Universität Hamburg
DER FORSCHUNG | DER LEHRE | DER BILDUNG

FAKULTÄT
FÜR WIRTSCHAFTS- UND
SOZIALWISSENSCHAFTEN

EXAMINING THE FACTORS AFFECTING FOREIGN DIRECT INVESTMENT INFLOWS IN PAKISTAN: AN EMPIRICAL ANALYSIS OF THREE INDIVIDUAL MODELS

Cumulative Dissertation

A Ph.D. Dissertation submitted to the Faculty of Economics and Social Sciences, University of Hamburg, Germany

Submitted by: Ayesha Serfraz (Matrikel-Nr 6749473)

Date of Defense: 11th September, 2018

Primary Supervisor: Prof. Dr. Arne Heise

Second Supervisor: Prof. Dr. Ulrich Fritsche

Chairman of examination committee: Prof. Dr. Thomas Straubhaar

HAMBURG 2018

PREFACE AND ACKNOWLEDGEMENTS

This dissertation was written in fulfillment of doctoral program for Ph.D. at "The Graduate School of Economics, and Social Sciences, University of Hamburg, Germany". The three-year degree program has been supported by University of the Punjab, Lahore, Pakistan, and University of the Hamburg, Germany. The dissertation is an empirical study based on Foreign Direct Investment Inflows in Pakistan and its relationship with various factors either affecting it or causing an impact which has been analyzed in a way that adds new and innovative dimensions to the existing body of knowledge.

All praises to Almighty Allah for giving me strength, resilience, faith, and knowledge to complete this challenging task. I am blessed to have extremely helpful parents and grandparents, who never gave up on me even when I lost all hope. I have no words for their support and especially my mother and grandmother for praying and bearing my mood swings. I pray for their long and healthy life.

I am extremely grateful to **Prof. Dr. Arne Heise** and **Prof. Dr. Ulrich Fritsche** for their supervision, guidance, patience, motivation, and kindness to bear me and guide me in the best possible way. I am forever indebted to my both learned and respected supervisors for everything and I do not believe that words can do justice. One person who is the witness of every phase through which I passed and who always came to my rescue is the Head of Graduate School, **Dr. Ulf Beckmann**. Without his help and guidance, it was impossible for me to survive the stressful phase I faced during these years. I am thankful to all the faculty members who taught me courses and guided me humbly. I would like to express my special gratitude to **Patrick Harms Christian**, research assistant to Prof. Fritsche, for helping me with the initial phase of empirical techniques. I would be failing if I do not express my personal indebtedness to **Florian Schütze**, research assistant to Prof. Fritsche, who helped me in the translation of executive summary in German language.

Lastly, I **dedicate** this dissertation to my father who always encourages me to study and go beyond the boundaries especially set for a female. From my first step to this journey, he has been my guardian angel. He never gave up on me even when I thought that I won't be able to do it. He stayed up for countless nights to guide me, correcting my mistakes, holding me when I thought of giving up, proofreading, helping me in writing, for wiping my tears, for telling me that he believes in me, for motivating me, for praying day and night that I get successful. I cannot pay back a single moment he spent in making me what I am today.

I have tried my best to write a good dissertation which can make my mentors proud, yet human limitations are there. As a wise man said,

"A good dissertation is a done dissertation, a great dissertation is a published dissertation, and a perfect dissertation is neither."

Unknown

"You might not write well every day, but you can always edit a bad page. You can't edit a blank page."

Jodi Picoult

Ayesha Serfraz

Table of Contents

List of Tables

Paper-1

Paper-2

Paper-3

List of Graphs

Paper-1

Paper-2

Paper-3

EXECUTIVE SUMMARY

Foreign direct investment inflows are very important especially for a developing country in order to get enough resources which could accelerate the process of growth and development. However, there are many factors which act as an obstacle to attract more FDI inflows. In the case of Pakistan, although a large sum of FDI is being attracted but it is not enough to remove the dual gaps of saving-investment and exports-imports. One of the most important obstacles is terrorism, but instead of focusing on external factors, the first paper uses sectarianism or sectarian terrorism as a catalyst for terrorism in Pakistan. The internal conditions are extremely hostile due to killings in the name of different sects; most importantly Shia-Sunni riots. Honor killings and differences in dogmatic beliefs add fuel to fire. The issue of sectarianism is not only leading to misallocation of resources but also discouraging foreign investors, resulting in low FDI inflows. Consequently, the economic growth rate is being negatively affected. This has also been proved by empirical findings of Cointegration analysis and error correction models.

Moving down to narrow factors, in the second paper, the relationship between FDI inflows, labor productivity, and education has been empirically analyzed. Undoubtedly, labor is the most important factor of production in the country since Pakistan is a labor abundant country and majority of the population is not educated enough to have proper knowledge and skills to obtain maximum gains from FDI inflows. The technology being transferred due to FDI is not providing sufficient benefits due to lack of educated and productive labor. In this second paper of the dissertation, it has been found that definitely FDI inflows increase labor productivity by bringing new technology and innovation, but it also results in unemployment since labor is replaced by capital and very few people are equipped with technical know-how. Also, MNCs create inequality by hiring educated people and polishing their skills through further training which results in the difference in wage rate and standard of living. Provision of education, on the other hand, is the responsibility of the domestic government which is not investing enough in the field of education. The results of Breitung-Candelon and Breitung-Schrieber Granger Causality test also indicate that though FDI inflows lead to an increase in labor productivity in Pakistan but full gains are not being obtained due to low labor productivity because of low spending on education by the government.

Analyzing the bottom relationships and impacts, in the third paper of dissertation, a sector-wise study has been conducted where the nexus between FDI inflows and a panel of seven major sectors of Pakistan's economy along with labor employed in those respective sectors, has been tested. Pakistan despite being an agricultural country, having a majority of the population employed in the said sector, is having more gains from FDI inflows in industrial and services sectors (including their related sub-sectors) as compared to the agriculture sector. Even in the said two sectors, i.e. industrial and services, maximum benefits from FDI spillovers are not being reaped because the labor is not productive enough. The empirical analysis proved that sectors which have a high number of educated workers are not just attracting more FDI inflows, but are also gaining spillover benefits from FDI along with an increase in labor productivity. The spillover effects are also found in the form of one sector benefitting the other e.g. since the textile sector is dependent on cotton which comes from agriculture, if there are fewer inflows to agriculture, the textile sector also feels the shock.

If Pakistan wants to attract more FDI inflows, it must devise such policies which can bring internal peace and stability. Also without having productive, educated and skilled labor, it is not possible to reap full benefits from FDI inflows. For this purpose, the government must give more attention to education so that labor is educated enough to absorb the gains from FDI inflows. In addition, individual backward sectors like agriculture also need more government attention to mechanize it through extensive use of modern technology for increasing its productivity.

Keywords: FDI inflows, Pakistan, terrorism, education, labor productivity, sector-productivity

ZUSAMMENFASSUNG

Besonders für ein Entwicklungsland sind Ausländische Direktinvestitionen (ADI) sehr wichtig, um ausreichend Ressourcen zu erhalten, welche den Wachstums- und Entwicklungsprozess beschleunigen können. Es existieren jedoch viele Faktoren, welche ein Hindernis für mehr ausländische Direktinvestitionen darstellen. Im Falle Pakistans sind die ADIs zwar sehr hoch, diese reichen jedoch nicht aus, um die doppelten Lücken von Ersparnisse im Verhältnis zu Investitionen und Exporte im Verhältnis zu Importen zu beseitigen. Eines der wichtigsten Hindernisse bei Direktinvestitionen ist der Terrorismus. Anstatt sich auf externe Faktoren zu konzentrieren, verwendet das erste Papier religiöses Sektierertum oder sektiererischen Terrorismus als Auslöser für den Terrorismus in Pakistan. Die internen, in Pakistan vorherrschenden Bedingungen sind extrem

feindselig in Bezug auf Direktinvestitionen, primär wegen Morden im Namen verschiedener Sekten; insbesondere durch die schiitisch-sunnitische Unruhen. Ehrenmorde und Unterschiede in der Religionsauslegung heizen die Unruhen weiter an. Diese Probleme führen nicht nur zu einer Fehlallokation von Ressourcen, sondern auch zu einer Abschreckung ausländischer Investoren, was wiederrum zu geringen Zuflüssen von ausländischen Direktinvestitionen führt. Daraus resultierend wird das Wirtschaftswachstum negativ beeinflusst, welches empirisch durch Kointegrationsanalyzen und Error Correction Modelle gezeigt wurde.

Im zweiten Papier wurde die Beziehung zwischen ADI-Zuflüssen, Arbeitsproduktivität und Bildung empirisch analysiert. Zweifellos ist Arbeitskraft der wichtigste Produktionsfaktor des Landes, allerdings ist die Mehrheit der Bevölkerung nicht gut genug ausgebildet, um direkt von den ADIs zu profitieren.
Die hierdurch übertragene Technologie bietet aufgrund mangelnder Bildung sowie mangelnder produktiver Arbeit keine ausreichenden Verbesserungen für die Bevölkerung. In dieser zweiten Dissertationsarbeit wurde festgestellt, dass ADI-Zuflüsse definitiv die Arbeitsproduktivität durch neue Technologien und Innovationen steigern, aber auch zu Arbeitslosigkeit führen, da Arbeit durch Kapital ersetzt wird und nur sehr wenige Menschen mit dem notwendigem technischen Know-how ausgestattet sind. Auch Multinationale Unternehmen schaffen Ungleichheit, indem sie gebildete Leute einstellen und ihre Fähigkeiten durch weitere Ausbildung verbessern, wodurch sich die Unterschiede in Lohnsatz und Lebensstandard weiter vergrößern.
Die Bereitstellung von allgemeiner Bildung liegt dagegen in der Verantwortung der einheimischen Regierung, deren Investitionen in diese zu gering sind. Die Ergebnisse des Breitung-Candelon-Tests und des Breitung-Schrieber-Granger-Kausalitäts-Tests zeigen auch, dass ADI-Zuflüsse zwar zu einem Anstieg der Arbeitsproduktivität in Pakistan führen, aber dieser Anstieg aufgrund der geringen Bildungsausgaben der Regierung sowie der niedrigen, vorher vorhandenen Arbeitsproduktivität zu gering ist.

In der dritten Abhandlung der Dissertation wurden Sektoren-bezogene Studien durchgeführt, in denen die Verbindungen zwischen ADI-Zuflüssen und sieben verschiedenen Sektoren der Pakistanischen Wirtschaft zusammen mit den in diesen Sektoren beschäftigten Arbeitskräften analysiert und geprüft wurden.
Obwohl Pakistan ein Agrarland ist, in dem die Mehrheit der Bevölkerung in diesem Sektor beschäftigt ist, gehen mehr ADIs in Industrie- und Dienstleistungssektoren (einschließlich der damit verbundenen Teilsektoren) als in den Agrarsektor. Dennoch werden in diesen beiden Sektoren (Industrie und Dienstleistungen) nicht die maximal möglichen Vorteile durch ADIs genutzt, da die Arbeit nicht produktiv genug ist.

Die empirische Analyze hat gezeigt, dass Sektoren mit einer hohen Anzahl an qualifizierten Arbeitskräften nicht nur mehr ausländische Direktinvestitionen anziehen, sondern auch durch Spillover Effekte von den ausländischen Direktinvestitionen in anderen Sektoren profitieren und gleichzeitig die Arbeitsproduktivität steigt. Diese Spillover Effekte finden sich in Form von Abhängigkeiten zwischen Sektoren. Wenn z.B. der Textilsektor von Baumwolle abhängig ist, die im Agrarsektor hergestellt wird, wird der Textilsektor ebenfalls betroffen sein, wenn weniger ADIs in den Agrarsektor fließen.

Wenn Pakistan mehr ADI-Zuflüsse anziehen will, müssen solche Rahmenbedingungen geschaffen werden, die inneren Frieden und Stabilität bringen können. Auch ohne produktive, gebildete und qualifizierte Arbeitskräfte können die Direktinvestitionen nicht in vollem Umfang genutzt werden. Zu diesem Zweck muss die Regierung dem Bildungssektor mehr Aufmerksamkeit widmen, um so einen Bildungsgrundstock zu schaffen, der es den Arbeitern ermöglicht, von den ADIs zu profitieren. Darüber hinaus benötigen einzelne rückständige Sektoren wie die Landwirtschaft mehr Aufmerksamkeit der Regierung, um sie mithilfe des extensiven Einsatzes moderner Technologien zur Steigerung ihrer Produktivität zu mechanisieren.

1. INTRODUCTION

1.1 A WIDE CONTEXT

Although FDI is measured both in terms of inflows and outflows but this dissertation is concentrating on FDI inflows only and factors affecting these inflows. The main reason for concentrating on inflows instead of outflows is that developing economies are in dire need of FDI inflows for fighting saving-investment gap, lack of proper technology, improving export-producing sectors, increasing labor productivity and attracting more capital to increase growth rate and enter the group of developed countries. For quite some time now, a huge debate has been going on regarding the benefits of foreign direct investment inflows for both host and recipient countries. According to Kurtishi-Kastrati (2013), realizing the benefits of economic growth and development through FDI, developing economies, emerging economies and those in transition, liberalized their policies to attract more investment. The host countries get maximum benefits through FDI in the form of technology spillovers, human capital formation, competitive business environment, enhancement of international trade and an improvement in enterprise development. FDI also helps in the improvement of environment and social conditions by a relocation of cleaner technology and socially responsible corporate policies. Similarly, Sauvant (2016) highlights the role of FDI in achieving the Sustainable Development Goals (SDG) where FDI inflows mobilize tangible and intangible assets like capital, technology, skills and provide access to markets etc. which are essential for SDG. In order to achieve its full potential, FDI must be increased and it has to be geared up to earn sustainable development within the framework of international law and policy although by remaining respectful to the host government's legitimate public policy objectives.

Siddiqui (2014) throws light at the importance and, at the same time, effects of foreign policy on host country starting with the argument that mainstream economists held that foreign investment benefitted developing countries by increasing the availability of capital which accelerated the economic development of countries like Japan, South Korea, Singapore and Taiwan after World War II but the experience of developed countries in their early phase of industrialization has been ignored in this conclusion

where capital inflows to developing countries sharply declined after global financial crises in 2008 in the context of neo-liberal economic reforms and financial deregulation. Foreign investors could put into use such technologies and products which do not suit local environments and furthermore they could cause balance of the payments problems due to high remittances.

Regarding Pakistan, Awan et al (2014), point out that FDI promotes globalization through increased interaction between states, regions, and MNCs, which gives rise to international trade, information and migration. Though Pakistan's economy has got integrated with the world economy through the mechanism of FDI and trade, which increased investors' confidence, but after 2007 FDI inflows started falling due to war like conditions (terrorism). Foreign investors showed reluctance to invest in Pakistan despite favorable conditions like the large market size and cheaper labor force. Again in 2017, FDI inflows started increasing due to better policies and decline in terrorist activities but this time different sectors of Pakistan' economy witnessed uneven distribution. Initially manufacturing sector attracted more FDI but later on, the services sector started getting higher FDI inflows on account of developing mobile communication and internet services. Despite an increase in FDI inflows, due to an absence of policy direction, quite a large portion of FDI has gone to services and consumer goods industries at the cost of manufacturing and technology sectors.

Similarly Mohiudin and Salam (2011) in their study, have highlighted that in order to encourage FDI, the government of Pakistan has offered incentives to international investors by allowing them to hold 100 percent equity without any government permission in manufacturing/industrial sector and No Objection Certificate (NOC) by the provincial government is not required for setting up of these projects. Except manufacturing of arms/ammunition and heavy explosives, all other manufacturing/industrial units fall in this regime. Similarly, international investors are allowed to hold 100 percent equity on a repatriable basis in all non-manufacturing sectors which cover services, infrastructure, social sector, tourism, housing/construction, and information technology and portfolio investment. Many foreign companies are doing their business in Pakistan which includes food and beverages, pharmaceuticals, insurance and banking, chemicals, automotive assembly, oil and gas exploration and marketing, power generation etc. yet there is a long way to go.

Regarding productivity, Hussain (2017) argues that FDI has a positive and significant impact on the increase in labor productivity since it brings technology, skilled management along with investment to local firms which

allow these firms competitive advantage and economies of scale. Pakistan offers a great opportunity for foreign direct investment and the government must provide business friendly and safe environment to foreign investors in order to enhance their confidence for investing here.

The following sections explain the scope of dissertation and connection among three individual papers. The three papers have been published earlier as ZÖSS discussion papers (University of Hamburg), later they have been published as peer-reviewed with minor changes and corrections. Links to both versions have been provided but this dissertation includes the discussion paper versions which were written initially for fulfilling the requirements for attaining a Ph.D. degree.

1.2 SCOPE OF DISSERTATION

This dissertation concentrates on the importance of FDI inflows in Pakistan and the obstacles in its way. For this purpose, internal factors are focused on since at the moment, internal problems are discouraging foreign investors more as compared to external factors to invest in Pakistan. In addition, it focuses on how FDI affects Pakistan's economic growth, overall labor productivity, and sector-wise labor productivity. The purpose is to check that what factors are responsible for low FDI inflows and for starting the research, the most important and debated topic of terrorism is taken but instead of a tradition and broad measure of terrorism (overall terrorism), sectarianism has been used as proxy of terrorism since majority of terrorist activities in Pakistan are being carried out in the name of religion. Moving on to narrow factors of education, labor productivity and sectors of Pakistan, an in-depth analysis has been carried out to check the impact of these variables on FDI inflows, i.e., whether education increases the productivity of labor and more productive labor attracts high FDI inflows and vice versa? Also how different sectors and sector productivity affect and get affected by FDI inflows. Which sectors attract more FDI and why? Sector-wise productivity also affects FDI inflows? For this purpose, a detailed empirical analysis has been conducted by writing three individual papers. All this is discussed in detail in later sections of the dissertation.

1.3 CONNECTION AMONG THREE INDIVIDUAL PAPERS

This dissertation is based on three individual papers. Each paper estimates a separate model related to factors affecting FDI inflows in Pakistan. In addition, all three papers are unique since they add some innovative point to the existing body of literature both in the sense of variables and empirical techniques. The purpose of writing individual papers is to highlight most important factors hindering FDI inflows in Pakistan starting from the main and most important issue of terrorism and then moving towards narrow factors of productivity, education, and sectors, specifically analyzing the

relationship among these factors and their impact on FDI inflows. Moreover, studying separate variables and their relationships require distinct and unique models along with different variables and relevant literature. Therefore, Paper1 deals with the factor of sectarian terrorism as a catalyst for terrorism in Pakistan. It explores the impact of FDI inflows on economic growth of Pakistan using sectarianism as the measure for terrorism. The purpose behind using sectarianism as a measure for terrorism is to show that before blaming external factors for instability inside the country, internal factors must be analyzed first. Since terrorism is the most important issue all over the world especially related to the Asian region, the intention is to check whether it really affects FDI inflows and economic growth or not. As the main focus of dissertation moves around examining internal issues, the next question is about absorptive capacity which has been examined in paper 2 that how labor is responding to FDI and vice versa as Pakistan is a labor abundant country but majority of labor is not educated enough to reap benefits from FDI inflows. The connecting link again goes back to internal problems relating to lack of proper attention by the government to provide education. In addition, political instability and unrest which are causing a diversion in attention and misallocation of resources. Since labor is the main factor of production, what is its contribution towards the growth of various sectors of Pakistan? The third paper analyzes the more detailed internal issue related to the impact of FDI inflows on labor productivity working in different sectors and how sectoral growth is affected by FDI coming to major sectors, prominent ones being agriculture, industry, and services, how the labor working in these sectors is responding to FDI inflows? An analysis of these main sectors along with sub-sectors shows that the labor is more productive in those sectors which employ more skilled and educated workers. Consequently, these sectors attract more FDI inflows suggesting that attention is not only required in educating labor but the modernization of sectors is equally important. For reaping benefits from technology transfer, first of all workers must be trained and educated enough to use the modern technology and secondly, these sectors also need a reconstruction where instead of old techniques, modern and updated techniques of production are used to increase output. Increase in quantity with better quality not only increases the growth rate of individual sectors but contributes to overall economic growth thus bringing stability in the economy which results in more FDI inflows. Following hypothesis have been tested:-

(i) FDI inflows have a positive relationship with economic growth and a negative relation with sectarian terrorism.

