unit root properties or integrated at order one or I(1).

**Table 1. Panel Unit Root Test**

Variables	Levin-Lin & Chu t-rho-stat	Im, Pesaran & Shin (IPS) w-stat	Maddala & Wu (MW)		Decision about H <sub>0</sub>
			ADF fisher chi-square	PP fisher chi-square	
<b>M<sub>1</sub>: Heterogeneous intercepts with no trends</b>					
D(GDP)	-3.89 <sup>a</sup>	-3.61 <sup>a</sup>	23.05 <sup>a</sup>	35.74 <sup>a</sup>	Reject
D(FDI)	-3.04 <sup>a</sup>	-3.66 <sup>a</sup>	23.32 <sup>a</sup>	34.26 <sup>a</sup>	Reject
D(DI)	-1.54 <sup>c</sup>	-2.24 <sup>a</sup>	14.84 <sup>a</sup>	12.48 <sup>c</sup>	Reject
D(INF)	-0.96	-1.38 <sup>c</sup>	12.60 <sup>a</sup>	14.71 <sup>a</sup>	Reject
D(HC)	-2.28 <sup>a</sup>	-2.50 <sup>a</sup>	16.08 <sup>a</sup>	15.90 <sup>a</sup>	Reject
D(INS)	-5.11 <sup>a</sup>	-3.52 <sup>a</sup>	23.24 <sup>a</sup>	19.20 <sup>a</sup>	Reject
<b>M<sub>2</sub>: Heterogeneous intercepts with trends</b>					
D(GDP)	-3.04 <sup>a</sup>	-2.27 <sup>a</sup>	15.02 <sup>a</sup>	26.00 <sup>a</sup>	Reject
D(FDI)	-2.04 <sup>a</sup>	-2.41 <sup>a</sup>	16.00 <sup>a</sup>	23.82 <sup>a</sup>	Reject
D(DI)	-2.89 <sup>a</sup>	-1.17	9.79	8.00	Reject
D(INF)	-2.12 <sup>a</sup>	0.82	4.49	23.86 <sup>a</sup>	Reject
D(HC)	-2.66 <sup>a</sup>	-1.86 <sup>a</sup>	12.37 <sup>c</sup>	12.37 <sup>c</sup>	Reject
D(INS)	-4.07 <sup>a</sup>	-2.23 <sup>a</sup>	15.30 <sup>a</sup>	12.76 <sup>a</sup>	Reject
Source: Author's own estimates Here, a and c represents significance at 1% and 10%					

(ii) Panel cointegration test

After the confirmation of unit root properties in referred variables, the next step is to look for common stochastic trend or cointegration between them. For this purpose, Pedroni (1999) cointegration approach is used allowing common long run relationships of referred variables. It allows multiple heterogeneous cointegrating vectors, preferred over traditional panel cointegrating techniques with the null hypothesis of ‘no cointegration’.

The targeted cointegration relationship has following form:

$$GDP_{it} = \beta_0 + \beta_1 FDI_{it} + \beta_2 DI_{it} + \beta_3 INF_{it} + \beta_4 HC_{it} + \beta_5 INST_{it} + \varepsilon_{it}$$

here,  $\beta_0$  represents sector specific effects while  $\varepsilon_{it}$  shows residuals specifying deviancy from steady state relationship. The panel cointegration relationship checks for the stationarity of extracted residuals at level or I(0), signifying long run cointegration between our model. On the

other hand, Pedroni (1999) refers seven different statistics divided into two categories to examine this long run cointegration. The first category includes four statistics based on pooling autoregressive coefficients (within dimension) across all the cross sections of the panel. While, the second category includes three statistics based on average of autoregressive coefficients (between dimension) for each cross section of the panel. For within dimension category, the

Table 2. Pedroni Cointegration Test

<b>H<sub>0</sub>: No cointegration between the variables</b>	
<b>Within Dimension M1: Heterogeneous intercepts with no trends</b>	
<b>Statistics</b>	
Panel V-Stat	-0.67
Panel Rho-Stat	1.60
Panel PP-Stat	1.13
Panel ADF-Stat	1.34
<b>Between Dimension</b>	
<b>Statistics</b>	
Group Rho-Stat	2.39
Group PP-Stat	-1.59 <sup>c</sup>
Group ADF-Stat	0.73
Decision about H <sub>0</sub>	Weakly Reject
<b>Within Dimension M2: Heterogeneous intercepts with trends</b>	
<b>Statistics</b>	
Panel V-Stat	4.21 <sup>a</sup>
Panel Rho-Stat	1.97
Panel PP-Stat	-3.7 <sup>a</sup>
Panel ADF-Stat	-2.4 <sup>a</sup>
<b>Between Dimension</b>	
<b>Statistics</b>	
Group Rho-Stat	2.5
Group PP-Stat	-6.3 <sup>a</sup>
Group ADF-Stat	-2.6 <sup>a</sup>
Decision about H <sub>0</sub>	Strongly Reject
Source: Author's own estimates	
Here, <sup>a</sup> and <sup>c</sup> represents significance at 1% and 10%	

positive value of first stat with large negative values of two statistics reveals presence of long run cointegration across all three cross sections. Similarly, large negative values of two between

dimension statistics also show the presence of long run cointegration between our model for each cross sectional unit of the panel. Table 2 reveals five significant test statistics at one percent. Therefore, we conclude that FDI, domestic investment, infrastructure, human capital and institutions are correlated with GDP in the long run.