(ii) Economic growth has a positive relationship with FDI inflows and a negative relation with sectarian terrorism.

(iii) FDI inflows and labor productivity have bi-directional causality both in the short-run and long-run. (A Positive relationship between FDI inflows and labor productivity).
(iv) Education and labor productivity have bi-directional causality both in the short-run and long-run. (A positive relationship between Education and labor productivity)
(v) Sector-wise FDI inflows increase sector-wise labor productivity.

1.4 LINKS TO PUBLISHED PAPERS

Paper 1 has occupied more space, as compared to paper 2 and paper 3 since it covered a very wide topic of sectarianism which had to be explained in detail. All the three papers have already been published. Following are the titles and links to the discussion paper versions and peer-reviewed versions of published papers respectively:-

- Paper 1: 'What is the effect of foreign direct investment inflows on economic growth in Pakistan? An empirical analysis in the light of religious sectarianism as a catalyst for terrorism.

Link:https://www.wiso.uni-hamburg.de/fachbereich-sozoek/professuren/heise/zoess/publikationen/dp59.pdf

Link: https://iiste.org/Journals/index.php/EJBM/article/view/43260

- Paper 2: Analysing short-run and long-run Causality between FDI inflows, labor productivity and education in Pakistan.

Link:https://www.wiso.uni-hamburg.de/fachbereich-sozoek/professuren/heise/zoess/publikationen/dp61.pdf

Link:http://www.asianonlinejournals.com/index.php/AJEER/article/view/1380/1306

- Paper 3: Foreign direct investment inflows and labor productivity in Pakistan: a sector-wise panel Cointegration analysis.

Link:https://www.wiso.uni-hamburg.de/fachbereich-sozoek/professuren/heise/zoess/publikationen/dp65.pdf

Link:http://www.asianonlinejournals.com/index.php/AJEER/article/view/1247/1097

REFERENCES

Awan, A., Ahmad, W., Shahid, P., & Hassan, J. (2014). Factors Affecting Foreign Direct Investment In Pakistan. *International Journal of Business and Management Review, 2*(4), 21-35.

Kurtishi-Kastrati, S. (2013). The effects of foreign direct investments for host country's economy. *European Journal of Interdisciplinary Studies, 5*(1), 26.

Mohiudin, S. A., & Salam, M. A. (2011). Determinants of foreign direct investment in Pakistan. *Journal of Independent Studies and Research.9* (1), 117-124

Hussain, A. (2017). Foreign direct investment (FDI) and its impact on the productivity of domestic firms in Pakistan. *Pakistan Business Review, 18*(4), 792-812.

Sauvant, K. P. (2016). The Challenge: How Can Foreign Direct Investment Fulfil Its Development Potential? *OECD, Development Co-operation Report 2016: The Sustainable Development Goals as Business Opportunities.* 50-51

Siddiqui, K. (2014). Flows of foreign capital into developing countries: A critical review. *Journal of International Business and Economics, 2*(1), 29-46.

2. INDIVIDUAL PAPERS

PAPER- 1

What is the effect of foreign direct investment inflows on economic growth in Pakistan?

An empirical analysis in the light of religious sectarianism as a catalyst for terrorism

Abstract

FDI inflows play an important role in bringing growth and development to emerging economies. Pakistan is also heavily dependent on FDI inflows for achieving a high growth rate but the main obstacle being faced by Pakistan is an increasing number of terrorist activities. Although there is a vast literature available which throws light on FDI led economic growth relation based on terrorism but this study will surely add new dimensions to the ever-increasing research on overseas investment in developing countries, specifically Muslim countries, by correlating religious sectarianism with FDI and economic growth. The present study analyzes the effect of religious sectarianism on the relationship between FDI inflows and economic growth in Pakistan for the period of 1989-2016. For measuring sectarian terrorism, data of sectarian violence in Pakistan is

taken for carrying out the empirical analysis. This study explores an empirical relationship by testing a two-way causality between FDI inflows and economic growth of Pakistan, using the techniques of Johansen Cointegration and VECM model. For testing two-way causality, two separate models are constructed; in the first model, FDI inflows is taken as a dependent variable with economic growth and sectarian terrorism as independent variables. In the second model, economic growth is taken as a dependent variable and FDI inflows along with sectarian terrorism are taken as independent variables. ADF and KPSS tests have been applied to check the stationarity status of variables included in the dataset. Later Johansen Cointegration test has been applied twice for checking the strength of Cointegration. The results of VECM and system equation model show that the first model is more practical as the F-statistic is strong in case of the first model as compared to the second model but the purpose is achieved and a two-way causality has been confirmed by empirical analysis. Wald test and Granger Causality tests have been applied to check the Exogeneity and causality respectively. The results show that FDI is not weakly exogenous whereas the second model concludes that GDP is weakly exogenous. The same results are confirmed by the Granger Causality test.

Keywords: FDI inflows, Economic Growth, Sectarianism, Johansen Cointegration, Pakistan

List of Abbreviations

ADF = Augmented Dicky-Fuller (Test)

ARDL =Auto Regressive Distributed Lag

ARMAX =Autoregressive-Moving-Average Model

BoP = Balance of Payment

CPEC = China-Pakistan Economic Corridor

ECM = Error Correction Model

FDI = Foreign Direct Investment

GDP = Gross Domestic Product

IMF = International Monetary Fund

ISIS = Islamic State of Iraq and Syria

KPSS = Kwiatkowski-Pillips-Schmedt-Shin test

LDCs = Least Developed Countries

MNEs = Multinational Enterprises

NATO = North- Atlantic Treaty Organization

OIC = Organization of Islamic Conference

SAPs = Structural Adjustment Programs

SATP = South Asia Terrorism Portal

TSCS = Pooled time-series, cross-sectional

US = United States

VAR = Vector Autoregressive Model

VECM = Vector Error Correction model

WTC = World Trade Center

2.1 INTRODUCTION

Several studies have tested the relationship between foreign direct investment (FDI) inflows and economic growth and found different results. If an analysis has to be conducted without going into depth, figures and reports issued by WDI, OECD and other authentic sources of data convey that FDI inflows do exert a positive impact on economic growth especially in case of developing economies since FDI inflows bring a complete package of financial and human resources to developing countries which fill the gap between savings and investment, exports, and imports. A detailed study unfolds many factors that hamper this relationship and religious sectarianism leading to terrorism is amongst the top factors which have a negative impact on economic growth in developing and underdeveloped economies. According to a study conducted by Buckley et al (2002), the effectiveness of FDI inflows in recipient countries is dependent on a congenial environment and investment-friendly policies.

Pakistan is a developing economy with an annual growth rate of 4.24 percent in 2014-15[(1)] whereas 4.71 % has been reported for the fiscal year of 2015-16 by Pakistan Bureau of Statistics [(2)] and it needs a higher growth rate (minimum 7%) for achieving the goal of development. For this purpose, presently, FDI inflows serve as the main engine of growth. Pakistan has been implementing liberalization policies for attracting higher levels of FDI inflows. Moreover, policymakers are continuously working on creating a friendly environment for foreign investors, but the factor of terrorism is discouraging foreign investors. Apparently, terrorism is likely to be the most important factor disrupting FDI led economic growth in Pakistan. According to Shahzad et al (2016), an increase in terrorist activities creates uncertainty and instability in economic and political accomplishments. As a result, foreign investors fear that their investments and profits might run the risk of loss which discourages them to invest.

Religious sectarianism or extremism is a manifestation of prejudice and hatred amongst people believing in different religions as well as people belonging to different sects in the same religion and even encompasses the hatred between believers in a religion and non-believers.

---

(1) Economic Survey of Pakistan (2014-15)
(2) Pakistan Bureau of Statistics (2014-15)

For example the differences between Muslims and Jews and between different sects amongst the Muslims (Shia-Sunni conflicts) as well as the differences between believers and Atheists. In case of Pakistan, as stated by Fair (2015), the internal war based on terrorist activities has claimed more lives than the wars fought at borders and all these clashes are based on religious sectarianism.

The present study analyzes the effect of sectarian terrorism on the relationship between FDI inflows and economic growth in Pakistan for the period of 1989-2016. In this study, terrorism is taken in the sense of religious sectarianism, which is responsible for the maximum number of terrorist activities in Pakistan. For measuring religious sectarianism, data of sectarian violence in Pakistan is taken for carrying out the empirical analysis. Though there are many factors which affect FDI led economic growth relationship, but this study only concentrates on terrorism in the form of religious sectarianism as the main obstacle.

While there are numerous other factors like energy crises, underdeveloped infrastructure and, poor governance etc. but sectarian terrorism is the main stumbling block which is adversely affecting the entire socio-politico-economic structure of Pakistan and is having a deep impact on its international relations for the last more than one decade.

The present study seems to be a good contribution in the existing vast literature pertaining to the relationship between FDI inflows and economic growth because it would be adding new horizons through an empirical study to check the relationship between FDI inflows and economic growth in Pakistan in the light of religious sectarianism as a catalyst for terrorism depending on the most updated data till the current year of 2016. Moreover, this study is also unique and innovative in the sense it uses the factor of religious sectarianism to carry out the empirical analysis. The most common and dangerous form of sectarianism in Pakistan is religious sectarianism where different sects having a particular mode of ideology conduct terrorist activities in the form of target killings, suicide bombings, honor killings etc. This study is a useful addition in the existing literature since it tests two-way causation; in the first model, the variable of FDI inflows has been taken as the dependent variable with economic growth and terrorism as independent variables. In the second model economic growth plays the role of a dependent variable and FDI inflows along with terrorism work as independent variables. The rationale behind estimating two-way causality is to check the impact of sectarian terrorism on the relationship between FDI inflows and growth rate. Here an important point is worth mentioning that for checking two-way causality, the majority of the studies use Granger Causality test but its results are not that much reliable, yet at the end,

Granger Causality test is also applied to check the direction of causality. In addition, Wald test has also been applied to check exogeneity. This paper is divided into 10 sections. Section 1 explains the introduction, section 2 is a detailed review of literature based on existing studies. Section 3 concentrates on data and methodology. Section 4 explains the empirical analysis. Section 5 estimates the Johansen Cointegration analysis. Section 6 tests the Error Correction Model. Section 7 deals with the Impulse response function and variance decomposition. Section 8 focuses on VEC Granger Causality test/Block Exogeneity Wald test. Cointegration relationships have been discussed in section 9 and the last section explains empirical findings and concludes the study.

2.2 OBJECTIVE OF STUDY

This study is an attempt to analyze the relationship between FDI inflows and Economic growth; taking religious sectarianism as the main and most important facet of terrorism and investigating into its relationship with FDI and growth. For this purpose time series data of Pakistan over the period of 1989-2016 has been analyzed. As this is one country study using time series analysis, the traditional ADF tests and Cointegration techniques have been used to test the relationship. KPSS test is also used for testing stationarity of data.

To remove all doubts, two-way causation has been used by replacing dependent and independent variable for which Granger Causality test has not been preferred as its results are not that much reliable as compared to Cointegration and VAR models.

2.3 LITERATURE REVIEW

The literature review will be focusing on the existing body of knowledge explaining the relationship between FDI inflows and economic growth in the presence of religious sectarianism leading to terrorism. The literature review is divided into three sections. Section 1 will be discussing FDI inflows in detail and their relationship with religious sectarianism leading to terrorism, section 2 will be throwing light on the relationship between FDI inflows and economic growth and the last section is based on detailed discussion about terrorism, religious sectarianism, sectarian violence and their relationship with FDI inflows and growth rate of Pakistan, keeping present scenario under consideration. Also, it will explain the relationship of religious sectarianism and sectarian violence with terrorism. Moreover, all three sections will be evaluating the relevant variables and explaining each variable separately while analyzing the history, the present trends and the effects on Pakistan's economy. Historical patterns are discussed in order to increase the understanding of the subject matter and to explain the current situation with more clarity.

2.3.1 FOREIGN DIRECT INVESTMENT INFLOWS

This section will be discussing studies related to FDI inflows and terrorism which focus on Pakistan as a subject country. According to Aqeel et al (2004), developing countries like Pakistan are always faced with the problem of scarcity of capital and resources for satisfying domestic needs. On the other hand, due to high demand in developing economies, it is profitable for developed countries to invest in developing countries and thus FDI becomes a source of mutual benefits for both north and south.

There is a huge literature on benefits of FDI inflows to recipient country like Falki (2009), who explains that FDI inflows benefit host country by increasing employment opportunities as when a foreign firm invests in a host country, it establishes its own systems which provide jobs to many locals. Moreover, FDI is furnished with modern technology which increases the productivity and increases human capital, boosts exports which leads to an improvement in the balance of payment deficits. In addition, new technology facilitates exploitation and proper allocation of local raw materials.

2.3.2 Historical Patterns of FDI inflows in Pakistan

In 1947, the newly born state of Pakistan was faced with many challenges and the basic one was the question of its survival. In the presence of such basic needs, other economic activities remained at the back.

During the first 11 years (1947-1958), Pakistan maintained a strict control over FDI and liberalization policies as the country was not stable [(3)].

Husain (2009), carried out a detailed study about different political regimes of Pakistan and their performance.

According to Hussain, Ayub Khan's government is labeled as "The Golden Sixties". Khan's government came into being in October 1958. Ayub Khan implemented five-year plans for economic planning. This gave impressive results with the annual growth rate of Pakistan increasing from 3 percent to 6 percent. Many advances were made in agriculture and manufacturing sector. Liberalization policies were carried out and trade was encouraged.

---

(3) Abbas (2015)

Hussain also claims that if Ayub Khan's government had continued for another two decades, Pakistan would have emerged as a developed country. But due to opposition's claim of increased income disparities, Khan's government and Pakistan went through a set-back in the form of separation of East Pakistan in 1971 now known as Bangladesh. This led to more instabilities and proper attention could not be given to liberalization policies.

However, the next government, headed by Zulfiqar Ali Bhutto followed the policy of nationalization which resulted in negative effects on liberalization policies.

The regime of Zia-ul-Haq (1977-1988) has been analyzed in detail by Mohiuddin (2007) [(4)]. According to the author, in this era, Pakistan witnessed both Islamization and economic liberalization which led to an annual growth rate of more than 6 percent. His regime promoted business-friendly policies including privatization of public sector industrial units. Government's monitoring role was lessened and the industrial licensing procedure was liberalized.

Mohiuddin further added that foreign remittances from overseas Pakistani workers touched new heights during Zia years and by 1984, these foreign remittances were not only the largest source of foreign exchange earnings for Pakistan's economy, since about 86 percent of the trade deficit was met through these remittances, but also covered the 6 percent gap between savings and investments and these were four times greater than the net aid inflows to Pakistan.

According to Hussain (2009), Zia cooperated with the United States (US) for overthrowing the Soviet Union from the occupation of Afghanistan, due to which large-scale military and economic assistance flowed from the US to Pakistan.

Although this short-term objective was achieved but in the long-term, the spread of Kalashnikov and drug culture, ethnic and sectarian violence, and the emergence of jihadist parties and spread of militancy are also attributed to this era. With regard to Islamization, State laws were modified and new Shariah laws were enforced.

---

(4) For details see Chapter "Islamization and Liberalization" of the Economy under the Military Government of Zia-ul- Haq (1977-1988)

With the withdrawal of Soviet Union from Afghanistan, US also lost interest resulting in steep short fall of military/economic aid to Pakistan, as a consequence of which, Pakistan had to approach the International Monetary Fund (IMF) for assistance in 1988.

Zakaria (2014) states that the period from the early 1980s onwards to early 2000 is marked with Structural Adjustment Programs (SAPs) and trade reforms under the supervision of International Monetary Fund (IMF) and World Bank (WB). The purpose of SAPs was to implement the system of free market economy and Pakistan cooperated and reduced trade barriers like tariffs and other quantitative restrictions. These steps led to an increase in trade but FDI inflows also increased.

Zakaria also conducted an empirical analysis to study the effects of trade liberalization on exports, imports and trade balance in Pakistan for the period of 1981-82 to 2007-08 and found that trade liberalization worsened the balance of trade in Pakistan since liberalization policies resulted in higher imports as compared to exports increasing payments rather than receipts.

Akbar and Akbar (2015) studied the patterns of FDI inflows in Pakistan for the period of 2000-2013. They carried out an empirical study related to determinants of FDI inflows in Pakistan and found that FDI inflows increased during 2000-2008 and fell during 2009-2013. Their arguments were consistent with the study carried out by Hussain (2009). The better performance during 2000-2008 was due to the liberalization policies carried out by the military government of Gen Pervaiz Musharraf. During that period, FDI inflows increased to a great extent leading to improvement in economic indicators in Pakistan and making it third fastest growing economy after India and China. But FDI inflows fell during the period of 2009-2013 because of bad governance, poor law and order conditions and especially because of high terrorist activities.

2.3.3 Further details and discussion on already established literature

According to Iqbal and Lodhi (2014), Pakistan's economy has been facing instability both at the micro and macro level resulting in a fall in FDI inflows and an increase in poverty and unemployment. Religious violence and extremism have worsened the situation and their roots are connected to historical political policies. Authors add that the acts of violence have become a common practice to achieve ideological, religious and political goals. These activities include terrorism specifically communal and sectarian violence. Moreover, after the incidence of 9/11, religious sectarianism and extremism emerged in its most severe forms in the country leading to negative impact on international relations resulting in low FDI inflows and continuous decline in economic growth.

According to a study conducted by Mehmood (2014), Pakistan is attracting more and more researchers for studying the impact of terrorism on the economy since it has a long and intense history of terrorism, consequently, researchers are able to study and analyze the economy of Pakistan for a long-run time period. The history goes back to the Zia-ul-Haq era (as mentioned before). According to the author, estimates of the direct cost of post 9/11 terrorism is around 7 billion US dollars, cumulatively terrorism has cost Pakistan around 33.02% of its real National Income.

Pakistan ranks 127th at the UN Human Development Index with 22.6% of the population living on less than 1.25 dollars a day (according to UN statistics, 2011[(5)]). This is an alarming situation for Pakistan and it needs an early end to the war going inside based on terrorist activities related to religious discrimination and sectarian violence.