(iii) Fully Modified Ordinary Least Square (FMOLS) test

Given that the referred variables are cointegrated, showing significant relationship but the results still can be misleading due to spurious regression problem (Phillips & Hansen, 1990). Therefore, fully modified ordinary least square (FMOLS) test proposed by (Pedroni, 2000) is used to tackle serial correlation and endogeneity of regressors. Similarly, it is unbiased and asymptotically efficient. Given the results in table 3, foreign direct investment (FDI), infrastructure (INF) and institutions (INS) showed a positive and significant relationship between

Table 3. Fully modified ordinary least square (FMOLS) test

<b>Variables</b>	<b>Coefficients</b>
Foreign Direct Investment (FDI)	8.7 <sup>a</sup> (8.4)
Domestic Investment (DI)	-3.6 <sup>a</sup> (-7.03)
Infrastructure (INF)	1440439 <sup>a</sup> (17.98)
Human Capital (HC)	-349289.10 <sup>a</sup> (-8.2)
Institutions (INS)	114480.5 <sup>a</sup> (3.8)
<b>Source:</b> Author's own estimates Here, <sup>a</sup> represents significance at 1%	

economic growth of Pakistan. On the other hand, domestic investment and human capital showed negative relationship with Pakistan's growth.

(iv) Vector Error Correction Model (VECM)

After the confirmation of long run relationship between respective variables, we look for causality between them. Firstly, residuals are extracted from the cointegrated model. Then, using these residuals, a dynamic error correction model is estimated. The results in table 4 show a bidirectional short run causality of FDI, DI and institutions with GDP of Pakistan. Similarly, there exists a unidirectional causality running from infrastructure and human capital to GDP of Pakistan. Similarly, the error correction term signifies the existence of long run relationship between our variables of interest.

Table 4. Vector Error Correction Model (VECM)

	Short Run					Long Run	
Explained variables	$\Delta$ GDP	$\Delta$ FDI	$\Delta$ DI	$\Delta$ INF	$\Delta$ HIC	$\Delta$ INS	ECT(-1)
$\Delta$ GDP	-	10.2 <sup>a</sup>	7.0 <sup>a</sup>	8.3 <sup>a</sup>	3.5 <sup>a</sup>	1.6	-0.12 <sup>a</sup>
$\Delta$ FDI	22.2 <sup>a</sup>	-	7.8 <sup>a</sup>	0.3	0.9	156.2 <sup>a</sup>	-0.99 <sup>b</sup>
$\Delta$ DI	14.8 <sup>a</sup>	45.9 <sup>a</sup>	-	5.0 <sup>b</sup>	21.8 <sup>a</sup>	8.2 <sup>a</sup>	-0.53 <sup>b</sup>
$\Delta$ INF	0.1	0.3	0.2	-	0.6	0.5	-0.44 <sup>c</sup>
$\Delta$ HIC	0.4	0.1	1.0	0.7	-	0.6	-0.26 <sup>c</sup>
$\Delta$ INS	14.2 <sup>a</sup>	4.0 <sup>b</sup>	1.8	1.2	0.9	-	-0.97 <sup>a</sup>

**Source:** Author's own estimates  
Here, ECT (-1) is error correction term. <sup>a</sup> is significance at 1%, <sup>b</sup> at 5% and <sup>c</sup> at 10%.

(v) Sector wise Causality

After exploring the causal relationship of referred variables in our panel, we focus on finding the nature and magnitude of causal relationships in all cross sections of our study. For primary sector, the results in table 5 reveal bidirectional short run causality between primary sector FDI and GDP. Similarly, for secondary sector, the results of table 6 reveal no short run or long run relationship between secondary sector FDI and GDP. Lastly, for tertiary sector, no short run or long run relationship was found between tertiary sector FDI and GDP. The results are

somewhat surprising because post reform period registered tertiary sector as the largest recipient of FDI in Pakistan. Similarly, all three sectors show a long run relationship from GDP to FDI. Moreover, GDP of all sectors tends to develop a long run relationship with infrastructure. But in short run, only GDP of tertiary sector tends to cause infrastructure. The sector wise results also show that human capital tends to develop a long run relationship only with GDP of tertiary sector. Lastly, economic growth in primary and secondary sector has a long run relationship with domestic institutions. As these sectors grow, the performances of domestic institutions also improve.

Table 5. Sector wise VECM

Primary			Secondary			Tertiary		
Hypothesis	W-Stat	ECT(-1)	Hypothesis	W-Stat	ECT(-1)	Hypothesis	W-Stat	ECT(-1)
<b>FDI → GDP</b> <b>GDP → FDI</b>	3.18 <sup>c</sup> 5.05 <sup>a</sup>	0.027 -0.98 <sup>a</sup>	<b>FDI → GDP</b> <b>GDP → FDI</b>	0.08 0.05	0.03 -0.60 <sup>a</sup>	<b>FDI → GDP</b> <b>GDP → FDI</b>	0.41 0.75	-0.001 -0.64 <sup>b</sup>
<b>DI → GDP</b> <b>GDP → DI</b>	0.23 0.37	-0.03 -1	<b>DI → GDP</b> <b>GDP → DI</b>	0.51 1.00	-0.06 -0.05 <sup>a</sup>	<b>DI → GDP</b> <b>GDP → DI</b>	0.96 0.03	0.13 -0.67 <sup>b</sup>
<b>INF → GDP</b> <b>GDP → INF</b>	1.00 1.80	-0.13 -0.75 <sup>a</sup>	<b>INF → GDP</b> <b>GDP → INF</b>	0.37 16.33	-0.85 -0.58 <sup>a</sup>	<b>INF → GDP</b> <b>GDP → INF</b>	0.86 4.54 <sup>a</sup>	-0.20 -0.36 <sup>c</sup>
<b>HC → GDP</b> <b>GDP → HC</b>	1.43 0.55	0.72 -0.10	<b>HC → GDP</b> <b>GDP → HC</b>	0.13 0.10	-2.1 0.24	<b>HC → GDP</b> <b>GDP → HC</b>	0.84 0.09	-0.94 <sup>c</sup> -0.54
<b>INS → GDP</b> <b>GDP → INS</b>	1.13 0.04	-0.13 -0.74 <sup>c</sup>	<b>INS → GDP</b> <b>GDP → INS</b>	0.12 0.04	0.04 -0.65	<b>INS → GDP</b> <b>GDP → INS</b>	4.14 <sup>c</sup> 0.14	-0.1 <sup>a</sup> -0.74 <sup>c</sup>

**Source:** Author's own estimates  
Here, ECT (-1) shows error correction term. \*\*\* is significant at 1%, \*\* at 5% and \*at 10% respectively.

(vii) Cross Sector Spillover test

Given the results about the impact of FDI overall and sector wise in economic growth of Pakistani economy, we also focus upon the cross sector impact between primary, secondary and tertiary sectors. The VECM results show no evidence of short causality and long run relationship

between FDI of a particular sector and economic growth of other sector. However, growth of primary sector has a long run relationship with FDI inflows to secondary and tertiary sectors. It means that as primary sector grows, it attracts more FDI in secondary and tertiary sectors. Similarly, growth of secondary sector tends to cause FDI in primary sector in the short run. There also exists a long run relationship between the two. As secondary sector grows, primary sector receives more FDI. The growth of secondary sector also has a long run relationship with FDI in tertiary sector. The growth of secondary sector attracts FDI in tertiary sector. Lastly, the

Table 6. Cross Sector VECM

Hypothesis	W-Stat	ECT(-1)
<b>FDI(S) → GDP(P)</b>	0.323	0.06
<b>GDP(P) → FDI(S)</b>	2.182	-0.76 <sup>b</sup>
<b>FDI(P) → GDP(S)</b>	0.272	0.003
<b>GDP(S) → FDI(P)</b>	9.89 <sup>a</sup>	-1 <sup>b</sup>
<b>FDI(T) → GDP(P)</b>	0.791	0.05
<b>GDP(P) → FDI(T)</b>	1.015	-0.67 <sup>b</sup>
<b>FDI(T) → GDP(S)</b>	0.008	0.03
<b>GDP(S) → FDI(T)</b>	0.386	-0.59 <sup>b</sup>
<b>FDI(S) → GDP(T)</b>	0.430	0.01
<b>GDP(T) → FDI(S)</b>	2.945	-0.65 <sup>b</sup>

Source: Author's own estimates  
Here, P = primary sector, S = secondary sector and T = tertiary sector. Here, ECT (-1) is error correction term. <sup>a</sup> is significance at 1%, and <sup>b</sup> is significance at 5%.

growth of tertiary sector also attracts FDI in secondary sector. The cross sector VECM results also support the market size hypothesis in case of Pakistan. The growth of a particular sector

affects the FDI inflows to other sectors but, FDI in a sector doesn't have any cross sector spillover in case of Pakistan.