Most of the studies related to FDI, economic growth and terrorism mainly focus on the after-effects of 9/11 incident as Muslim countries got extremely affected by the terribly sad incident.

According to Rehman and Askari (2010), although economists agree that there are many determinants of economic growth but it needs to go in more depth. Quoting a study conducted by Barro (2004), the authors mentioned a very important point:-

"*Successful explanations of economic performance have to go beyond narrow economic variables to encompass political and social forces*."[(6)]*(Page 64)*

According to the authors, religion is one such factor which not only affects social norms but business, politics, and economic activities are also affected by religious views and practices. They developed an Economic Islamicity Index (EI2) to analyze the working of Islamic countries and for that, they took 208 countries (according to sub-groups which are High, Upper-Middle, Lower-Middle, and Low Income-Countries, OECD and Non-OECD Countries, OIC Countries, and Non-OECD Non-OIC Countries, and Persian Gulf Countries). According to their results, Pakistan ranks 145 among the Organization of Islamic Conference (OIC). The rank shows the level of performance of the particular Islamic country in the context of governance, economic activity, policy making etc. but they emphasized that these are preliminary results and a concrete conclusion cannot be drawn.

---

(5) United Nations (2010:8)
(6) Barro (2004)

According to their conclusion

"*It is difficult at this time to draw more concrete conclusions other than to say that it is our belief that most self-declared Islamic countries have not adopted economic and financial policies that are in conformity with Islamic teachings." (Page 24)*[7]

Authors add that if Islamic teachings are to be considered, they do not include violence, division in sects or terrorism but these unfortunate incidents are taking place in many Islamic countries including Pakistan.

Another study by Qian and Back (2011) analyzes the after-effects of 9/11 attacks on both developed and developing economies. According to them, the 9/11attacks had extremely appalling effects on the global economy as a whole. They stated that these effects are more serious in the case of developing economies and high political risk exerted negative impacts on FDI inflows.

They mentioned three major types of political risks that caused harm to FDI inflows and growth of developing countries:-

(i) Nationalization of foreign assets resulting in a frequent breach of contracts leading to a threat to foreign investors.
(ii) Unstable policies related to FDI.
(iii) War, political violence including terrorism which leads to damage of foreign assets.

All these factors exert a negative impact on working of an economy especially developing economies since they have a high rate of terrorist activities based on religious sectarianism and discrimination. As a result, foreign investors are discouraged from investing which leads to economic, political and social shocks in developing economies.

Unfortunately, Pakistan is also going through a tough time because of all the factors which hinder investment and growth especially in recent past, sectarian terrorism and violence have added fuel to the fire and nation is being divided in sects and killing each other in the name of religion.

---

(7) Rehman and Askari (2010)

Hyder et al (2015) in their study, empirically analyzed the relationship between terrorism and economic growth in case of Pakistan. They emphasized that though terrorism is not a new phenomenon but it gained more importance after the 9/11 attacks on the US in 2001. Although this tragic incident affected the whole world but developing countries of the Middle East and South Asia faced more severe consequences and a series of war on terror started. In their own words

"*Pakistan has been a victim of terrorism for the last three decades, due to her involvement in wars in Afghanistan. Besides involvement in those wars, ethnic and sectarian conflicts among different factions and separatist nationalistic movements on Pakistani soil are other sources of terrorism in Pakistan."(Page 705)* [(8)]

They added that sectarian conflict weighed down Pakistan and it started during the Zia-ul-Haq regime. The Islamization policies of Zia-ul-Haq divided the nation into different sects leading to religious conflicts and Sectarianism (each sect claimed that it is superior to the other).

For empirical analysis, they applied the technique of Johansen Cointegration test and concluded that Pakistan has paid and is still paying the cost of terrorism in the form of loss of human lives, poverty, capital flight, destruction of infrastructure, reduction in exports, low public expenditures on law and order.

As a result, economic growth has been negatively affected. In addition, due to terrorist activities, FDI inflows fell sharply and international trade and business activities have been damaged to a great extent.

Presently Pakistan is facing many problems and they are not just limited to economic activities but political instability and extremely disturbed social conditions are acting as obstacles in achieving the goal of development. Terrorism, internal conflicts, and skirmishes at the international level are giving rise to extremely hostile conditions for foreign investors still FDI inflows are showing an upward trend mainly due to the biggest project of China-Pakistan Economic Corridor (CPEC). As a result, the FDI literature related to Pakistan is continuously adding new prospects and details making researchers more curious to carry out studies related to FDI in Pakistan.

---

(8) Hyder et al (2015)

Some important figures related to FDI inflows in Pakistan have been mentioned in the following table. One important thing to note is that although overall FDI inflows have fallen, yet the net effect is positive because almost half of the total FDI that Pakistan received in the last fiscal year originated from China alone. FDI from China amounted to $593.9 million in 2015-16, which is up by 131.3% from 2014-15 and constitutes 46.3% of the total FDI Pakistan received over the entire fiscal year. (Published in *The Express Tribune, July 21st, 2016)* [(9)]

(9) https://tribune.com.pk/story/1146075/2015-16-china-helps-fdi-pakistan-surges-38-8/

C) Some Important Figures

Foreign Investment inflows in Pakistan ($Millions)

Table 1.1 Country Wise FDI Inflows to Pakistan ($ Million)

COUNTRY	2007-08	2008- 09	2009- 10	2010- 11	2011- 12	2012- 13	2013- 14	2014-15	2015-16
USA	1,309.3	869.9	468.3	238.1	227.7	227.1	212.1	209.0	(65.5)
UK	460.2	263.4	294.6	207.1	205.8	633.0	157.0	174.3	79.8
U.A.E	589.2	178.1	242.7	284.2	36.6	22.5	(47.1)	216.4	164.2
Japan	131.2	74.3	26.8	3.2	29.7	30.1	30.1	71.1	21.6
Hong Kong	339.8	156.1	9.9	125.6	80.3	242.6	228.5	83.4	130.9
Switzerland	169.3	227.3	170.6	110.5	127.1	149.0	209.8	2.8	76.0
Saudi Arabia	46.2	(92.3)	(133.8)	6.5	(79.9)	3.2	(40.1)	(64.8)	(102..2)
Germany	69.6	76.9	53.0	21.2	27.2	5.5	(5.7)	(20.3)	(33.0)
Korea (South)	1.2	2.3	2.3	7.7	25.4	25.8	24.4	14.3	(18.6)
Norway	274.9	101.1	0.4	(48.0)	(275.0)	(258.4)	(21.6)	2.7	172.3
China	13.7	(101.4)	(3.6)	47.4	126.1	90.6	695.8	255.3	593.9
Others	2,005.2	1,964.2	1,019.6	631.3	289.7	285.5	224.4	261.7	90.4
Total including Pvt. Proceeds	5,409.8	3,719.9	2,150.8	1,634.8	820.7	1,456.5	1,667.6	851.2	1,281.1
Privatization Proceeds	133.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FDI Excluding Pvt. Proceeds	5,276.6	3,719.9	2,150.8	1,634.8	820.7	1,456.5	1,698.6	851.2	1,281.1

SOURCE: BOARD OF INVESTMENT AND STATE BANK OF PAKISTAN

Note: Pakistan's Fiscal Year runs from 1st July till 30th June next year. The figures in brackets are in negative.

Source link: *http://boi.gov.pk/ForeignInvestmentinPakistan.aspx*

2.4 FDI INFLOWS AND ECONOMIC GROWTH IN PAKISTAN

This section of literature review concentrates on the relationship between FDI inflows and economic growth of Pakistan. Since Pakistan is a developing economy and for developing countries, the high economic growth rate is very important to enter the comity of developed countries. The same point has been emphasized by Chenery and Shout (1966) and according to them the present focus of all developing countries is towards getting a high growth rate of economic and social indicators. To achieve this goal, foreign assistance is playing the most important role which is leading towards an increase in economic growth.

Iqbal and Zahid (1998) conducted an empirical study to analyze the effects of some important macroeconomic variables on Pakistan's economic growth. The authors state that Pakistan has been facing a downward trend in economic growth mainly because of unstable political and economic conditions which include an increase in foreign debt, low demand of Pakistani products in international markets, poor law and order situation, low level of physical and human capital. The empirical results suggested that openness of Pakistan's economy promoted growth. Also, the government should provide education in order to increase human capital.

There are many determinants of economic growth in Pakistan but out of all these, FDI inflows have proved to be the most important determinant amongst others. Therefore many studies have empirically tested the relationship between FDI inflows and growth rate in Pakistan. Malik (2015) carried out an empirical study to examine the impact of FDI inflows on economic growth of Pakistan over the time period of 2008-2013 and found that FDI is not the only factor leading to high economic growth but trade liberalization and domestic capital also have a positive impact on growth rate. The author also recommended that the government should take steps to increase both foreign and domestic investment and should provide protection to domestic industries so that total output increases which will lead to a higher economic growth in Pakistan.

Atique et al (2004) conducted an empirical study by using data of Pakistan covering a period of 1970-2001 and concluded that the positive impact of FDI on economic growth of Pakistan increases under an export promotion (EP) system as compared to import substitution (IS) regime. They suggested that Pakistan must adopt such policies which encourage FDI inflows as Pakistan's economic growth is highly dependent on FDI inflows. Another empirical study carried out by Gudaro et al (2010) analyzed the impact of FDI inflows on the growth rate of Pakistan, by adopting a multiple regression model using data of Pakistan covering the time period of 1981-2010. They found that an increase in FDI inflows leads to a higher growth

rate and thus government must concentrate on policies to create a friendly environment which could attract foreign investors.

Zafar et al (2016) empirically tested the impact of FDI flows and trade openness on the growth rate of Pakistan by using time series data for the years of 1994-2014. After applying the Johansen Cointegration test and ECM, they found that FDI has a positive and significant impact on growth rate but trade openness has a negative, though significant, relationship with growth rate. The authors add that since FDI has a positive relationship with growth rate, factors like political stability and improvement in macro-level variables can make this relationship stronger over a long time period. Regarding trade openness, although it is significant but with a negative sign because Pakistan being a developing country, is presently unable to compete with foreign products and thus domestic products and industries are facing loses both in national and international markets. They suggested that better policies of trade openness can result in a positive impact on the growth rate.

Ghazali (2010) is of the view that FDI inflows have a strong impact on economic activities of Pakistan and they play a significant role in increasing exports and economic growth rate of the country. The author conducted an empirical analysis to test the causal relationship between FDI inflows, domestic investment and economic growth of Pakistan covering a period of 1981-2008. The Cointegration analysis reveals that FDI leads to an increase in economic growth and this relation runs both ways. The results also suggest that domestic savings should be encouraged in Pakistan as they lead to an increase in both domestic and foreign investment, resulting in a higher growth rate.

Javaid (2016) conducted an empirical analysis to investigate the relationship between FDI inflows and growth rate of Pakistan by using time series data covering the range from 1966 to 2014. After applying the ARDL-ECM technique, the results indicated that FDI inflows have a significant and positive impact on growth rate in Pakistan both in short and long-run.

Ahmad et al (2012) in their study empirically investigated the relationship between FDI inflows and economic growth of Pakistan. After applying the Cointegration test and ECM on time series data of Pakistan for a period of 1971-2007, they found that there exists a positive relationship between growth rate and FDI inflows both in short and long-run. In addition, the authors recommend that policymakers must formulate FDI attracting policies so that economic growth keeps on increasing.

Similarly, Najaf and Najaf (2016) also found a positive relationship between FDI inflows and economic growth of Pakistan. They used data of

Pakistan from 1991-2011 to empirically test the relationship between major macroeconomic variables and FDI inflows. Their results suggested that FDI has a positive relationship with the growth rate of Pakistan but inflation has a negative impact on FDI. Also, political stability is very important for attracting more FDI. They also emphasized on bringing political stability and a friendly atmosphere to attract more FDI in Pakistan. Quoting their own words

"*A dynamic market economy requires political stability for its best possible Outcomes. Political instability generates economic uncertainty because of turn down in Investment. Political instability is reducing the confidence of investors in our country. In business sector decisions are mainly based on the political stability not on the type of the government. Business friendly environment must be created on priority to attract large FDI. To maximize the benefits of FDI persistently Pakistan should also focus on developing human capital and technology Jobs for unskilled population when compared with service sector." (Page 101)* [(10)]

On the other hand, many studies find that FDI has either no effect on economic growth of Pakistan or has a negative influence on growth rate. Like Ali (2014), in his study explored the impact of foreign capital flows on economic growth in Pakistan for the period of 1972-2013. The study divided foreign capital flows into three categories; foreign debt, FDI and worker's remittances. The results showed that foreign capital flows hamper growth over a long-run time period. The study suggested that domestic investment must be encouraged to have a high rate of economic growth since high foreign debts hinder economic growth of Pakistan. Moreover, FDI in the presence of better macroeconomic policies and improved human capital can be beneficial for long-run growth and development of Pakistan's economy.

Similarly, Saqib et al (2013) in their study state that economic performance of any country depends on many factors but in case of developing countries, FDI inflows have proved to be the most important determinant of economic growth. The authors empirically tested the relationship between FDI inflows and economic growth of Pakistan by using time series data covering the period of 1981-2010. In addition to FDI inflows, four other variables are also tested which include debt, trade, inflation and domestic investment. The results are totally opposite as compared to other studies testing the relationship between FDI inflows and growth rate.

---

(10) Najaf and Najaf (2016)

Their findings indicate that there is a negative relationship between FDI inflows and growth rate of Pakistan. Same results were obtained for the other variables except for domestic savings which show a positive impact on growth rate. The probable reason for conflicting results could be due to the profits taken back by the investing country which may be due to the limited capacity of the host country to absorb new knowledge and technology transferred through FDI inflows.

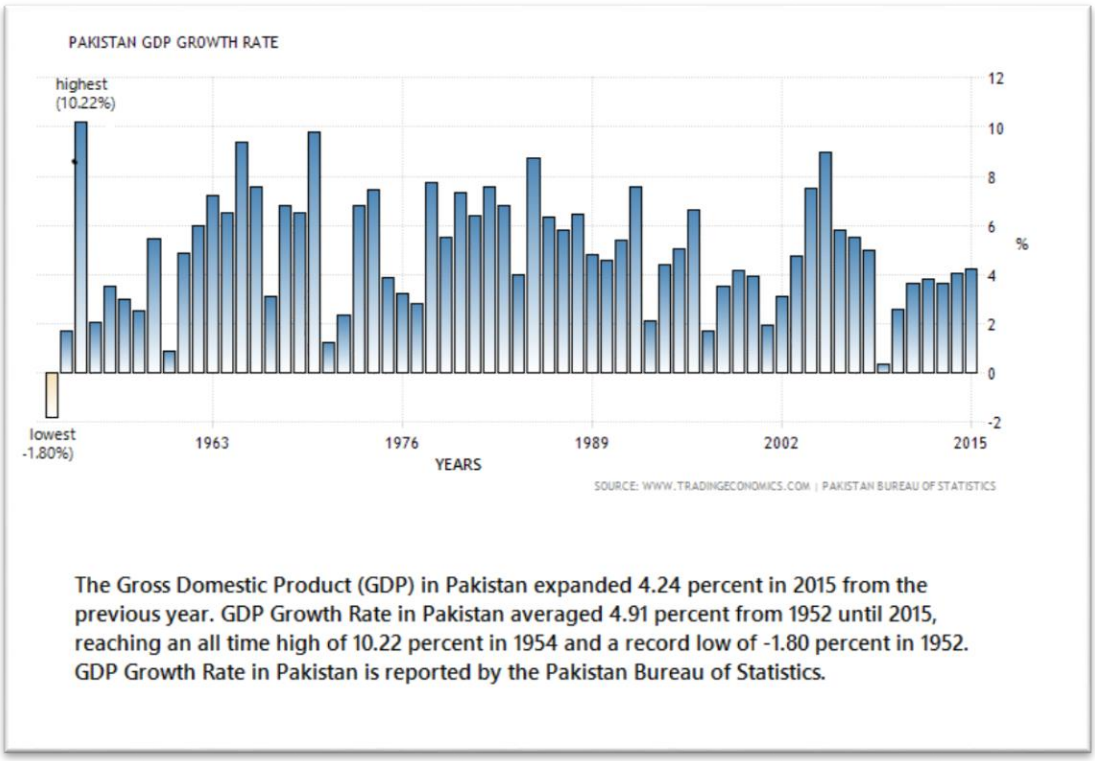
Arshad (2012) found the same results regarding the relationship between FDI inflows and economic growth. The author used time series data of Pakistan for the period of 1965-2005 and after applying Cointegration VAR framework on the variables of FDI, trade (exports and imports) and economic growth of Pakistan, he found that both exports and imports have a positive long-run relationship with growth but the impact of FDI on growth is not significant. Granger Causality test also revealed that FDI does not cause GDP growth but GDP causes FDI.

Yasir and Ramazan (2013) conducted an empirical study to test the relationship between FDI inflows and growth rate of Pakistan. This study made use of time series data covering the period of 1978-2010 and applied ARDL (Auto Regressive Distributed Lag), model. The results conclude that FDI and exports do not have a strong long-run relationship with the economic growth. Authors recommended that policymakers should concentrate on devising export promotion policies concentrating on specialization in production and economies of scale. This would stimulate Pakistan to import high-level products and modern technology for strengthening domestic industry which would result in a positive impact on FDI-led economic growth as the country would be able to absorb the new techniques and better technology being transferred through FDI inflows.

2.4.1 SOME FIGURES

Economic growth of Pakistan has shown different trends over time since 1947 and many factors have contributed towards these fluctuations. Policymakers and governments have been implementing various measures to improve economic conditions, yet it has been facing both upwards and downwards trends over the period of time. Trends of economic growth of Pakistan can be observed with the help of the following graph:-

Graph1.1: GROWTH RATE OF PAKISTAN OVER YEARS (1952-2015)



SOURCE: https://tradingeconomics.com/pakistan/gdp-growth-annual

(Time Period: Max, Graph type: Column)

NOTE: Gross Domestic Product (GDP) or Gross National Product (GNP) are used as a proxy measure for economic growth.

As mentioned earlier that in 2016, a growth rate of 4.71 has been reported by the Pakistan Bureau of Statistics, State Bank of Pakistan and Economic Survey of Pakistan (issued by Ministry of Finance, Pakistan)

2.5 TERRORISM, FDI INFLOWS AND GROWTH RATE

Although religious sectarianism as a catalyst of terrorism in Pakistan has been discussed in some detail in section 2.1, yet this section will also throw light on the fact that religious sectarianism is the most important facet of terrorism affecting FDI led economic growth in Pakistan. However, before that, this section will discuss terrorism in detail. In addition, its impact on FDI and economic growth relationship shall be debated initially through the international studies available in the literature and in later part the details shall be limited only to the case of Pakistan. Besides FDI, terrorism and economic growth, many other determinants of all three variables will be discussed in detail.

2.5.1 What is terrorism?

Terrorism has many forms and often its results are unpredictable but they are always disastrous. There are many definitions of terrorism given by different researchers, analysts, writers etc.