## **5. Conclusion and Policy Recommendations**

The post reform period recorded a boom in FDI inflows in Pakistan. This period also documented a shift in composition of FDI. The focus shifted towards tertiary sector from secondary sector. While primary sector continuously recorded a meager amount of FDI. Using multivariate framework, this paper mainly focused upon FDI led growth hypothesis for Pakistan through disaggregated analysis.

Pedroni panel cointegration approach highlighted that FDI, domestic investment, infrastructure, human capital and institutions are cointegrated in the long run. While FMOLS showed that FDI, infrastructure and institutions positively affects the long run economic growth of Pakistan. On the other hand, domestic investment and human capital recorded a negative relationship with economic growth of Pakistan. The VECM showed a bidirectional causality of FDI and domestic investment with economic growth in short run. While there exists a unidirectional short run causality from infrastructure and human capital to economic growth.

At sector level, there exists market size hypothesis of primary sector in the long run. But there exists bidirectional causality between primary sector FDI and economic growth. For secondary sector, no short run causality holds for Pakistan but, there exists a long run cointegration from secondary sector growth to FDI, domestic investment and infrastructure. Moreover, for tertiary sector, short run causality runs from tertiary sector's growth to infrastructure and institutions to economic growth. Similar to other sectors, growth of tertiary sector attracts FDI, domestic investment, improves infrastructure and institutions in Pakistan.

Lastly, the cross sector results also showed no spillover impact of FDI of a particular sector to other sectors. The growth of primary sector has a long run relationship with secondary and tertiary sector's FDI. Similarly, the growth of secondary sector causes FDI of primary sector in the short run and also holds a long run relationship between them. It also shows a long run relationship with tertiary sector's FDI. But the growth of tertiary sector only showed a long run relationship with FDI of secondary sector. Overall, the cross sector results also favor the market size hypothesis for Pakistan.

Still, one can't conclude that FDI has not complemented the growth process of both secondary and tertiary sectors of Pakistan. One can't ignore the energy crises and poor law and order situation affecting these sectors. Similarly, disaggregated level results can undergo with aggregation bias (Aykut & Sayek, 2007). Especially at sector level, the data limitation could also be a factor for ambiguous results. However, it can be an important direction to evaluate the FDI led growth hypothesis for Pakistan.

On the other hand, it also points fingers on the policies regarding foreign projects. This means that FDI had no impact in improving domestic technology and exports in secondary and tertiary sector. The policies should focus on the quality of the foreign project rather than FDI itself. Moreover, local investors and human capital should be strengthened to extract favorable results from FDI. This can improve the absorptive capacity of domestic markets, especially secondary and tertiary for boasting the growth along with spillover effects to other sectors as well.

### **Notes**

1. The GDP data set was available at PBS. The sector wise data set was available via economic groups from 1950 till 2014 but the sector wise data of FDI was only available

from 1997. The FDI data in disaggregated form was available in 24 economic groups for the time period 1997-2001. For the time span 2002-2013, the FDI data was distributed in 36 economic groups. Therefore, it was added up for the major 24 economic groups. Moreover, FDI data was available in million US\$ terms while GDP data was in million rupees, both in nominal terms. The FDI data was multiplied with real effective exchange rate and divided by GDP deflator factor constant 2006. The GDP data was divided by GDP deflator constant factor 2006 for common bases. The data of domestic investment was also collected from SBP and Pakistan Bureau of Statistics (PBS). It was also converted in factor cost 2006 using GDP deflator. All the variables used to derive an infrastructural index were obtained from Economic Survey of Pakistan (2012-2013). Human Capital data was obtained from UNDP reports. Lastly, the governance indicators which were used to derive an institutional index were obtained from WGI.

2. The sector wise GDP data set is prepared by Pakistan Bureau of Statistics (PBS) and is managed by Mr. Suleman Khan, who is the Assistant Director of Statistics at SBP.

Email: [Suleman.Khan@sbp.org.pk](mailto:Suleman.Khan@sbp.org.pk)

3. The FDI data by economic groups is managed by Mr. Muhammad Zarar Askari, who is the Senior Joint Director at SBP. Email: [zarar.askari@sbp.org.pk](mailto:zarar.askari@sbp.org.pk)

4. Using Principal Component Analysis (PCA), the infrastructural index was derived for primary, secondary and tertiary sector using various infrastructure variables. A separate correlation matrix was also computed for each set of infrastructural variables of primary, secondary and tertiary sectors to avoid multicollinearity.

5. Using Principal Component Analysis (PCA), a common institutional index was derived for all three sectors. A correlation matrix was computed using four institutional variables to avoid multicollinearity.