According to Enders and Sandler (2011),

"Terrorism is the premeditated use or threat to use violence by individuals or subnational groups to obtain a political or social objective" (page 4) [(11)].

According to these authors, there are mainly two motives for carrying out terrorist activities:-

1) *Political Motives*—in this case violence and threats are made to get a political decision maker to respond to the demands made by terrorists.
2) *Social Motives*—to create fear in the society, to expand their audience, and to get their demands fulfilled.

Ismail and Amjad (2014), state that the existence of terrorism indicates that there are tensions at both social and political level. Terrorism results not only in substantial political and economic damage, but the most painful result of this activity is the loss of human life. There are many causes of terrorism like poverty, unemployment, economic and social inequalities, religious frictions, international conflicts etc.

There are many definitions and views about 'what is terrorism?' but all have one thing in common that terrorism is based on creating political, economic, social and religious unrest. Besides, it creates tensions between different countries.

---

(11) Enders and Sandler (2011)

Moreover the motives of terrorism cannot be easily summed up since whenever a terrorist activity takes place, different motives are presented, but mostly those are based on guess work and in many cases those remain shrouded in mystery and reality never sees light.

2.5.2 Who is a terrorist?

There is no consensus regarding a precise definition of a terrorist that could explain his traits. Terrorist, being a human being, cannot be attached to a specific nationality or religion —it is a very complex issue which cannot be put in few words to create a specific profile because one person/group can simultaneously be considered as a terrorist by some and a freedom fighter/hero by others. Taking from most narrow to the widest act of terrorism, a normal human mind can comprehend, a person shouting at home can be a terrorist…and a person killing others through gun attacks, bomb blasts, suicide bombing or any other way of damaging human life, playing with human emotions, bringing harm to economic and political resources---- also belongs to this category but in some cases, he/she may be considered a national hero. Why he conducts such activities and even worst how he can blow himself up--- there is no single and particular answer but whatever this is, it is related to the human psyche. *(12)*

2.5.3 A brief history and present scenario of terrorism in Pakistan

Romaniuk (2015) in reference to *Emon Murphy's 'The Making of Terrorism in Pakistan'*, has argued that Pakistan has been referred to as a "terrorist state" by various countries, religious scholars, policymakers and many national and international organizations. Many view terrorism in Pakistan as a result of religious conflicts and extremism. Moving on to a narrow aspect, different sects in religion (Islam) are held responsible for terrorist attacks. According to Romaniuk's analysis, Murphy in his book has referred to the period of Zia-ul-Haq (1977-1988) a "turning point"-----The Islamization of Pakistan. Foreign elements in this case, have been recognized as Afghan Jihad and Soviet Invasion of Afghanistan, the role of the United States, Saudi Arabia, and Iran and most importantly the rise of sectarian violence and terrorism. Further, the issue of Kashmir dispute between India and Pakistan has always added fuel to fire.

---

(12) Author's own views. This topic has not been discussed in detail as it is a passing reference but has been included in study because this question also needs attention keeping in view the present global scenario.

According to a study by Hussain (2010), internal conflicts led to the creation of mainly four types of terrorist groups in Pakistan based on the following differences:

(i) Language
(ii) Sect based (sectarian)
(iii) Race-based (especially refugees from India who settled in Karachi, had their grievances about the transfer of the country's capital from Karachi to Islamabad).
(iv) Religion (majority and minority religious groups)

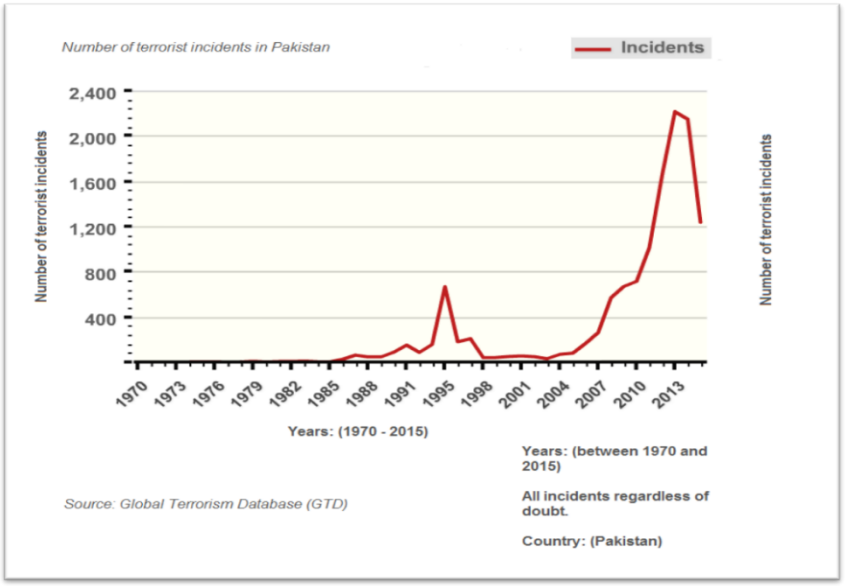
Unfortunately, the number of terrorist activities in Pakistan have been increasing which includes all kinds of viciousness starting from domestic violence, suicide bombing, target killing, kidnapping etc.

According to Farooq and Khan (2014), immediately after the attack on World Trade Center (WTC) in the US in September 2001, American President Bush declared that Osama Bin Laden was the prime suspect and demanded from the Taliban government in Afghanistan to hand him over to the US. When the Taliban government did not accept the US demand, the American and NATO forces attacked Afghanistan by declaring it a "war on terrorism" and on American demand, Musharraf, the then military ruler of Pakistan, became an ally of the American and NATO forces without consulting his Nation. Since then Pakistan is facing increased terrorist attacks as a result of which it has greatly suffered socially, economically and politically. The authors add that the US had a multi-purpose agenda including inter alia

(i) To block the spread of political Islam and the unity among the regional countries like Pakistan, Iran, Afghanistan and Central Asian Republics,
(ii) To limit the growth and development of Pakistan as the only nuclear Muslim State so that it remained dependent on US aid, and
(iii) To contain the rise of China as an Economic and Military power.

Figure 2 shows the number of terrorist incidents which took place in Pakistan during the period of 1970-2015. The terrorist activities/incidents show a continuous upward trend after 2001 because mainly Pakistan witnessed terrorism at its peak after the 9/11 incident. Drone attacks increased resulting in an unprecedented high death toll. In addition, the US and NATO attacks also led to an increase in terrorist activities but the government started a military operation (Zarb-e-Azab) on 15th June 2014 which was successful and terrorist activities decreased considerably.

Graph1.2 NUMBER OF TERRORIST INCIDENTS IN PAKISTAN (1970-2015)



Source: Global Terrorism Database (GTD)
LINK:
https://www.start.umd.edu/gtd/search/Results.aspx?search=Pakistan&sa.x=0&sa.y=0&sa=Search

2.5.4 Terrorism in the form of religious Sectarianism, FDI inflows, and economic growth

(i) International Studies

Quin and Back (2011) in their study have discussed the effects of political risks on FDI in case of both developed and developing countries. For carrying out empirical analysis, they used 12 category political risk index and reached the following conclusions:-

(a) Political risks significantly affect the determinants of FDI in both developed/industrialized and developing economies.
(b) After comparing the political risk components, they found that all aspects of political risk do not have the same impact on FDI rather political risks have become more significant and important determinants of FDI when developed/industrialized countries are analyzed.

In addition, their findings suggest that a good democratic structure and an investment-friendly environment encourage FDI flows for both

industrialized and developing countries. They added that better law and order situation, low religious tensions and high government stability are the factors that lead to high FDI inflows to developing countries.

According to Busse and Hefeker (2007), FDI is very important for economic development in case of emerging and developing economies. The authors examined the influence of government stability, socio-economic conditions, investment profile, internal and external conflicts, corruption, military in politics, religious tensions, law and order, ethnic tensions, democratic accountability and quality of bureaucracy (basically all the factors which are related to either violence/terrorism and economic growth/development) on FDI inflows. For this purpose, a sample of 83 developing countries was used covering a time period of 1984-2003. Their results concluded that the political risk and institutional indicators (mentioned above) are first analyzed by Multinational Enterprises (MNEs) while investing in developing countries. If there is government instability, religious tensions, and doubts about democratic accountability, MNEs are not much confident about the safety and profitability of their investment. Besides, all these factors are also related to economic growth which gets affected.

Osemwengie and Oriakhi (2012) conducted an empirical analysis to investigate the impact of National Security on FDI in Nigeria. They used the data of Nigeria covering the period of 1980-2009 and after applying the Least Square method, they found that there is a negative relationship between National Security and FDI.

The authors recommended that policymakers should give attention towards solving security issues like kidnappings, killings, corruption, bombings, domestic terrorism [(13)], social unrest and suicide bombings as they all result in loss of tourism, destruction of infrastructure and create a fear of loss among foreign investors and, as a result, economic growth gets negatively affected.

---

(13) According to authors, "Domestic terrorism is where the perpetrators, victims, supporters, and targets are all from the home country and the incidents normally occur on home soil. For instance, the kidnapping of a citizen for political purposes or economic reasons, the suicide bombing of a church or government buildings are domestic terrorist incident."(Page 90)

They also mentioned that the issue of terrorism gained more attention after the incidents of 9/11 attacks. These issues must be solved not just in Nigeria but in all other developing countries so that they can attract higher FDI for achieving a high level of economic growth rate.

Li and Schaub (2004) statistically analyzed the effect of economic globalization on transnational terrorism [(14)] within countries by using a sample of 112 countries and data from 1975 to 1997. The terrorist attacks of 9/11 have been mentioned as an example of transnational terrorism.

After applying the pooled time-series, cross-sectional (TSCS) design, their study concluded that trade, FDI and portfolio investment of a country have no direct impact on transnational incidents within its geographical boundaries. According to their findings, when development level in a country's economic partner improves, the incidents of transnational terrorist attacks decrease within the country which means that increasing economic integration between the country and its economic partners helps in discouraging the terrorists from those partner countries to undertake terrorist attacks within this country.

Alomar and El-Sakka (2011) are of the view that the after-effects of 9/11 terrorist attacks have clearly proved that terrorism has a negative impact on FDI inflows, economic growth and trade especially in case of developing countries. They conducted an empirical analysis using a panel data of 136 LDCs. After applying the Cointegration test, their study concluded that terrorist activities have a negative and significant impact on FDI inflows in the case of LDCs. As a result GDP growth rate also gets negatively affected.

Meierrieks and Gries (2013) in their study mention that although seemingly terrorism is negatively related to economic growth yet the relationship is complex as there are different conclusions/viewpoints related to this topic by different authors. They add that on one side, terrorism results in loss of human and physical capital, on the other side it has devastating effects on consumption, investment, government spending, and savings. It also results in creating an uncertain environment for foreign investors leading to a decline in foreign investment.

---

(14) According to authors "A transnational terrorist incident in a country involves victims, perpetrators, targets, or institutions of another country."(Page 231)

They used panel data of 160 countries from 1970-2007 and found that terrorism has severe effects on economic growth of Islamic countries with low levels of politico-institutional development, political instability, and persistent terrorist activity. On the other hand, they stated that advanced/western countries need not fear about terrorist activities because of strong economic and political stability.

Freytag et al (2011) are of the view that socio-economic development should not be taken too lightly while assessing the impact of terrorism on the economy. According to them, there are many social, economic and political reasons behind terrorism but religious conflicts are a prominent reason and cannot be ignored. Their empirical analysis concentrated on socio-economic situations of 110 countries between 1971 and 2001. They found that poor socio-economic conditions provide more attractive circumstances for terrorist activities which result in the destruction of political, economic and social activities and bring an overall loss to economic growth. Regarding religion as a reason for terrorism, religious differences and fractionalization into sects is a major cause of terrorism in Islamic countries. Their overall results indicated that consumption level, trade openness and investment (both domestic and foreign) get affected by terrorism and overall growth gets negatively affected.

Caruso and Schneider (2011) empirically investigated the socio-economic determinants of terrorism and political violence in Western Europe by taking a sample of 12 Western European countries from 1994-2007. They argued that poor economic conditions and lack of economic opportunities are likely to increase terrorist activities and political violence. According to this study, the larger the set of economic opportunities for an individual, the lower would be the likelihood for that individual for involving in terrorist activities. Empirical results show that if GDP per-capita increases by 1 percent, the expected number of terrorist incidents would decrease by 3.5 percent while an increase of 1 percent in youth unemployment would translate into 0.5 percent increase in terrorist activity. According to their findings, frustration and poor economic expectations fuel terrorist activity. Terrorist brutality measured in the number of victims per accident is positively associated with real GDP per-capita and its duration is associated with the continuation of such policies which make terrorists more brutal for getting more attention.

Kis-Katos et al (2011) in their study analyzed the determinants of the origin of domestic and international terrorism by using a panel data set of 159 countries covering a time period of 1970 to 2007. They conclude that terrorist activities increase as GDP per-capita increases, i.e. healthier countries are more prone to terror. High level of political and civil liberties

lead to more brutal terrorism. The authors state that their findings contradict the traditional mindset that terrorism increases due to economic deprivation. On the contrary, they found that "weak or failing states" were an incubator for terrorism and they concluded that reasons for both domestic and international terrorism were the same.

Here I would like to critically analyze the results. If these results are true, then it will not be wrong to conclude that terrorism is equally a threat to developed countries as it is for developing countries. In the case of developed countries, stable political conditions result in a different kind of brutal terrorism as compared to those countries which have unstable political, economic and social conditions. In both cases, the objective of terrorists is to seek the attention and create fear. For developed countries, their high development status is a threat whereas, for developing countries, low level of growth and development is the cause of terrorism. This argument results in inconclusiveness on the part of determinants of terrorism.

Feldman and Ruffle (2008) conducted a comprehensive empirical study to investigate the role of religion and religious ideology on terrorism. Their findings contradict that terrorism is associated with religiously motivated groups. Keeping other factors constant, they found that religiously motivated groups initiated fewer attacks on average as compared to terrorist groups without religious ideology. According to them, religious diversity motivated religious terrorism without having any effect on the terrorism of communists, nationalists or other ideologies. This finding supports Adam Smith's untested view:

"Competition would tend to restrain, not encourage, religious fanaticism and intolerance, and ensure that religious sects contributed to "good temper and moderation." (Page 1073) [(15)]

(ii) Studies Specific to the case of Pakistan

Terrorism has affected not only the functioning of the economy but it has also exerted adverse effects on the socio-political environment and international relations.

According to Shah (2014), terrorism originating from religious sectarianism, particularly between Sunnis and Shias, the age old two sects of Muslims, has given birth to suicide attacks on the worshippers in their respective places of worship and target killing of religious leaders of either sect has gravely affected the security of Pakistan since the last few decades. Naturally, it had its adverse effects on the FDI related economic growth.

Khan (2016) states that invasion of Afghanistan by Soviet Russia in 1979 brought Saudi Arabia, in addition to the US, to the region, which resulted in the growth of Sunni sect, ultimately leading to the rise of Taliban, and overthrow of Monarchy in Iran through revolution which brought Shia sect in the limelight. The sectarian divide between the Shia and Sunni sects in Pakistan, supported respectively by Iran and Saudi Arabia, has ignited sectarian terrorism to the extent that this sectarian conflict is posing danger to the stability of Pakistan, despite the fact that followers of both the sects have lived in peace and harmony in this region for centuries. The author goes to the extent that the present conflict in different countries of the Middle East like Yemen, Iraq, Syria, and rise of ISIS is the direct result of the conflict between Saudi Arabia and Iran. Due to this conflict of religious sectarianism, the goal of economic growth could not be achieved which resulted in extreme poverty.

Abbas (2010) is of the view that religious sectarianism in Pakistan has taken a dangerous turn and it has now posed a great threat to both internal and external peace. The author suggests that political and military leaders must promote sectarian harmony which is a pre-requisite for peace in South Asia.

Zaman (1998) has presented his views that Pakistan, which is an Islamic State in a way, in accordance with its Constitution, having the largest Shia population (about 20 percent) after Iran, but is a minority as compared to the Sunni majority (about 80 percent), has to tackle this sectarian conflict, which is part and parcel of its socio-politico-economic life, for its smooth sailing as a state.

According to Abbasi (2013), Pakistan has paid a heavy price as a "Frontline State" in this global war on terrorism led by the US and NATO forces in the form of loss of more than 52000 human lives including civilians and men in uniform between the time span of 2002-2013. In addition, it has also paid and is still paying a direct cost in terms of the shock to economic activities, investment inflow, the flight of capital and shaken market confidence. It has escalated instability, insecurity and political violence in the country. Militant organizations successfully established close nexus with criminal networks which resulted in an increase in the crime rate across Pakistan in the form of sectarian violence, target killing and other forms of terrorism. Due to geographical proximity to Afghanistan, which was the theater of war on terrorism, Pakistan had to suffer not only huge losses in the form of human lives but also the massive damage to its infrastructure.

---

(15) Anderson (1988)

According to Clarke (2011), in the case of Pakistan, religion has entered into politics resulting in extremism and sectarianism. In the political arena, Islamist parties receive more support from middle and lower classes as compared to high-income entrepreneurs. This is intensifying sectarian conflict, leading to violence especially in the most crowded city of Pakistan which is also an economic hub in the sense that it is the largest city with seaport having a huge industrial set up – Karachi. All this is having a negative influence on economic growth as the determinants of economic growth particularly FDI inflows are being negatively affected. *(16)*

In the foregoing discussion, mainly two major Muslim sects i.e. Shias and Sunnis have been mentioned though amongst the Sunnis there are other sub-sects like Ahle-Hadis (also called Wahabis), Deobandis and Brelvis etc. and similarly sub-sects are also existing amongst the Shias. Occasionally some scuffles take place amongst the Ahle-Hadis/Deobandis and Brelvis. In order to avoid digression from the main topic of my paper, I have avoided going into details of the conflicts amongst these sub-sects. Historically, amongst the Muslims, Shias and Sunnis have existed as the main sects since centuries in the whole Muslim world.

After highlighting the nature and extent of religious sectarianism in Pakistan, now I proceed to review of literature pertaining to impact of terrorism on FDI inflows, economic growth and their relationship along with the methodology used by other researchers and the conclusions drawn by them in this respect, since I also have to undertake empirical analysis of my study.

According to Shehbaz et al (2013), Pakistan receives a huge amount of FDI inflows which affect economic growth. Authors have mentioned a proper mechanism through which terrorism affects FDI inflows and then economic growth; terrorism directly causes the loss of human and capital resources resulting in a negative impact on three main actors of economy i.e. consumer, producer and chiefly the investor. This hurts investor's confidence and low FDI inflows act as a shock on economic growth.

Haider and Anwar (2014), conducted a time series regression analysis on Pakistan's data covering the time period from July 2001 to November 2011. They applied the econometric technique of ARMAX to examine the impacts of terrorism on FDI inflows to Pakistan.

Their study found that terrorist violence reduces FDI inflows and affects Pakistan's economy negatively leading to reduction in growth indicators.

---

(16) For details see Chapter 7

Rasheed and Tahir (2012), used the empirical technique of Granger Causality test on Pakistan's data ranging 2003 till 5th June 2011 and concluded that an increase in terrorist activities leads to reduction in FDI inflows.