## References

- Abdullah, T. S., Ali, A., & Siraj, W. (2015). The Effect of Foreign Direct Investment on Economic Growth of Pakistan. *Cell*, 223240369, 2130.
- Adler, J. H. (1965). Absorptive capacity: The concept and its determinants: *Brookings Institution*.
- Agmon, T., & Hirsch, S. (1979). Multinational corporations and the developing economics: potential gains in a world of imperfect markets and uncertainty. *Oxford Bulletin of Economics and Statistics*, 41(4), 333-344.
- Ahmad, M. H., Alam, S., Butt, M. S., & Haroon, Y. (2003). Foreign Direct Investment, Exports, and Domestic Output in Pakistan [with Comments]. *The Pakistan Development Review*, 715-723.
- Ahmad, N., Hayat, M. F., Luqman, M., & Ullah, S. (2012). The causal links between foreign direct investment and economic growth in Pakistan. *European Journal of Business and Economics*, 6, 20-21.
- Aqeel, A., Nishat, M., & Bilquees, F. (2004). The Determinants of Foreign Direct Investment in Pakistan [with Comments]. *The Pakistan Development Review*, 651-664.
- Aykut, D., & Sayek, S. (2007). The role of the sectoral composition of foreign direct investment on growth. Do multinationals feed local development and growth, 35-62.
- Balasubramanyam, V. N., Salisu, M., & Sapsford, D. (1996). Foreign direct investment and growth in EP and IS countries. *The economic journal*, 92- 105.
- Banga, R. (2004). Impact of Japanese and US FDI on productivity growth: a firm-level analysis. *Economic and Political Weekly*, 453-460.

- Basu, P., Chakraborty, C., & Reagle, D. (2003). Liberalization, FDI, and growth in developing countries: A panel cointegration approach. *Economic Inquiry*, 41(3), 510-516.
- Berman, E., Bound, J., & Griliches, Z. (1994). Changes in the demand for skilled labor within US manufacturing: Evidence from the annual survey of manufacturers. *The Quarterly Journal of Economics*, 367-397.
- Blonigen, B. A., & Wang, M. (2004). Inappropriate pooling of wealthy and poor countries in empirical FDI studies.
- Borensztein, E., De Gregorio, J., & Lee, J.-W. (1998). How does foreign direct investment affect economic growth? *Journal of international Economics*, 45(1), 115-135.
- Buckley, P. J., & Casson, M. (1976). The future of the multinational enterprise (Vol. 1): *Macmillan London*.
- Carree, M. A., & Thurik, A. R. (2003). The impact of entrepreneurship on economic growth Handbook of entrepreneurship research (pp. 437-471): *Springer*.
- Castejón, C. F., & Woerz, J. (2006). Good or bad? The influence of FDI on output growth. An industry-level analysis. Documentos de trabajo (Universidad de Zaragoza. Facultad de Economía y Empresa)(1), 1.
- Chakraborty, C., & Nunnenkamp, P. (2008). Economic reforms, FDI, and economic growth in India: a sector level analysis. *World development*, 36(7), 1192-1212.
- Clements, M., & Taylor, N. (2003). Evaluating prediction intervals for high-frequency data. *Journal of Applied Econometrics*, 18, 445-456.
- Conner, K. R. (1991). A historical comparison of resource-based theory and five schools of thought within industrial organization economics: do we have a new theory of the firm? *Journal of management*, 17(1), 121-154.

- Dar, A. A., Muhammad, T., & Mehmood, B. (2016). IS THERE A RELATIONSHIP BETWEEN FOREIGN DIRECT INVESTMENT, HUMAN CAPITAL, TRADE OPENNESS AND ECONOMIC GROWTH OF PAKISTANI ECONOMY?. *Science International*, 28(1).
- Dar, A. A., Muhammad, T., & Mehmood, B. (2016). JOINT VENTURE INVESTMENT, INFRASTRUCTURAL SPILLOVER AND ECONOMIC GROWTH: A SOUTH ASIAN PERSPECTIVE. *Science International*, 28(1).
- De Mello, L. R. (1999). Foreign direct investment-led growth: evidence from time series and panel data. *Oxford economic papers*, 51(1), 133-151.
- Dunning, J. H. (1980). Toward an eclectic theory of international production. *The International Executive*, 22(3), 1-3.
- Dunning, J. H. (1989). Multinational enterprises and the growth of services: some conceptual and theoretical issues. *Service industries journal*, 9(1), 5-39.
- Dunning, J. H. (1998). Location and the multinational enterprise: a neglected factor? *Journal of international business studies*, 45-66.
- Dunning, J. H., & Enterprises, M. (1993). the Global Economy. Domestic Governance, Strategies and.
- Dutta, D., & Ahmed, N. (2004). Trade liberalization and industrial growth in Pakistan: a cointegration analysis. *Applied Economics*, 36(13), 1421-1429.
- Economic survey 2012-2013; Retrieved from Url: [http://www.finance.gov.pk/survey\\_1213.html](http://www.finance.gov.pk/survey_1213.html)
- Elu, J. U., & Price, G. N. (2010). Does China Transfer Productivity Enhancing Technology to Sub-Saharan Africa? Evidence from Manufacturing Firms\*. *African Development Review*, 22(s1), 587-598.
- Falki, N. (2009). Impact of foreign direct investment on economic growth in Pakistan. *International Review of Business Research Papers*, 5(5), 110-120.
- FAO Investment Centre : Retrieved from url: <http://www.fao.org/investment/newsandmeetings/en/>

- Ghazali, A. (2010). Analyzing the relationship between foreign direct investment domestic investment and economic growth for Pakistan. *International Research Journal of Finance and Economics*, 47(1), 123-131.
- Gow, H. R., & Swinnen, J. F. (1998). Up-and downstream restructuring, foreign direct investment, and hold-up problems in agricultural transition. *European Review of Agricultural Economics*, 25(3), 331-350.
- Guo, B., Gao, J., & Chen, X. (2013). Technology strategy, technological context and technological catch-up in emerging economies: industry-level findings from Chinese manufacturing. *Technology Analysis & Strategic Management*, 25(2), 219-234.
- Hadi, T. (2013) . Investment in Pakistan. KPMG Report.
- Hansen, H., & Rand, J. (2006). On the causal links between FDI and growth in developing countries. *The World Economy*, 29(1), 21-41.
- Hawkes, C., & Hawkes, C. (2005). The role of foreign direct investment in the nutrition transition. *Public Health Nutrition-Wallingford*, 8(4), 357-365.
- Hufbauer, G. C. (1975). The multinational corporation and direct investment. International trade and finance: *Frontiers for research*, 253-319.
- Hussain, S. B. (2004). Encyclopedia of Capitalism (Facts on File Library of World History) 3 VOL SET.
- Hymer, S. H. (1976). The international operations of national firms: A study of direct foreign investment (Vol. 14): MIT press Cambridge, MA.
- Im, K. S., Pesaran, M. H., & Shin, Y. (2003). Testing for unit roots in heterogeneous panels. *Journal of econometrics*, 115(1), 53-74.
- Iqbal, M. S., Shaikh, F. M., & Shar, A. H. (2010). Causality relationship between foreign direct investment, trade and economic growth in Pakistan. *Asian Social Science*, 6(9), 82.

- Javorcik, B. S. (2004). Does foreign direct investment increase the productivity of domestic firms? In search of spillovers through backward linkages. *American economic review*, 605-627.
- Jawahar, I., & McLaughlin, G. L. (2001). Toward a descriptive stakeholder theory: An organizational life cycle approach. *Academy of management review*, 26(3), 397-414.
- Khan, M. A., & Khan, S. A. (2011). Foreign direct investment and economic growth in Pakistan: A sectoral analysis. Pakistan Institute of Development Economics Islamabad PIDE working papers, 67.
- Khawar, M. (2005). Foreign direct investment and economic growth: A cross-country analysis. *Global Economy Journal*, 5(1).
- Kolstad, I., & Villanger, E. (2008). Determinants of foreign direct investment in services. *European Journal of Political Economy*, 24(2), 518-533.
- KPMG (2013): Retrieved from <https://www.kpmg.com/PK/en/IssuesAndInsights/ArticlesPublications/Documents/Investment-in-Pakistan2013>.
- Levin, A., Lin, C.-F., & Chu, C.-S. J. (2002). Unit root tests in panel data: asymptotic and finite-sample properties. *Journal of econometrics*, 108(1), 1-24.
- Lewis, W. A. (1954). Economic development with unlimited supplies of labour. *The manchester school*, 22(2), 139-191.
- Lim, M. E.-G. (2001). Determinants of, and the relation between, foreign direct investment and growth: a summary of the recent literature: *International Monetary Fund*.
- Lipsey, R. E. (2004). Home-and host-country effects of foreign direct investment Challenges to globalization: Analyzing the economics (pp. 333-382): *University of Chicago Press*.
- Maddala, G. S., & Wu, S. (1999). A comparative study of unit root tests with panel data and a new simple test. *Oxford Bulletin of Economics and Statistics*, 61(S1), 631-652.