The authors state that because of terrorism, FDI decreases since investors lose their confidence and fear that their investment might suffer losses. This has spillover effects on economic growth. Authors also claim that after analyzing the results of their study, this relation does not only exist for Pakistan but any country would face the same consequences as a result of terrorist activities/terrorism.

Ali et al (2015), carried out an empirical study to investigate the impact of terrorism on FDI inflows in Pakistan. According to this study, terrorism can affect the economy in various ways which include damage of human and physical capital, increasing the factor of risk and uncertainty, diversion of resources from productive activities towards defense expenditures and counter-terrorism [(17)], and bringing harm to industrial sector especially tourism industry [(18)]. All these consequences disrupt socio-economic conditions leading to low economic growth. After applying the econometric technique of autoregressive distributive lag model using the data of Pakistan from 1989-2014, the results confirm that terrorism negatively affects FDI inflows in Pakistan.

Rauf et al (2016) explain the importance of FDI inflows towards developing countries; it reduces the saving-investment gap, brings new technology and technical know-how, creates jobs and reduces unemployment. They conducted an empirical study to measure the impact of terrorism and political stability on FDI inflows in Pakistan. After applying OLS method on secondary annual data of Pakistan from 1970-2013, their empirical findings suggest that GDP (the measure of economic growth), trade openness and political stability have a positive and significant impact on FDI whereas terrorism has a negative influence on FDI inflows and growth. They used the data of the number of bomb blasts in Pakistan to measure terrorist activity (including all motives behind bomb blasts; religious, political, social, others).

According to Farooq and Shehzad (2016), terrorism is a means of imposing your ideas (terrorist) on others to achieve their goals. There are many reasons for terrorism like social and economic factors, political issues, religious differences and extremism.

---

(17) Initially mentioned in Joint Economic Committee, & Congress, U. S. (2002).
(18) Initially mentioned in Abadie and Gardeazabal (2008)

They add that although there are many determinants of growth in Pakistan but FDI inflows is the most important source of growth rate. They carried out an empirical analysis by using the OLS method on data of Pakistan from 1973-2013 and found that FDI inflows have a positive and significant impact on growth rate whereas terrorism is adversely affecting the economy. Moreover, it is discouraging FDI inflows, therefore, the government must adopt such policies which could curb terrorism and increase FDI inflows in the country.

Zeb et al (2013) conducted an empirical study on the role of foreign direct investment in the economic growth of Pakistan. They took three variables; trade openness, political instability and terrorist attack. After applying OLS model using time series data of Pakistan from 1972 – 2012, they found that FDI inflows positively affect growth rate but due to defense expenditures, FDI is not proving fruitful to the required level. Therefore, the government must give attention to policy measures for reducing all kinds of terrorist attacks.

Ali and Gang (2016), have conducted a study giving a complete analysis of current issues of Pakistan and their relationship with economic growth. According to their study, terrorism and bad security conditions have been hindering the relationship between FDI and economic growth of Pakistan. A favorable investment environment is necessary for attracting FDI inflows which could lead to an improvement in economic growth but in case of Pakistan, factors like poor law and order condition, energy crises, corruption, political instability and most importantly security conditions play a negative role. The authors claim that now the environment is improving and FDI inflows are increasing leading to higher economic growth and CPEC is the latest evidence that Pakistan is moving towards better policy measures which are creating a favorable environment for foreign investment and major credit goes to Operation Zarb-e-Azab (army operation) to fight terrorism.

A similar conclusion has been drawn by Shehzad et al (2016), who conducted a study to find out a relationship between FDI, terrorism and economic growth in Pakistan analyzing the situation and data of pre 9/11 and post 9/11 incident. The results suggest that terrorism has negatively affected FDI inflows and economic growth post 9/11 which shows that government should take steps for controlling terrorist activities. The authors suggest that although the government has launched a big military operation, yet more measures are required especially for handling the root causes of terrorism like poverty, illiteracy, unemployment, sectarianism, and ethnicity etc.

2.6 DISCUSSION OF THE LITERATURE AND OWN RESEARCH ENDEAVOR

Numerous studies have been analyzed in the literature review throwing light on each variable (religious sectarianism, FDI inflows, economic growth, and terrorism) separately as well as their combined effect. History of religious sectarianism in Pakistan goes back to the period of Zia-ul-Haq (1977) but this gained hype at global level after the terrorist attacks of 9/11 in the US. Many authors have analyzed the relationship between FDI inflows and terrorism and as expected, their findings suggest that terrorism causes a decline in FDI inflows. The relationship between economic growth and terrorism has also been debated and researchers have a consensus that terrorist activities decrease economic growth. Both national and international level studies have been included in the literature review to have a deep insight into the subject.

On the other hand, these studies regarding the relationship between FDI inflows and economic growth give different results. Some studies confirm a positive relationship while others say that FDI inflows decrease economic growth by crowding out domestic investment and factor of competition between international and domestic industries leads to a decline in economic growth. In addition, some studies give inconclusive results. The most important part in the entire discussion is related to religious sectarianism which is mainly causing terrorism in Pakistan. Not much empirical studies are available on this topic which connects religious sectarianism to terrorism and further with FDI inflows and economic growth. Religious sectarianism has been discussed theoretically by most of the researchers but there are many studies available which discuss general terrorism and have carried out empirical analysis investigating the relationship between FDI inflows and economic growth especially emanating from the horrible occurrence of 9/11 in the US.

The present study has made an attempt to fill this gap by taking religious sectarianism and connecting it to terrorism in Pakistan. Moreover, its impact on FDI led economic growth has been investigated empirically.

2.6.1. DATA AND METHODOLOGY

This study uses time series data of Pakistan for the period of 1989 – 2016. The values of 2016 are till 31st July as the study is being conducted in the same current year.

2.6.2 Variables to be used

(i) Gross domestic product (GDP).
(iii) FDI inflows.
(iv) Sectarian violence as a measure of terrorism.

2.6.3 Units of data and sources

GDP is in current US dollars

FDI inflows are in BoP current US dollars.

Sectarian violence is taken as the number of incidents.

Data for GDP and FDI inflows have been retrieved from the World Development Indicators (WDI).

Data for Sectarian violence has been taken from the South Asia Terrorism Portal (SATP).

2.6.4 Rationale behind choosing these variables

According to Lequiller (2004), as growth means expansion and improvement, then GDP is a very satisfactory measure of growth.

Many other studies, mentioned in the literature review have also taken GDP as a measure of economic well-being. Another addition has been made by the Investopedia Staff (2015) [19], according to which GDP is one of the major indicators used to measure the health of a country's economy.

The rationale behind using sectarian violence data is due to its relation to terrorist activities in Pakistan on account of religious extremism and division of Muslims into different sects.

This is the oldest form of terrorism in Pakistan and still the most important root cause behind a large number of terrorist activities.

2.6.5 Log-Linear Model

This study uses a log-linear model (each variable is converted into logarithms of original values). Most empirical studies use this methodology, for example, Broekel and Brenner (2011) conducted an empirical study using set-ups for four German industries. They used the log-Linear model as according to them, this model performs better with regard to empirical analysis.

Another study by Mayr and Ulbricht (2007) states that the classical econometrics approaches provide better results if data is transformed into logarithms specially in case of time series to overcome the detrimental effects of heteroscedasticity and skewness in the level data on estimating and testing.

---

(19) http://www.investopedia.com/ask/answers/199.asp

As the present study is also based on time series data, therefore all variables are used in their log forms.

2.6.6 Abbreviations

GDP = Economic growth

FDI = Foreign direct investment inflows

ST = Sectarianism (sectarian violence) as a measure of terrorism

2.6.7 Tests to be applied

(i) Augmented Dicky-Fuller (ADF) and Kwiatkowski-Pillips-Schmedt-Shin (KPSS) tests for stationarity (unit root).
(ii) Johansen- Cointegration test for testing long-run Cointegration.
(iii) Vector Error Correction Model (VECM or ECM) or VAR (Vector Autoregressive Model) depending on results of the Johansen test. It is conducted for removing any errors and for studying both short-run and long-run causality between dependent and independent variables.
(iv) Impulse response functions.
(v) Variance decomposition.
(vi) System equation model.
(vii) Wald test for weak exogeneity.
(viii) VEC Granger Causality/Block exogeneity Wald test.

NOTE: AS DATA IS SAME, UNIT ROOT TEST AND JOHANSEN TEST RESULTS WILL BE REPRESENTING BOTH MODELS, VECM AND SYSTEM EQUATION MODELS WILL BE INDIVIDUALLY CARRIED OUT BASED ON CHANGE IN THE DEPENDENT VARIABLE.

2.6.8 Justifications for tests to be applied

Said and Dickey (1984) have discussed the importance of unit root tests. According to them, as time series data is marked by the presence of unit root i.e. series is not stationary. Series can be made stationary by taking differences (1st, 2nd etc.) and this is possible through unit root tests. Granger (1986) explains the importance of unit root tests with the help of an example that if a single series appears to be 'stationary', then it means that it possesses "linear properties" and such series are called I(0) denoting 'integrated of order zero'. If series are not stationary and need to be differenced to achieve the properties of linearity, then it will be integrated of order one denoted by I(1). To continue further testing, all series must have the same order of integration. To be stationary, a series must fluctuate around its mean value.

In a detailed study by Sjö (2008), the author highlights the importance of Dickey-Fuller (DF) test that in case of time series data, DF test not only indicates the stationarity status of series but the non-stationary ones can be

converted into stationary series after taking differences. This is the first step in time series analysis. After DF test, Johansen Cointegration test is applied to check the long-run relationship

"The superior test for Cointegration is Johansen test". (Page 13) [(20)]

Johansen Cointegration test is preferred to check the long-run relationship between or among series but this test has a weakness that it relies on asymptotic properties [(21)], making it sensitive to specification error [(22)] in limited tests. Therefore for removing errors and estimating both long-run and short-run relationships, Error Correction Model or Vector Error Correction Model (VECM) is applied where D in all equations shows short-run relations and coefficients without D show long-run relationships (D means difference).

According to Mitchell (2000), Impulse response analysis is extensively used in the empirical analysis to identify the responses of the dependent variable in the VAR models to measure the shock of one variable on another. It can be applied to both unrestricted VAR and restricted VAR (VAR with error correction term or VECM). If the evidence of Cointegration is found in the data, the impulse response analysis is applied on VECM with the lag length and Cointegrating equations are fixed as obtained in Johansen Cointegration test.

The importance of Impulse function has been explained by Lin (2006) , it cannot be explained in better words as it has already been explained in the paper, therefore citing original words,

"Structural VAR embeds economic theory within time series models, providing a convenient and powerful framework for policy analysis. Impulse response function (IRF) tracks the impact of any variable on others in the system. It is an essential tool in empirical causal analysis and policy effectiveness analysis". (Page 1) [(23)]

---

(20) Sjö (2008)

(21) Asymptotic theory, or large sample theory, is a generic framework for the assessment of properties of estimators and statistical tests. Within this framework, it is typically assumed that the sample size n grows indefinitely, and the properties of statistical procedures are evaluated in the limit as $n \rightarrow \infty$.

(22) In the context of a statistical model, specification error means that at least one of the key features or assumptions of the model is incorrect. In consequence, estimation of the model may yield results that are incorrect or misleading. Specification error can occur with any sort of statistical model, although some models and estimation methods are much less affected by it than others. Estimation methods that are unaffected by certain types of specification error are often said to be robust. For example, the sample median is a much more robust measure of central tendency than the sample mean because it is unaffected by the presence of extreme observations in the sample.
SOURCES: Online Encyclopedias

(23) For details see, Lin (2006)

Regarding exogeneity test, Julius (2006) has explained its importance and the reason why this test should be applied. According to the author, to check whether a variable of interest affects other variables in long-run without getting influenced itself is important in relation for checking the validity and it can be checked by using the hypothesis of "no levels feedback" or long-run weak exogeneity.

Regarding the Granger causality test, it is an additional test since the majority of studies focusing on causality tests prefer Granger Causality test (as mentioned in the introduction). It is basically applied to check future predictions. For example, Freeman (1983) in his study quoted Pierce (1977) words as follows:-

"The notion of Granger causality is based on a criterion of increment forecasting value. A variable X is said to "Granger cause" another variable Y if "Y can be better predicted from the past of X and Y together than the past of Y alone, other relevant information being used in the prediction". (Page 328)

2.6.9 The Models (statistical representation)

Both time series models are static models because they only capture the immediate or contemporaneous effect of X on Y. When X_t changes by one unit, it only has the effect on Y_t (in the same period). In other words, Y_{t+1}, Y_{t+2}, and so on are unaffected. , generally

$$Y_t = \beta_0 + \beta_1 X_t + \mu_t,\ t = 1, 2, 3\ldots..n \qquad (1)$$

Where Y_t and X_t are dated contemporaneously

μt is disturbance term, $\Delta\ \mu_t = 0$

Δ Represents change over time.

For this purpose, unit root tests have been applied, statistically

ΔY_t is the first difference. By definition, $\Delta Y_t = Y_t - Y_{t-1}$

After converting into logarithms, equation (1) becomes

$$\log Y_t = \beta_0 + \beta_1 \log X_t + \mu_t \qquad (2)$$

This study estimates two models. In the first model FDI is regressed on growth and ST,

Equation for the first model

Hypothesis: FDI inflows have a positive relationship with economic growth and a negative relation with sectarian terrorism.

FDI = f (GDP, ST)

FDI = $\beta_0 + \beta_1$ (GDP) + β_2 (ST) + μ_t where $_{\mu t}$ is a random error term

In the first model, FDI is dependent variable whereas GDP and ST are independent variables.

Equation for the second model

Hypothesis: Economic growth has a positive relationship with FDI inflows and a negative relation with sectarian terrorism.

GDP = (FDI, ST)

GDP = $\beta_0 + \beta_1$ (FDI) + β_2 (ST) + μ_t where μ_t is a random error term

In the second model, GDP is a dependent variable whereas FDI and ST are independent variables.

The **purpose** of having two models and testing two regressions is to determine a two-way causation between FDI and economic growth and whether this relationship is being affected by sectarian terrorism.

2.7 EMPIRICAL ANALYSIS

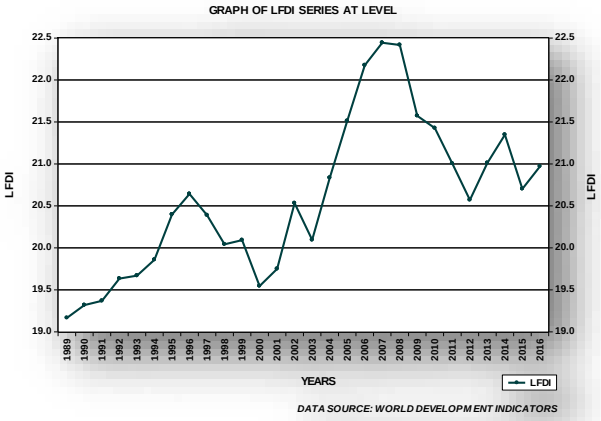
2.7.1 UNIT ROOT TEST (SAME FOR BOTH MODELS)

As mentioned earlier, the first step in conducting an empirical study using time series data is to check the stationarity status through the unit root test. This will be shown both graphically and empirically using ADF and KPSS tests. ADF test has a null hypothesis of non-stationarity whereas KPSS test is the opposite of ADF test, i.e., the null hypothesis states that series is stationary (there is no unit root). The main reason behind applying two opposite tests to have a cross-check about stationarity status of data.

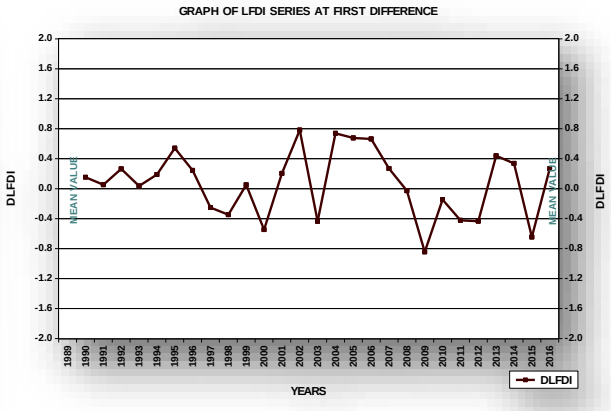
VISUAL REPRESENTATION OF DATA AT LEVEL

Visual representation also known as graphical presentation gives a quick idea about stationarity status of data. Also, it can be easily observed whether the data has any time trend or deterministic trend which makes it easier to decide for further tests to be applied. According to the graphical representation, the movement of all series shows that there is a deterministic trend present and series are not fluctuating around their mean value. Therefore all series have a unit root (non-stationary) at level. Whereas, at first difference, all series become stationary without any trend element present anymore. All graphs at first difference show that the series is moving around their mean value (zero). The graph area of all series is evenly divided and it covers all values.

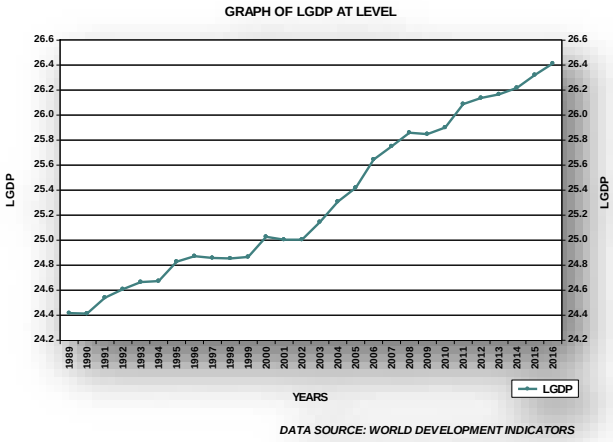
Graph1.3SERIES OF LFDI (Log FDI) AT LEVEL



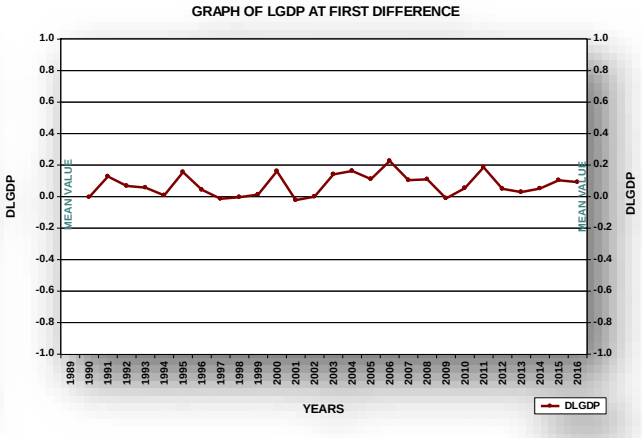
Graph1.4SERIES OF DLFDI (Log FDI)



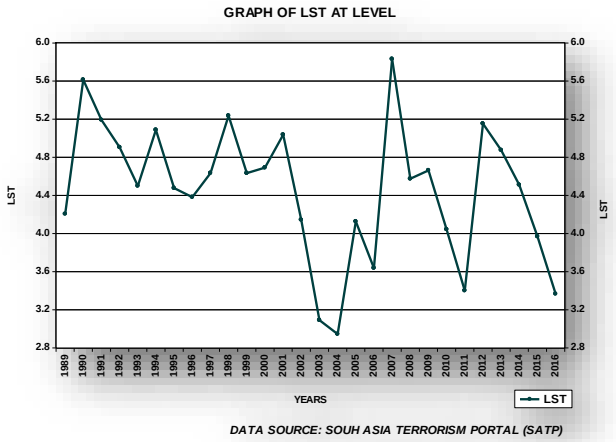
Graph1.5 SERIES OF LGDP (Log GDP) AT LEVEL



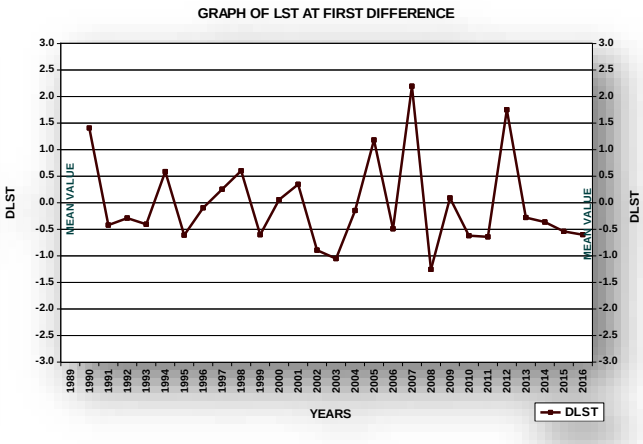
Graph1. 6 SERIES OF DLGDP (Log DGDP)



Graph1.7 SERIES OF LST (Log ST) AT LEVEL



Graph1.8 SERIES OF DLST (Log DST)



In the next part, ADF test shows the t-values of series both at the level and at first difference. As the series include trend component, all series are tested on the basis of two main components; (i) trend and intercept (ii) intercept. After applying the ADF test, KPSS is also carried out to have a cross check. After checking the stationarity status of data, further relevant tests have been conducted using econometric software EViews 7.0. Each test has been explained in detail including the characteristics and results.