- Markowitz, H. (1959). Portfolio Selection, Efficient Diversification of Investments: J. Wiley.
- Mughal, M. (2008). Boon or bane-role of FDI in the economic growth of Pakistan.
- Narula, R., & Marin, A. (2003). FDI spillovers, absorptive capacities and human capital development: evidence from Argentina.
- Nelson, R. R., & Phelps, E. S. (1966). Investment in humans, technological diffusion, and economic growth. *The American economic review*, 56(1/2), 69-75.
- Nurkse, R. (1935). The schematic representation of the structure of production. *The Review of Economic Studies*, 2(3), 232-244.
- Park, J. (2004). Korean Perspective on FDI in India: Hyundai Motors' Industrial Cluster. *Economic and Political Weekly*, 3551-3555.
- Pedroni, P. (1999). Critical values for cointegration tests in heterogeneous panels with multiple regressors. *Oxford Bulletin of Economics and Statistics*, 61(s 1), 653-670.
- Pedroni, P. (2000). FULLY MODIFIED OLS FOR HETEROGENEOUS COINTEGRATED PANELS.
- Pedroni, P. (2004). Panel cointegration: asymptotic and finite sample properties of pooled time series tests with an application to the PPP hypothesis. *Econometric theory*, 20(03), 597-625.
- Perez, C. (1985). Microelectronics, long waves and world structural change: New perspectives for developing countries. *World development*, 13(3), 441-463.
- Phillips, P. C., & Hansen, B. E. (1990). Statistical inference in instrumental variables regression with I (1) processes. *The Review of Economic Studies*, 57(1), 99-125.
- Rahmaddi, R., & Ichihashi, M. (2012). The impact of foreign direct investment on host country exports: Sector based evidence from Indonesian manufacturing.
- Rahman, Ur. Zia. (2014). Impact of foreign direct investment on economic growth in Pakistan. *Journal of Economics and Sustainable Development*, 5 (27).

- Ramasamy, B., Yeung, M., & Laforet, S. (2012). China's outward foreign direct investment: Location choice and firm ownership. *Journal of world business*, 47(1), 17-25.
- Reuber, G. L. (1973). Private foreign investment in development.
- Saqib, D., Masnoon, M., & Rafique, N. (2013). Impact of foreign direct investment on economic growth of Pakistan. *Advances in Management & Applied Economics*, 3(1), 35-45.
- Shahbaz, M., & Rahman, M. M. (2012). The dynamic of financial development, imports, foreign direct investment and economic growth: cointegration and causality analysis in Pakistan. *Global Business Review*, 13(2), 201-219.
- Shaheen, S., Ali, M. M., Kauser, A., & Ahmed, F. B. (2013). Impact of trade liberalization on economic growth in Pakistan. *Interdisciplinary Journal of Contemporary Research in Business*, 5(5).
- Simões, V. C., & Simões, V. C. (1988). Portugal and FDI attraction: A multi-criteria approach. *Management International Review*, 42-52.
- Tadesse, B., & Ryan, M. (2005). Export Platforms and the Industry-Specific FDI-Trade Relationship. *Journal of Economic Integration*, 644-671.
- Tintin, C. (2012). Does Foreign Direct Investment Spur Economic Growth and Development?-A Comparative Study: *Free University of Brussels, Brussels*.
- Tobin, J. (1958). Liquidity preference as behavior towards risk. *The Review of Economic Studies*, 25(2), 65-86.
- United Nation Conference on Trade and Development (1997): Retrieved from [http://unctad.org/en/Docs/ldc1997\\_en.pdf](http://unctad.org/en/Docs/ldc1997_en.pdf)
- Vahter, P. (2010). Does FDI spur innovation, productivity and knowledge sourcing by incumbent firms? Evidence from manufacturing industry in Estonia.

- Vernon, R. (1966). International investment and international trade in the product cycle. *The Quarterly Journal of Economics*, 190-207.
- Wachter, M. L., Gordon, R., Piore, M. J., & Hall, R. E. (1974). Primary and secondary labor markets: a critique of the dual approach. *Brookings Papers on Economic Activity*, 1974(3), 637-693.
- Weill, P. (1992). The relationship between investment in information technology and firm performance: A study of the valve manufacturing sector. *Information systems research*, 3(4), 307-333.
- World Development Indicators (WDI): Retrieved from <http://data.worldbank.org/data-catalog/world-development-indicators>
- Wilkins, M. (1970). The emergence of multinational enterprise: American business abroad from the colonial era to 1914 (Vol. 34): Cambridge, Mass: *Harvard University Press*.
- Zeb, N., Qiang, F., & Rauf, S. (2013). Role of Foreign Direct Investment in Economic Growth of Pakistan. *International Journal of Economics and Finance*, 6(1), 32.

## Appendix

(i) Economic groups included in sectors

Different Sectors	Included Economic Groups
Primary Sector	Food, Beverages, Tobacco, Sugar, Paper and Pulp, Leather and Leather Products, Rubber and Rubber Products
Secondary Sector	Chemicals, Pharmaceuticals and Fertilizers, Petro Chemicals and Petroleum Refining, Cement, Basic Metals, Metal Products, Machinery other than Electrical, Electrical Machinery, Electronics, Transport Equipment, power, Construction, Mining and Quarrying, Oil and Gas Exploration
Tertiary Sector	Wholesale and Retail Trade, Tourism, Transport, Storage and Communication, financial Businesses, Social and Private Services

## (ii) Correlation Matrix of Infrastructural Index

## (a) Primary Sector

	Cropped area (million hectares)	improved seed dist (000 tonnes)	water availability (MAF)	credit disbursement (RS.million)	fertilizer off take (000 N/T)	tube wells public & pvt (000)	production of tractors (NOS)	import of insecticides (tonnes)	oil/petroleum (tonnes)	gas(mm cft) fertilizers	electricity agricultural (GWH)
Cropped area (million hectares)	1.000	.415	.364	.446	.627	.503	.500	.602	-.424	.583	.678
improved seed dist (000 tonnes)	.415	1.000	.722	.929	.844	.906	.933	.497	-.903	.817	.662
water availability (MAF)	.364	.722	1.000	.608	.728	.798	.696	.533	-.654	.779	.377
credit disbursement (RS.million)	.446	.929	.608	1.000	.820	.905	.958	.360	-.960	.730	.788
fertilizer off take (000 N/T)	.627	.844	.728	.820	1.000	.910	.910	.722	-.828	.949	.780
tube wells public & pvt (000)	.503	.906	.798	.905	.910	1.000	.932	.553	-.943	.836	.702
production of tractors (NOS)	.500	.933	.696	.958	.910	.932	1.000	.477	-.922	.842	.741
import of insecticides (tonnes)	.602	.497	.533	.360	.722	.553	.477	1.000	-.413	.748	.559
oil/petroleum (tonnes)	-.424	-.903	-.654	-.960	-.828	-.943	-.922	-.413	1.000	-.705	-.769
gas(mm cft) fertilizers	.583	.817	.779	.730	.949	.836	.842	.748	-.705	1.000	.687
electricity agricultural (GWH)	.678	.662	.377	.788	.780	.702	.741	.559	-.769	.687	1.000
Cropped area (million hectares)	-	.024	.044	.017	.001	.007	.008	.001	.022	.002	.000
improved seed dist (000 tonnes)	.024	-	.000	.000	.000	.000	.000	.008	.000	.000	.000

water availability (MAF)	.044	.000	-	.001	.000	.000	.000	.004	.000	.000	.038
credit disbursement ( RS.million)	.017	.000	.001	-	.000	.000	.000	.046	.000	.000	.000
fertilizer offtake (000 N/T)	.001	.000	.000	.000	-	.000	.000	.000	.000	.000	.000
tube wells public & pvt (000)	.007	.000	.000	.000	.000	-	.000	.003	.000	.000	.000
production of tractors (NOS)	.008	.000	.000	.000	.000	.000	-	.011	.000	.000	.000
import of insecticides (tonnes)	.001	.008	.004	.046	.000	.003	.011	-	.025	.000	.003
oil/petroleum (tonnes)	.022	.000	.000	.000	.000	.000	.000	.025	-	.000	.000
gas(mm cft) fertilizers	.002	.000	.000	.000	.000	.000	.000	.000	.000	-	.000
electricity agricultural (GWH)	.000	.000	.038	.000	.000	.000	.000	.003	.000	.000	-
Determinant = 1.396E-010											

(b) Secondary sector

		Oil/Petroleum (tonnes)	Gas (mm cft)	Electricity (gwh)
Correlation	Oil/Petroleum (tonnes)	1.000	-.599	-.576
	Gas (mm cft)	-.599	1.000	.965
	Electricity (gwh)	-.576	.965	1.000
Sig. (1-tailed)	Oil/Petroleum (tonnes)	-	.002	.003
	Gas (mm cft)	.002	-	.000
	Electricity (gwh)	.003	.000	-
Determinant = .044				

(c) Tertiary sector

		Education exp (% of GNI)	Health exp (% of GDP)	Exp (law and Order, M.RS)	Length of roads(KM)	Buses on road-HCV
Correlation	Education exp (% of GNI)	1.000	.631	-.545	-.755	-.820
	Health exp (% of GDP)	.631	1.000	-.315	-.424	-.669
	Exp (law and Order, M.RS)	-.545	-.315	1.000	.721	.800
	Length of roads(KM)	-.755	-.424	.721	1.000	.910
	Buses on road-HCV	-.820	-.669	.800	.910	1.000
Sig. (1-tailed)	Education exp (% of GNI)	-	.003	.012	.000	.000
	Health exp (% of GDP)	.003	-	.109	.045	.002
	Exp (law and Order, M.RS)	.012	.109	-	.001	.000
	Length of roads(KM)	.000	.045	.001	-	.000
	Buses on road-HCV	.000	.002	.000	.000	-

Determinant = .004

(iii) Correlation Matrix of Institutional Index

	Rule of Law	Control of Corruption	Voice and Accountability	Political Stability and Absence of Violence	
Correlation	Rule of Law	1.000	-.094	.113	.367
	Control of Corruption	-.094	1.000	-.383	.241
	Voice and Accountability	.113	-.383	1.000	-.312
	Political Stability and Absence of Violence	.367	.241	-.312	1.000
Sig. (1-tailed)	Rule of law	-	.360	.333	.074
	Control of Corruption	.360	-	.065	.176
	Voice and Accountability	.333	.065	-	.111
	Political Stability and Absence of Violence	.074	.176	.111	-
Determinant = .601					