Table1. 2 ADF TEST STATISTIC (t-values)

EMPIRICAL RESULTS

VARIABLES	AT LEVEL		AT FIRST DIFFERENCE		ORDER OF INTEGRATION
COMPONENTS OF EQUATION	TREND AND INTERCEPT	INTERCEPT	TREND AND INTERCEPT	INTERCEPT	
LFDI	-1.601	-1.726	-4.311***	-4.319***	I(1)
LGDP	-1.760	0.645*	-4.669***	-4.707***	I(1)
LST	-3.948**	-3.456**	-7.001***	-7.160***	I(1)

Source: Author's Estimation based on EViews output

- *Null Hypothesis (H_0): Series has a Unit Root (non- stationary)*
- *If t-values (absolute or positive) are greater than critical values at 1%, 5%, and 10%, Null hypothesis (H_0) is rejected i.e., series does not have unit root (it is stationary)*

***Significant at 10% level of significance**
****Significant at 5% level of significance**

***** Significant at 1% level of significance**

Test details:-

- **Lag Length : Schwarz Info Criterion (Automatic)**
  : Maximum Lags 6 (Automatic)
- **Probability criterion :MacKinnon (1996) one-side p-values**

Table1. 3 KPSS (Kwiatkowski-Pillips-Schmedt-Shin) TEST STATISTIC (LM-stat)

EMPIRICAL RESULTS

VARIABLES	AT LEVEL		AT FIRST DIFFERENCE		ORDER OF INTEGRATION
COMPONENTS OF EQUATION	INTERCEPT	TREND AND INTERCEPT	INTERCEPT	TREND AND INTERCEPT	
LFDI	0.458**	0.0926*	0.124*	0.072**	I(0)
LGDP	0.66**	0.136*	0.180*	0.079**	I(0)
LST	0.310	0.0963	0.101**	0.067**	I(0)

Source: Author's estimation based on EViews output

- *Null Hypothesis (H_0): Series is stationary (absence of unit root).*
- *If LM-stat value is less than critical values at 1%, 5%, and 10%, Null hypothesis (H_0) is accepted i.e., series does not have unit root (it is stationary)*
- ***At level, * sign shows the level of significance at which null hypothesis of stationarity is rejected. If there is no * sign, it means that the series is stationary at level.***

***Significant at 10% level of significance**
****Significant at 5% level of significance**

***** Significant at 1% level of significance**

Test details:-

- **Spectrum Estimation Method: Bartlett Kernel (Default)**
- **Bandwidth : Newey-West Bandwidth (Automatic)**
- **Lag Length : 3 (Automatic)**

Interpretation of Results: In the case of ADF test, all series become stationary at 5% after taking first difference. In the case of KPSS test, since the null hypothesis is opposite, the *sign at level shows the rejection of the

null hypothesis (stationarity). In this case too, all series become stationary at first difference except LST but for applying Cointegration test, all series must have the same order of integration.

In a tutorial on EViews by Batchelor (2000), when all series have the same level of integration then Johansen Cointegration test is applied and if there exists Cointegration (presence of long-run relationship) then later VECM is applied for studying short-run relationship. But if Johansen tests conclude that there is no Cointegration or long-run relationship, then the VAR model is applied. Johansen test is always applied at level.

Table1. 4 JOHANSEN COINTEGRATION TEST FOR BOTH MODELS

(i) Using LFDI and LGDP

TRACE TEST AND MAXIMUM EIGEN VALUE TEST (RESULTS)

Sample (adjusted): 1992 2016
Included observations: 25 after adjustments
Trend assumption: Linear deterministic trend
Series: LFDI LGDP
Lags interval (in first differences): 1 to 2

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.493412	17.79463	15.49471	0.0221
At most 1	0.031230	0.793198	3.841466	0.3731

Trace test indicates **1 cointegrating eqn(s)** at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.493412	17.00144	14.26460	0.0180
At most 1	0.031230	0.793198	3.841466	0.3731

Max-eigenvalue test indicates **1 cointegrating eqn(s)** at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Source: Author's estimation based on EViews output

UNRESTRICTED COINTEGRATING COEFFICIENTS

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):		
LFDI	**LGDP**	
-1.514943	0.433865	
1.367215	-2.967305	
Unrestricted Adjustment Coefficients (alpha):		
D(LFDI)	0.257453	-0.037747
D(LGDP)	-0.015494	-0.010388
1 Cointegrating Equation(s):	**Log likelihood**	**28.55066**
Normalized cointegrating coefficients (standard error in parentheses)		
LFDI	**LGDP**	
1.000000	-0.286390	
	(0.29341)	
Adjustment coefficients (standard error in parentheses)		
D(LFDI)	**-0.390027** (0.11718)	
D(LGDP)	**0.023472** (0.02115)	

Source: Author's estimation based on EViews output

As ADF and KPSS test show there are three non-stationary I(1), applying the test again to check if there is a second Cointegration.

(ii) Using LFDI, LGDP, and LST

TRACE TEST AND MAXIMUM EIGEN VALUE TEST (RESULTS)

Sample (adjusted): 1992 2016
Included observations: 25 after adjustments
Trend assumption: Linear deterministic trend
Series: LFDI LGDP LST
Lags interval (in first differences): 1 to 2

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.656177	43.16698	29.79707	0.0008
At most 1 *	0.448725	16.47626	15.49471	0.0355
At most 2	0.061552	1.588207	3.841466	0.2076

Trace test indicates **2 cointegrating eqn(s)** at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.656177	26.69072	21.13162	0.0074
At most 1 *	0.448725	14.88805	14.26460	0.0398
At most 2	0.061552	1.588207	3.841466	0.2076

Max-eigenvalue test indicates **2 cointegrating eqn(s)** at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Source: Author's estimation based on EViews output

UNRESTRICTED COINTEGRATING COEFFICIENTS

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):			
LFDI	**LGDP**	**LST**	
1.220546	0.205491	2.386885	
1.079404	-0.760208	-1.920923	
-1.403775	2.950652	-0.143124	
Unrestricted Adjustment Coefficients (alpha):			
D(LFDI)	-0.263882	-0.080749	0.045702
D(LGDP)	0.003499	0.027968	0.010117
D(LST)	-0.213800	0.150127	-0.122108
1 Cointegrating Equation(s):	**Log likelihood**	**15.64858**	
Normalized cointegrating coefficients (standard error in parentheses)			
LFDI	**LGDP**	**LST**	
1.000000	0.168360	1.955588	
	(0.30603)	(0.43566)	
Adjustment coefficients (standard error in parentheses)			
D(LFDI)	-0.322080 (0.08628)		
D(LGDP)	0.004270 (0.01729)		
D(LST)	-0.260952 (0.16652)		
2 Cointegrating Equation(s):	**Log likelihood**	**23.09260**	
Normalized cointegrating coefficients (standard error in parentheses)			
LFDI	LGDP	LST	
1.000000	0.000000	1.234954 (0.34848)	
0.000000	1.000000	4.280324 (0.91413)	
Adjustment coefficients (standard error in parentheses)			
D(LFDI)	**-0.409240** (0.11067)	**0.007161** (0.05349)	
D(LGDP)	**0.034459** (0.02027)	**-0.020542** (0.00980)	
D(LST)	**-0.098904** (0.21423)	**-0.158062** (0.10354)	

Source: Author's estimation based on EViews output

INTERPRETATION OF RESULTS

In both tests, there are two hypothesis

Null Hypothesis: There is no Cointegration

Alternate Hypothesis: There is Cointegration

Johansen Cointegration test has been applied twice to check if the results give a second Cointegration. The first one indicates that both trace test and maximum Eigen values test statistics have one Cointegrating equation. Moreover, it is applied using only LFDI and LGDP. In the second case, all three variables (LFDI, LGDP, and LST) are taken and the results show that there are two Cointegrating equations. In both cases, the number of Cointegrating equations is less than the number of variables. Since there is evidence of the presence of Cointegration, VECM is applied instead of VAR.

As there are two models; the first one uses FDI as dependent Variable and the second model uses GDP as the dependent variable. VECM is applied for both models separately

2.7.2 VECM FOR MODEL 1

Table1. 5 VECTOR ERROR CORRECTION MODEL (VECM)

Test Details

- LFDI is the dependent variable whereas LGDP and LST are independent variables.
- VECM automatically creates first difference of data.
- As Johansen Cointegration test suggested two cointegrating equations, the number of cointegration has been manually set at 2.
- The number of coefficients is always equal to P-values but P-values are not shown in VECM
- Var type; Vector Error Correction.
- Lag Interval for Endogenous: 1 2
- Endogenous Variables: LFDI LGDP LST

In VECM, there are three models; D(LFDI), D(LGDP) and D(LST) but D(LFDI) is the main target model as D(LFDI) is the dependent variable but this model does not show P-value (Probability values) for each variable. To find out the P-value of each variable for the main model, system equation is estimated also known as system equation model. VECM has been applied using two lags. Here D(LFDI) is the dependent variable. It is also the coefficient of CointEq1. There are three models but D(LFDI) is the target model. It is also known as “error correction model”. Also, the coefficient

divided by standard error gives t-value but probability values are required to conclude whether the coefficients are significant or not.

Vector Error Correction Estimates Sample (adjusted): 1992 2016 Included observations: 25 after adjustments Standard errors in ( ) & t-statistics in [ ]			
Cointegrating Eq:	**CointEq1**	**CointEq2**	
LFDI(-1)	1.000000	0.000000	
LGDP(-1)	0.000000	1.000000	
LST(-1)	1.234954 (0.35920) **[3.43804]**	4.280324 (0.94226) **[4.54262]**	
C	-26.20168	-44.47661	
Error Correction:	**D(LFDI)**	**D(LGDP)**	**D(LST)**
CointEq1	-0.409240 (0.11408) **[-3.58739]**	0.034459 (0.02089) **[1.64948]**	-0.098904 (0.22082) **[-0.44789]**
CointEq2	0.007161 (0.05513) **[0.12988]**	-0.020542 (0.01010) **[-2.03455]**	-0.158062 (0.10673) **[-1.48101]**
D(LFDI(-1))	-0.008352 (0.19642) **[-0.04252]**	0.054365 (0.03597) **[1.51138]**	-0.360561 (0.38022) **[-0.94829]**
D(LFDI(-2))	0.048690 (0.18546) **[0.26253]**	0.000501 (0.03396) **[0.01474]**	-0.187439 (0.35900) **[-0.52211]**
D(LGDP(-1))	0.789847 (1.35956) **[0.58096]**	-0.092226 (0.24897) **[-0.37042]**	4.206466 (2.63173) **[1.59837]**
D(LGDP(-2))	1.950521 (1.49791) **[1.30216]**	-0.602770 (0.27431) **[-2.19741]**	2.885937 (2.89953) **[0.99531]**
D(LST(-1))	0.450174 (0.17302) **[2.60187]**	0.045745 (0.03168) **[1.44376]**	0.110609 (0.33492) **[0.33026]**
D(LST(-2))	0.213332 (0.14351) **[1.48652]**	-0.013392 (0.02628) **[-0.50958]**	0.328920 (0.27780) **[1.18402]**
C	-0.113688 (0.15788) **[-0.72009]**	0.125540 (0.02891) **[4.34213]**	-0.562657 (0.30561) **[-1.84110]**
R-squared	0.615355	0.432972	0.553460
Adj. R-squared	0.423033	0.149459	0.330190
Sum sq. resids	1.960743	0.065755	7.346947
S.E. equation	0.350066	0.064107	0.677631
F-statistic	3.199600	1.527165	2.478884
Log likelihood	-3.654058	38.78515	-20.16608
Akaike AIC	1.012325	-2.382812	2.333286
Schwarz SC	1.451120	-1.944016	2.772081
Mean dependent	0.064002	0.074945	-0.073026
S.D. dependent	0.460866	0.069512	0.827976
Determinant resid covariance (dof adj.)		0.000121	
Determinant resid covariance		3.16E-05	
Log likelihood		23.09260	
Akaike information criterion		0.792592	
Schwarz criterion		2.401508	

Source: Author's estimation based on EViews output

D (difference) represents short-run relationship

2.7.3 IMPULSE RESPONSE FUNCTION AND VARIANCE DECOMPOSITION

Test Details

- The test is applied on three series LGDP, LFDI, and LST.
- The test is applied at levels (instead of differenced coefficients) to get the proper nature of responses.
- As there is an evidence of Cointegration, the responses are checked on restricted VAR (VECM).
- The number of Cointegrating equations is set according to the results obtained in the Johansen test.
- Default decomposition method of Cholesky – dof adjusted method is used.
- The lag length has been set in accordance with VECM, i.e., 1 2 and responses are checked for the period of 20 years.
- The zero (0) line is the benchmark for measurement.

The results are presented in graph 9.

INTERPRETATION OF RESULTS

- As impulse response function is a shock to the VAR system, it identifies the responsiveness of the variables in the VAR system when a shock is put to the error terms. In this case, impulse response has been analyzed in case of restricted VAR. The effects of all variables are checked in a combined test, therefore this test investigates both models.
- Each graph shows the effect of one standard deviation change in one variable on other.

Generally, along zero line, if one variable moves above the line and other moves down, the variables are moving in opposite direction. If both move above or below zero line with the same pattern, it means the reaction is same.

(i) <u>Responses of LFDI on other variables.</u>

Initially, an increase in LFDI leads to an increase in LGDP and a reduction in LST. Later the response of LFDI to LFDI, LFDI to LGDP and LFDI to LST is almost same in all three graphs and the line moves around the benchmark line.

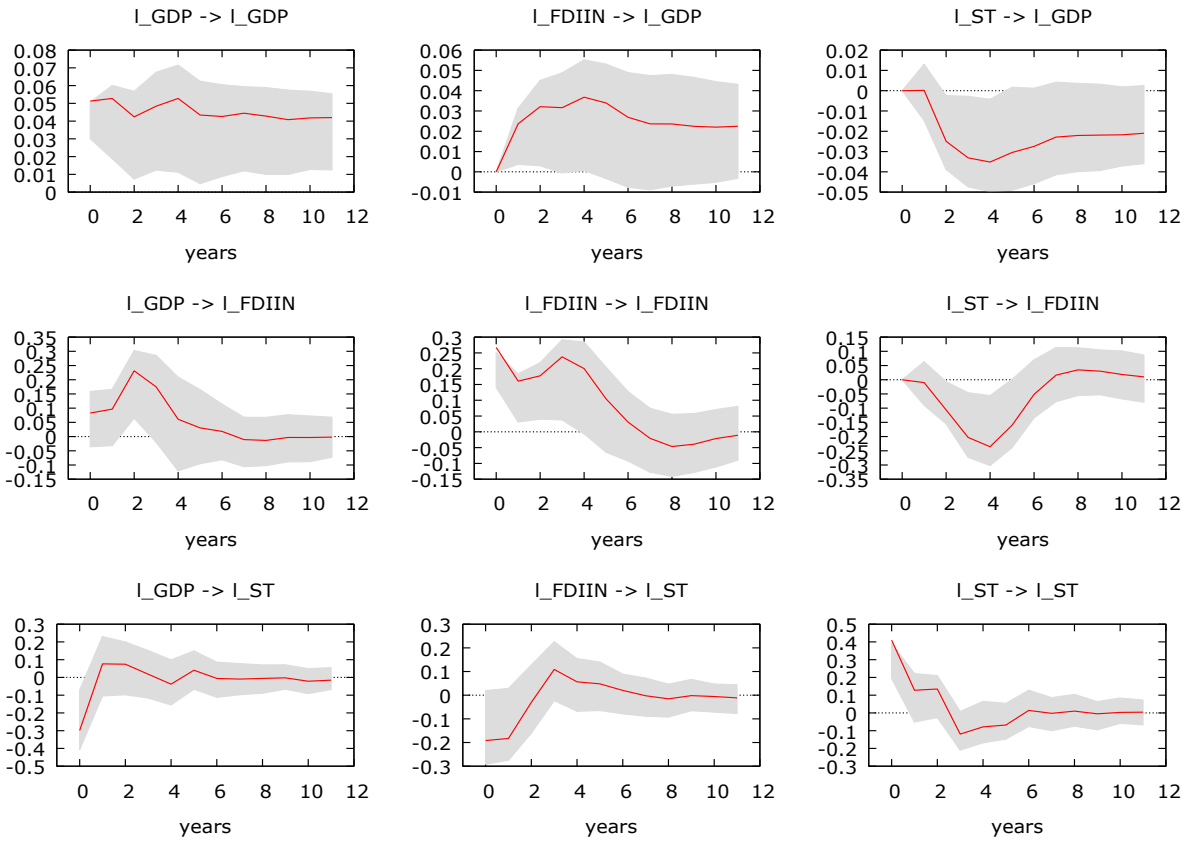
(ii) <u>Responses of LGDP on other variables.</u>

LGDP leads to an increase in LFDI and vice versa whereas LST decreases but after some time the line becomes stable still it remains on the negative side.

(iii) Responses of LST on other variables.

The response of ST to LFDI and LST to LGDP is same. LST does not react to LGDP but reacts to LFDI. As LST increases, LFDI decreases.

Graph1.9 IMPULSE RESPONSES



Responses are based on Cholesky ordering with 90% level of significance (dotted 0 line)

Forecast horizon = 12 years

VARIANCE DECOMPOSITION

Test Details [24]

- Since impulse response functions trace the impacts of a shock to one endogenous variable on to the other variables in the VAR, variance decomposition separates the variation in an endogenous variable into the component shocks to the VAR. Thus, the variance decomposition provides information about the relative importance of each random innovation in affecting the variables in the VAR.

- For variance decomposition, all the information must be the same as provided in impulse responses. It is normally viewed in a table format which displays a separate variance decomposition for each endogenous variable. The second column, labeled "S.E.", contains the forecast error of the variable at the given forecast horizon. The source of this forecast error is the variation in the current and future values of the innovations to each endogenous variable in the VAR. The remaining columns give the percentage of the forecast variance due to each innovation, with each row adding up to 100.
- As with the impulse responses, the variance decomposition based on the Cholesky factor can change dramatically if a change is made in the ordering of the variable or the variables in the VAR. For example, the first-period decomposition for the first variable in the VAR ordering is completely due to its own innovation.

---

(24) Schwert (2009)

Table1. 6 VARIANCE DECOMPOSITION OF VARIABLES

(i) VARIANCE DECOMPOSITION OF LFDI

Period	S.E.	LFDI	LGDP	LST
1	0.350066	100.0000	0.000000	0.000000
2	0.421315	98.15578	1.754892	0.089331
3	0.572605	80.13656	14.46038	5.403059
4	0.726800	72.70162	11.74326	15.55512
5	0.826802	66.20156	9.074699	24.72374
6	0.861434	63.46852	8.360408	28.17107
7	0.865009	63.19936	8.305455	28.49519
8	0.865728	63.20280	8.295068	28.50213
9	0.868928	63.22257	8.234226	28.54320
10	0.871154	63.20557	8.207492	28.58694
11	0.871875	63.19362	8.195932	28.61044
12	0.872077	63.18927	8.192456	28.61827
13	0.872174	63.17582	8.203690	28.62049
14	0.872346	63.16157	8.227815	28.61062
15	0.872621	63.15530	8.249083	28.59562
16	0.873050	63.14494	8.269062	28.58600
17	0.873571	63.13147	8.286524	28.58201
18	0.874031	63.11945	8.299411	28.58114
19	0.874381	63.10794	8.312259	28.57980
20	0.874652	63.09673	8.327270	28.57600

Source: Author's estimation based on EViews output

INTERPRETATION OF RESULTS

- After discussing the details of the test, the results can be interpreted for both short-run and long-run time periods. For analysis, short- run time period is analyzed at 6 (6 years) and for long-run, the end time is taken, i.e., 20 years. (As data is annual, observations mean years).
- In short-run, impulse or innovation or a shock to LFDI can cause 63.47 percent fluctuation on LFDI which is also called own shock. In the case of LGDP, it is 8.36 percent and 28.17 percent fluctuation in LST. Total= 63.47 + 8.36 + 28.17 = 100 percent.
- Now studying long-run for making the comparison. A shock to LFDI, LGDP, and LST in long-run can cause 63.09 percent, 8.33 percent and 28.58. Total = 63.09 + 8.33 + 28.48= 99.9 almost 100 percent.
- COMPARISON shows that both in short-run and long-run, a shock to LFDI cannot contribute much to the fluctuations in LFDI, LGDP and LST (taking both individual and total values).

(ii) VARIANCE DECOMPOSITION OF LGDP

Period	S.E.	LFDI	LGDP	LST
1	0.064107	8.770049	91.22995	0.000000
2	0.096621	28.34759	71.65202	0.000391
3	0.121373	37.79851	55.59318	6.608313
4	0.147208	39.99904	47.60020	12.40076
5	0.173391	42.21449	42.41918	15.36633
6	0.190426	43.83515	39.42652	16.73833
7	0.203483	43.92717	38.57207	17.50076
8	0.214907	43.70667	38.83621	17.45712
9	0.225128	43.65302	38.93461	17.41237
10	0.234139	43.56149	38.97383	17.46468
11	0.242995	43.39831	39.13565	17.46605
12	0.251555	43.33077	39.28267	17.38656
13	0.259815	43.30331	39.36880	17.32789
14	0.267952	43.26558	39.45664	17.27778
15	0.276097	43.24845	39.51166	17.23989
16	0.284093	43.26104	39.51074	17.22822

17	0.291919	43.27238	39.49104	17.23658
18	0.299567	43.27973	39.47741	17.24286
19	0.307016	43.28788	39.46537	17.24675
20	0.314255	43.29274	39.45658	17.25068

Source: Author's estimation based on EViews output

INTERPRETATION OF RESULTS

- Again short-run period is set at 6 years and long-run at 20 years.
- In short-run, impulse or innovation or a shock to LGDP accounts for 43.85 percent fluctuations in LFDI, 39.43 percent in LGDP (own shock) and 16.74 percent respectively resulting in a total of 100.02, almost 100 percent.
- In long-run a shock to LGDP exerts a shock of 43.30 percent on LFDI, 39.46 percent on LGDP (own shock) and a fluctuation of 17.25 percent in LST respectively. Total = 43.30 + 39.46 + 17.25 = 100.1 almost 100 percent.
- COMPARISON shows that both in short-run and long-run, a shock to LFDI cannot contribute much to the fluctuations in LFDI and LGDP but a shock in LST can contribute plentiful in the long-run. In previous years (2, 3, 4 and 5) are observed, they show the same result.

(iii) VARIANCE DECOMPOSITION OF LST

Period	S.E.	LFDI	LGDP	LST
1	0.677631	25.05620	17.73258	57.21122
2	0.738922	27.66865	19.53642	52.79494
3	0.764502	25.86068	19.97098	54.16833
4	0.791011	27.14009	18.71083	54.14908
5	0.801539	26.87395	18.89749	54.22856
6	0.809867	27.12238	18.65459	54.22303
7	0.810495	27.15545	18.65721	54.18734
8	0.810588	27.15513	18.66889	54.17599
9	0.810944	27.19487	18.65258	54.15255
10	0.810976	27.19407	18.65183	54.15410
11	0.811455	27.19387	18.71377	54.09236
12	0.811823	27.22548	18.72661	54.04791
13	0.812334	27.25235	18.71590	54.03175
14	0.812692	27.26820	18.71368	54.01812
15	0.812999	27.28330	18.71764	53.99906
16	0.813136	27.29112	18.72163	53.98725
17	0.813260	27.29375	18.73038	53.97587
18	0.813383	27.29628	18.74077	53.96295
19	0.813514	27.30053	18.74873	53.95073
20	0.813639	27.30489	18.75553	53.93958

Source: Author's estimation based on EViews output

INTERPRETATION OF RESULTS

- In the case of LST also, short-run period is set at 6 years and the long-run at 20 years.
- In short-run, impulse or innovation or a shock to LST contributes to 27.12 percent shock to LFDI, 18.65 to LGDP and 54.22 to LST (own shock). Total = 27.12 + 18.65 +54.22 = 99.99 again almost 100 percent.
- In long-run, a shock to LST exercises a shock of 27.30 percent on LFDI, 18.76 percent on LGDP and a fluctuation of 53.94 percent in LST respectively. Total = 27.30 + 18.76 + 53.94 = 100 percent
- COMPARISON shows that both in short-run and long-run, a shock to LST cannot contribute much to the fluctuations in LFDI and LGDP but a shock in LST can contribute with a slight change in value in the form a decrease in the long-run. If previous years (2, 3, 4 and 5) are observed, they show the same result for other variables too but the effect is very small.

NOTE: The effects of all variables have been checked in a combined test, therefore this test investigates both models.

Cholesky Ordering: LFDI LGDP LST

Table1. 7 SYSTEM EQUATION MODEL

Estimation Method: Least Squares

Dependent Variable: D(LFDI)

Sample (adjusted): 1992 2016

Included observations: 25 after adjustments

EQUATION: D(LFDI) = C(1)*(LFDI(-1) + 1.23495448622*LST(-1) - 26.2016838894) + C(2)*(LGDP(-1) + 4.28032393629*LST(-1) - 44.4766101224) + C(3)*D(LFDI(-1)) + C(4)*D(LFDI(-2)) + C(5)*D(LGDP(-1)) + C(6)*D(LGDP(-2)) + C(7)*D(LST(-1)) + C(8)*D(LST(-2)) + C(9)

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	**-0.409240**	0.114078	-3.587390	**0.0025****
C(2)	0.007161	0.055135	0.129880	0.8983
C(3)	-0.008352	0.196424	-0.042522	0.9666
C(4)	0.048690	0.185463	0.262532	0.7963
C(5)	0.789847	1.359557	0.580959	0.5694
C(6)	1.950521	1.497907	1.302164	0.2113
C(7)	0.450174	0.173019	2.601870	**0.0193***

C(8)	0.213332	0.143511	1.486518	0.1566
C(9)	-0.113688	0.157879	-0.720094	0.4819
R-squared	0.615355	Mean dependent var		0.064002
Adjusted R-squared	0.423033	S.D. dependent var		0.460866
S.E. of regression	0.350066	Akaike info criterion		1.012325
Sum squared resid	1.960743	Schwarz criterion		1.451120
Log likelihood	-3.654058	Hannan-Quinn criter.		1.134028
F-statistic	3.199600	Durbin-Watson stat		2.065208
Prob(F-statistic)	0.022768*			

Source: Author's estimation based on EViews output

***Significant at 10% level of significance**
****Significant at 5% level of significance**

***** Significant at 1% level of significance**

C(1) = Coefficient of integration model or the coefficient of the dependent variable or the coefficient of error correction model, also

C(1) = Speed of adjustment towards long-run equilibrium.

INTERPRETATION OF RESULTS

- The coefficient of C(1) must be negative and significant to ensure that there is both long-run and short-run causality running from GDP and ST to FDI inflows, where
- C(1) = Speed of adjustment towards long-run equilibrium
- C(1) is the coefficient of the dependent variable.
- In this case, error correction coefficient C(1) is not only negative but also significant at 5 percent level.
- The value of R-squared is 0.615355 which is high. Also, Prob (F-statistic) is 0.022768 which is 2.28% (less than 5%) which means that all the independent variables jointly can influence the dependent variable. This also shows that the whole model is viable.
- The coefficient of C(1) is -0.409240 which means it is 40.94 percent which shows that it is adjusting towards long-run equilibrium approximately at the rate of 50%.
- Coming to other coefficients i.e. C(2), C(3), C(4), C(5), C(6) C(7), C(8) and C(9) are all short-run coefficients not long-run.
  - C(2) is the coefficient of LGDP(-1)
  - C(3) is the coefficient of D(LFDI(-1))

- C(4) is the coefficient of D(LFDI(-2))
- C(5) is the coefficient of D(LGDP(-1))
- C(6) is the coefficient of D(LGDP(-2))
- C(7) is the coefficient of D(LST(-1))
- C(8) is the coefficient of D(LST(-2))
- C(9) is the constant.

To test for exogeniety, Wald test is applied using coefficients of C(1) and C(2)

Table1. 8 WALD TEST FOR WEAK EXOGENEITY

Wald Test			
Test Statistic	Value	df	**Probability**
F-statistic	7.767861	(2, 16)	**0.0044**
Chi-square	15.53572	2	**0.0004**
Null Hypothesis: C(1)=C(2)=0 Null Hypothesis Summary:			
Normalized Restriction (= 0)		Value	Std. Err.
C(1)		-0.409240	0.114078
C(2)		0.007161	0.055135
Restrictions are linear in coefficients			

Source: Author's estimation based on EViews output

INTERPRETATION:

The Null Hypothesis states that C(1)=C(2)=0 which means that FDI is weakly exogenous. The Chi-square is 15.53572 and the P-value is 0.0004, which is less than 5%, the null hypothesis can be rejected and it can be concluded that FDI is not weakly exogenous.

Empirical results reveal that Johansen Cointegration test shows one Cointegrating relationship between LFDI and LGDP which is also true in case of LST (using three variables give 2 Cointegrating equations). This

leads to the application of VECM and to interpret VECM, system equation model is used which confirms that FDI has a significant relationship with GDP and ST. Also, the Coefficient of error correction model confirms that there exists a long-run causality running from GDP and sectarian terrorism to FDI inflows and value converges towards equilibrium. Exogeneity test also conveys that FDI is not weakly exogenous.

2.7.4 VECM FOR MODEL 2

Table1. 9 VECTOR ERROR CORRECTION MODEL (VECM)

Vector Error Correction Estimates Sample (adjusted): 1992 2016 Included observations: 25 after adjustments Standard errors in ( ) & **t-statistics in [ ]**			
Cointegrating Eq:	**CointEq1**	**CointEq2**	
LGDP(-1)	1.000000	0.000000	
LFDI(-1)	0.000000	1.000000	
LST(-1)	4.280324 (0.94226) **[4.54262]**	1.234954 (0.35920) **[3.43804]**	
C	-44.47661	-26.20168	
Error Correction:	D(LGDP)	D(LFDI)	D(LST)
CointEq1	-0.020542 (0.01010) **[-2.03455]**	0.007161 (0.05513) **[0.12988]**	-0.158062 (0.10673) **[-1.48101]**
CointEq2	0.034459 (0.02089) **[1.64948]**	-0.409240 (0.11408) **[-3.58739]**	-0.098904 (0.22082) **[-0.44789]**
D(LGDP(-1))	-0.092226 (0.24897) **[-0.37042]**	0.789847 (1.35956) **[0.58096]**	4.206466 (2.63173) **[1.59837]**
D(LGDP(-2))	-0.602770 (0.27431) **[-2.19741]**	1.950521 (1.49791) **[1.30216]**	2.885937 (2.89953) **[0.99531]**
D(LFDI(-1))	0.054365 (0.03597) **[1.51138]**	-0.008352 (0.19642) **[-0.04252]**	-0.360561 (0.38022) **[-0.94829]**
D(LFDI(-2))	0.000501 (0.03396) **[0.01474]**	0.048690 (0.18546) **[0.26253]**	-0.187439 (0.35900) **[-0.52211]**
D(LST(-1))	0.045745 (0.03168) **[1.44376]**	0.450174 (0.17302) **[2.60187]**	0.110609 (0.33492) **[0.33026]**
D(LST(-2))	-0.013392 (0.02628) **[-0.50958]**	0.213332 (0.14351) **[1.48652]**	0.328920 (0.27780) **[1.18402]**
C	0.125540 (0.02891) **[4.34213]**	-0.113688 (0.15788) **[-0.72009]**	-0.562657 (0.30561) **[-1.84110]**
R-squared	0.432972	0.615355	0.553460
Adj. R-squared	0.149459	0.423033	0.330190
Sum sq. resids	0.065755	1.960743	7.346947

S.E. equation	0.064107	0.350066	0.677631
F-statistic	1.527165	3.199600	2.478884
Log likelihood	38.78515	-3.654058	-20.16608
Akaike AIC	-2.382812	1.012325	2.333286
Schwarz SC	-1.944016	1.451120	2.772081
Mean dependent	0.074945	0.064002	-0.073026
S.D. dependent	0.069512	0.460866	0.827976
Determinant resid covariance (dof adj.)		0.000121	
Determinant resid covariance		3.16E-05	
Log likelihood		23.09260	
Akaike information criterion		0.792592	
Schwarz criterion			
		2.401508	

Source: Author's estimation based on EViews output

D (difference) represents short-run relationship

Test Details

- LGDP is the dependent variable whereas LFDI and LST are independent variables.
- VECM automatically creates first difference of data.
- As Johansen Cointegration test suggested two Cointegrating equations, number of Cointegration has been manually set at 2.
- The number of coefficients is always equal to P-values but P-values are not shown in VECM
- Var type; Vector Error Correction.
- Lag Interval for Endogenous: 1 2
- Endogenous Variables: LFDI LGDP LST

As mentioned earlier in VECM for the first model, there are three models; D (LFDI), D(LGDP) and D(LST) but D(LGDP) is the main target model in this case as it is the dependent variable whereas D(LFDI) and D(LST) are independent variables. Since this model does not show P-value (Probability values) for each variable, the system equation model is estimated to find P-values.

Again VECM has been applied using two lags. Here D(LGDP) is the dependent variable. It is also the coefficient of CointEq1. There are three models but D(LGDP) is the target model. It is also known as "error correction model". Mentioning again, coefficient divided by standard error gives t-value but probability values are required to conclude whether the coefficients are significant or not.

Table1.10 SYSTEM EQUATION MODEL

Estimation Method: Least Squares

Dependent Variable: D(LGDP)

Sample (adjusted): 1992 2016

Included observations: 25 after adjustments

D(LGDP) = C(1)*(LGDP(-1) + 4.28032393629*LST(-1) - 44.4766101224) + C(2)*(LFDI(-1) + 1.23495448622*LST(-1) - 26.2016838894) + C(3) *D(LGDP(-1)) + C(4)*D(LGDP(-2)) + C(5)*D(LFDI(-1)) + C(6)*D(LFDI(-2)) + C(7)*D(LST(-1)) + C(8)*D(LST(-2)) + C(9)

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	**-0.020542**	0.010097	-2.034547	**0.0588***
C(2)	0.034459	0.020891	1.649475	0.1185
C(3)	-0.092226	0.248973	-0.370424	0.7159
C(4)	-0.602770	0.274309	-2.197409	**0.0431***
C(5)	0.054365	0.035971	1.511378	0.1502
C(6)	0.000501	0.033963	0.014743	0.9884
C(7)	0.045745	0.031685	1.443763	0.1681
C(8)	-0.013392	0.026281	-0.509578	0.6173
C(9)	0.125540	0.028912	4.342129	**0.0005****
R-squared	0.432972	Mean dependent var		0.074945
Adjusted R-squared	0.149459	S.D. dependent var		0.069512
S.E. of regression	0.064107	Akaike info criterion		-2.382812
Sum squared resid	0.065755	Schwarz criterion		-1.944016
Log likelihood	38.78515	Hannan-Quinn criter.		-2.261109
F-statistic	1.527165	Durbin-Watson stat		
Prob(F-statistic)	0.223909			2.160919

Source: Author's estimation based on EViews output

***Significant at 10% level of significance**
****Significant at 5% level of significance**

***** Significant at 1% level of significance**

C(1) = Coefficient of integration model or the coefficient of dependent variable or the coefficient of error correction model, also

C(1) = Speed of adjustment towards long-run equilibrium.

2.7.5 INTERPRETATION OF RESULTS

(Similar to the previous model in some specifications but results are different)

- The coefficient of C(1) must be negative and significant to ensure that there is both long-run and short-run causality running from GDP and ST to FDI inflows, where
- C(1) = Speed of adjustment towards long-run equilibrium
- C(1) is the coefficient of the dependent the variable.
- In this case, error correction coefficient C(1) is not only negative but also significant but at 10 percent level.
- The value of R-squared is 0.432972 which is high. Also Prob (F-statistic) is 0.223909 which is 22.39 % (greater than 5%). This shows that all independent variables cannot affect the dependent variable taken jointly but they might have individual influence.
- The coefficient of C(1) is -0.020542 (in percent it is equal to 2.05 which shows that speed of adjustment towards equilibrium is very slow but as the coefficient of adjustment is significant, this shows equilibrium is reached but at a very slow pace. Coming to other coefficients i.e. C(2), C(3), C(4), C(5), C(6) C(7), C(8) and C(9) are all short-run coefficients not long-run.

- C(2) is the coefficient of (LFDI(-1)
- C(3) is the coefficient of D(LGDP(-1))
- C(4) is the coefficient of D(LGDP(-2))
- C(5) is the coefficient of D(LFDI(-1))
- C(6) is the coefficient of D(LFDI(-2))
- C(7) is the coefficient of D(LST(-1))
- C(8) is the coefficient of D(LST(-2))
- C(9) is the constant.

Again to check that whether short-run variables affect dependent variable jointly, Wald test is used.

Table1.11 WALD TEST FOR WEAK EXOGENEITY

Wald Test			
Test Statistic	Value	df	**Probability**
F-statistic	2.416330	(2, 16)	**0.1211**
Chi-square	4.832660	2	**0.0892**
Null Hypothesis: C(1)=C(2)=0 Null Hypothesis Summary:			
Normalized Restriction (= 0)		Value	Std. Err.
C(1)		-0.020542	0.010097
C(2)		0.034459	0.020891
Restrictions are linear in coefficients			

Source: Author's estimation based on EViews output

INTERPRETATION:

The Null Hypothesis states that C(1)=C(2)=0 which means that GDP is weakly exogenous. The Chi-square is 4.83 and the P-value of 0.0892 is higher than 5%, the null hypothesis cannot be rejected and it can be concluded that GDP is weakly exogenous. (At 10% it can be concluded that it is not weakly exogenous).

2.7.6 VEC GRANGER CAUSALITY/BLOCK EXOGENEITY WALD TEST

Test Details

- Null hypothesis (H0) states that there is no Granger Causality.
- If Chi-sq is greater than the critical value (P-value is smaller than significance level) then the null hypothesis is rejected meaning that taken all lags together, independent variable granger cause dependent variable/ can affect dependent variable in future/ can predict future values.

Table1.12 VEC GRANGER CAUSALITY/BLOCK EXOGENEITY WALD TEST

(Test Results)

VEC Granger Causality/Block Exogeneity Wald Tests Sample: 1989 2016 Included observations: 25			
Dependent variable: D(LFDI)			
Excluded	**Chi-sq**	**df**	**Prob.**
D(LGDP)	2.295301	2	0.3174
D(LST)	6.776192	2	0.0338
All	17.78289	4	**0.0014**
Dependent variable: D(LGDP)			
Excluded	**Chi-sq**	**df**	**Prob.**
D(LFDI)	2.355747	2	0.3079
D(LST)	4.997206	2	0.0822
All	6.951486	4	**0.1385**
Dependent variable: D(LST)			
Excluded	**Chi-sq**	**df**	**Prob.**
D(LFDI)	1.372210	2	0.5035
D(LGDP)	4.081594	2	0.1299
All	5.286726	4	**0.2591**

Source: Author's estimation based on EViews output

INTERPRETATION:

MODEL 1: Strong evidence of Granger Causality. **(Significant)**

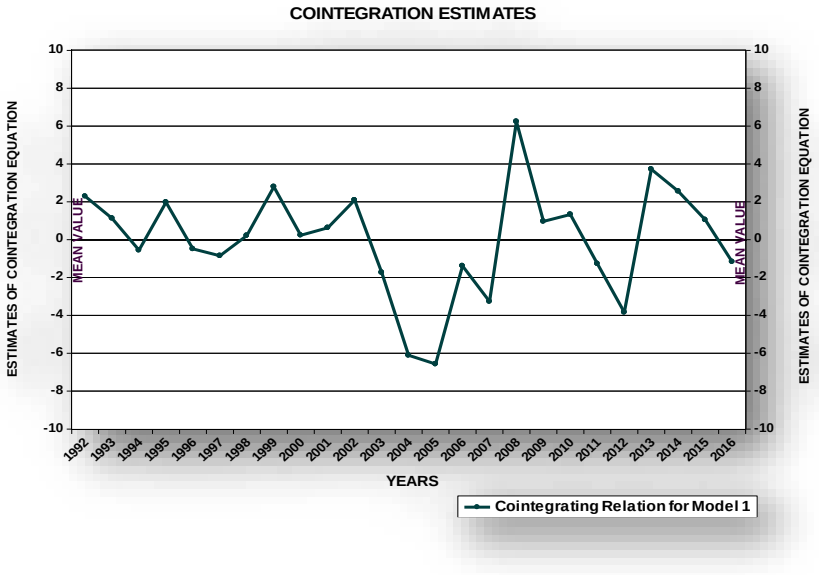
MODEL 2: No evidence of Granger Causality. **(Not significant)**

MODEL 3: No evidence of Granger Causality. **(Not significant)**

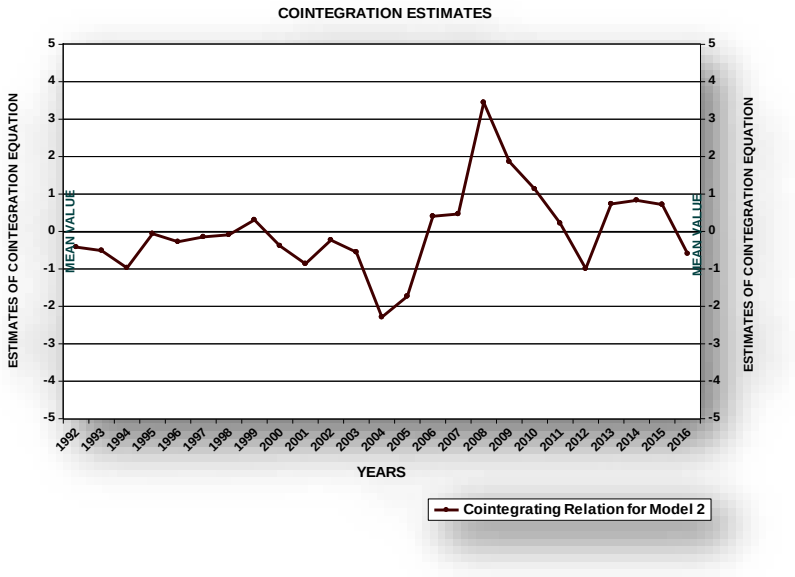
2.8 COINTEGRATING RELATIONS

In the end, estimations of Cointegration equations for both models will be analyzed with the help of graphical technique. All estimates must be having a normal distribution having zero mean and all values must fluctuate around the mean value i.e. the estimates are stationary.

Graph1. 10 ESTIMATES OF COINTEGRATING EQUATION FOR MODEL-1



Graph1. 11 ESTIMATES OF COINTEGRATING EQUATION FOR MODEL-2



The graphical representation shows that both models are stable and they converge towards equilibrium in the long-run.

2.9 EMPIRICAL FINDINGS OF BOTH MODELS, CONCLUSION, DISCUSSION AND RECOMMENDATIONS

In this study time series data of Pakistan covering a period of 1989 – 2016 has been used for conducting an empirical analysis to determine the relationship between FDI inflows and economic growth of Pakistan in the light of sectarian terrorism. This study is unique in the sense that it uses most updated data of Pakistan and tests two-way causality to confirm the relationship between FDI inflows and economic growth of Pakistan. In the first model, the variable of FDI inflows has been taken as a dependent variable along with economic growth and terrorism as independent variables. In the second model, economic growth has been taken as a dependent variable whereas FDI inflows and terrorism act as independent variables. As every time series requires a unit root test for checking the stationarity status of variables, ADF and KPSS tests have been applied to check the stationarity status of variables included in the dataset. Both tests show that all series are stationary at 10% level of significance. Later Johansen Cointegration test has been applied twice. In first test LFDI and LGDP are used to find Cointegration and second time all three series (LFDI, LGDP, and LST) have been used. After establishing a strong Cointegration which is evident from the results of Johansen Cointegration test, VECM is

used for further investigation. As in the first model, LFDI is taken as a dependent variable, VECM is applied by taking LGDP and LST as independent variables. To find probability values, system equation model is conducted. In the first model, the coefficient of the dependent variable is found to be significant showing that LGDP and LST affect FDI inflows both in short and long-run. Moreover, the whole model shows that all independent variables can jointly affect the dependent variable.

On the other hand, in the second model where LGDP serves as the dependent variable, same results have been found; the coefficient of dependent variable is significant meaning that LGDP is affected by both LFDI and LST but probability of F-statistic shows that all independent variables taken together or jointly, cannot influence the dependent variable but they may have an individual impact. In this context, model 1 is more practical as compared to model 2 but the purpose is achieved and a two-way causality has been confirmed by empirical analysis. The Cointegrating equations also show stationarity leading to the conclusion that both models tend to converge towards equilibrium over the long-run time period. Impulse responses and variance decomposition tests show the effect of shocks or fluctuations in endogenous variables on other variables, the detailed empirical analysis explains the behavior of shocks and fluctuations in all variables caused by each other. Wald test and Granger Causality tests have been applied to check the exogeniety and causality respectively. The results show that FDI is not weakly exogenous whereas the second model concludes that GDP is weakly exogenous. The same results are confirmed by the Granger Causality test.

Another important point has been revealed by normalized Cointegration equations which show that all series move in the same direction (LFDI, LGDP, and LST have same signs). A positive relationship between FDI inflows and GDP is expected and leads to desirable results but positive sign with ST shows that LDFI, LGDP, and LST, all move in same direction. An important factor brought forward by the data is that despite an increase in terrorism in the form of sectarianism in Pakistan, FDI inflows have also increased in recent years at a very fast rate. A detailed analysis reveals that major portion of FDI inflows in Pakistan are from China in the form of CPEC (for details refer to table-1 in literature review). The growth in FDI inflows despite an increased number of sectarian-based terrorist incidents in Pakistan is due to the net effect of these two opposing forces where FDI inflows overweigh terrorist incidents. Therefore it can be concluded that whether the causation runs from FDI to growth or from growth rate to FDI in presence of sectarian terrorism, there exists two-way causality, for the first case, it is for both in short-run and long-run and for the second case, it

is only in short-run. FDI inflows lead to an increase in economic growth but this relationship is affected by sectarian terrorism in Pakistan.

After discussing and concluding empirical findings, the theoretical discussion also leads to the same conclusion. In other words, growth rate increases as a result of an increase in FDI inflows but sectarian terrorism acts as an obstacle. Nonetheless, presently terrorist activities have been controlled in Pakistan after the Military Operation of Zarb-e-Azab. This is evident from CPEC which is one of the biggest investment in Pakistan carried out by China. Impact of Zarb-e-Azab on terrorism in Pakistan and the effects of CPEC cannot be tested empirically as both these plans are ongoing and started recently. Also, there is no long-run or enough data which could be used for carrying out empirical analysis. Although there are many theoretical studies on both topics but long-run empirical study can be conducted only after some years when the effects are clearer and ample data is available for empirical analysis.

As indicated in the literature review also, the incident of 9/11 resulted in reshaping the global scenario and the differences between North and South increased. The most disastrous consequences were faced by developing countries and this trend is still going on. Out of developing countries, Muslim countries faced the worst consequences since the incident of 9/11 was attributed to Muslims and a wave of prejudice and hatred got spread against them, particularly in the West. Afghanistan got devastated with more than one million people dead. The Middle Eastern countries like Iraq, Libya, Syria, and Yemen etc. got worst hit and the spillover effects are still continuing in the form of destroyed economies, the death of millions while millions got disabled, besides getting displaced. Although sectarian violence was already a part of Pakistan's socio-politico-economic system but religious differences increased manifold after 9/11 incident. The US started a war on terror against Muslim countries and Asia got hit in an unexpected worst way. This resulted in a reaction and many groups in Muslim countries turned to militancy and they fought back. Different groups came to the surface based on ideologies; some had an extreme reaction which led to suicide bombing with the belief that such an act would surely land the suicide bomber in heaven. Groups with opposing ideologies emerged who did not believe in killing and terror which led to armed conflicts among Muslim sects. So far the results are consistent with other studies that terrorist incidents increased after the 9/11 attacks but the argument made in this study that all this was based on conflicting religious views, is found to be correct. This study has viewed all these factors with a different angle and results have also been proved that presently, sectarian terrorism is the result of conflicting religious ideologies. Islam is a religion of peace, tolerance and enjoins its believers to respect life, honor, and

property of everyone irrespective of religious beliefs. Unfortunately, majority amongst the non-Muslims dubbed Islam for preaching terrorism against non-Muslims while the disgruntled elements amongst the Muslim sects have declared violence, including the killing of non-Muslims as well as the believers belonging to opposite sects as virtuous deeds leading to heaven. Both are patently wrong. Therefore, I would recommend that Muslims and non-Muslims must have an interfaith dialogue at the global level to develop mutual understanding and tolerance for each other. Not only this, the Muslim countries have to make concerted efforts to develop a consensus code of conduct in the light of fundamental teachings of Islam so that different sects amongst Muslims develop not only tolerance but brotherly feelings for each other. This multiple dialogues with complete sincerity and honesty is the only way out to develop tolerance and mutual respect not only amongst Muslims and non-Muslims but also amongst believers of different sects of Muslims which would definitely make this world a peaceful abode for all the human beings.

REFERENCES

Abbas, H. (2010). *Shiism and sectarian conflict in Pakistan: identity politics, Iranian influence, and tit-for-tat violence*. Combating Terrorism Center at West Point.

Abbas, K. (2015). Foreign Direct Investment and Trade Liberalization Policies in Pakistan. *Islamabad Policy research Institute (IPRI),* January 30, 2015. As accessed on August, 2, 2016.

Link:http://www.ipripak.org/foreign-direct-investment-fdi-and-trade-liberalization-policies-in-pakistan/#sthash.5A3DrPnI.dpbs

Abbasi, N. M. (2013). Impact of terrorism on Pakistan. *Strategic Studies*, *33*(2).

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.

Akbar, M., & Akbar, A. (2015). An Empirical Analysis of Foreign Direct Investment in Pakistan. *Studies in Business and Economics*, *10*(1), 5-15.

Ali, S. (2014). Foreign capital flows and economic growth in Pakistan: An empirical analysis. *Ali, Sharafat (2014). Foreign Capital Flows and Economic Growth in Pakistan: An Empirical Analysis. World Applied Sciences Journal*, *29*(2), 193-201.

Ali, S., Waqas, H., & Asghar, M. (2015). Bearing the Brunt: The Effect of Terrorism on Foreign Direct Investment in Pakistan. *Journal of Applied environmental and Biological Sciences*, *5*(5), 312-320.

Ali, W., & Gang, L. (2016). Relationship of Security Stability with FDI Inflows and Economic Growth Evidence from Pakistan. *Journal of Economics and Sustainable Development*, *7*(8), 131-139.

Alomar, M., & El-Sakka, M. (2011). The impact of terrorism on the FDI inflows to less developed countries: A panel study. *European Journal of Economics, Finance and Administrative Sciences*, *28*(1), 16-126.

Anderson, G. M. (1988). Mr. Smith and the preachers: the economics of religion in the wealth of nations. *The Journal of Political Economy*, 1066-1088.

Arshad, M. (2012). Impact of foreign direct investment on trade and economic growth of Pakistan: A co-integration analysis. *Int. J. Eco. Res*, *3*(4), 42-75.

Aqeel, A., Nishat, M., & Bilquees, F. (2004). The Determinants of Foreign Direct Investment in Pakistan [with Comments]. *The Pakistan Development Review*, 651-664.

Atique, Z., Ahmad, M. H., Azhar, U., & Khan, A. H. (2004). The Impact of FDI on Economic Growth under Foreign Trade Regimes: A Case Study of Pakistan [with Comments]. *The Pakistan Development Review*, 707-718.

Barro, R. J. (2004). Spirit of capitalism: Religion and economic development. *Harvard International Review*, *25*(4), 64-67.

Batchelor, R., & ESCP, P. (2000). EVIEWS tutorial: Cointegration and error correction. *City University Business School, London & ESCP, Paris*, 1-16.

Bent E. Sørensen. (2005). Granger Causality. *ECONOMICS 7395, spring, 2005*.

Link: http://www.uh.edu/~bsorense/gra_caus.pdf

Broekel, T., & Brenner, T. (2011). Regional factors and innovativeness: an empirical analysis of four German industries. *The Annals of Regional Science*, *47*(1), 169-194.

Buckley, P. J., Clegg, J., Wang, C., & Cross, A. R. (2002). FDI, regional differences and economic growth: panel data evidence from China. *Transnational corporations*, *11*(1), 1-28.

Busse, M., & Hefeker, C. (2007). Political risk, institutions and foreign direct investment. *European journal of political economy*, *23*(2), 397-415.

Caruso, R., & Schneider, F. (2011). The socio-economic determinants of terrorism and political violence in Western Europe (1994–2007). *European Journal of Political Economy*, *27*, S37-S49.

Chenery, H. B., & Strout, A. M. (1966). Foreign assistance and economic development. *The American Economic Review*, *56*(4), 679-733.

Clarke, R. (2011). *Crime-terror nexus in South Asia: states, security and non-state actors*. Taylor & Francis.

Economic Survey of Pakistan. (2014-15). *Finance Division*, Government of Pakistan as accessed on July, 31, 2016,

Link: http://www.finance.gov.pk/survey/chapters_15/01_Growth.pdf

Enders, W., & Sandler, T. (2011). *The political economy of terrorism*. Cambridge University Press.

Fair, C. C. (2015). Explaining Support for Sectarian Terrorism in Pakistan: Piety, Maslak and Sharia. *Religions*, *6*(4), 1137-1167.

Falki, N. (2009). Impact of foreign direct investment on economic growth in Pakistan. *International Review of Business Research Papers*, *5*(5), 110-120.

Farooq, M., & Khan, Z. (2014). Impact of Foreign Direct Investment and Some Other Factors on Economic Growth of Pakistan. *City University Research Journal,* 4(1), 53-68.

Farooq, A. M, & Shahzad. (2016). Impact of Foreign Direct Investment and Some Other Factors on Economic Growth of Pakistan. Journal of Law, Policy and Globalization, 33, 2224-3259.

Feldman, N. E., & Ruffle, B. J. (2008). *Religious terrorism: A cross-country analysis*. Samuel Neaman Institute for Advanced Studies in Science and Technology.

Foreign Investment inflows in Pakistan ($Millions). *Board of investment (BOI) Pakistan, as accessed on September 3, 2016, http://boi.gov.pk/ForeignInvestmentinPakistan.aspx*

Freeman, J. R. (1983). Granger causality and the times series analysis of political relationships. *American Journal of Political Science*, 327-358.

Freytag, A., Krüger, J. J., Meierrieks, D., & Schneider, F. (2011). The origins of terrorism: Cross-country estimates of socio-economic determinants of terrorism. *European Journal of Political Economy*, *27*, S5-S16.

Granger, C. W. (1986). Developments in the study of cointegrated economic variables. *Oxford Bulletin of economics and statistics*, *48*(3), 213-228.

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.

Gudaro, A. M., Chhapra, I. U., & Sheikh, S. A. (2010). Impact of foreign direct investment on economic growth: A case study of Pakistan. *Journal of Management and Social Sciences*, *6*(2), 84-92.

Haider, M., & Anwar, A. (2014). Impact of terrorism on FDI flows to Pakistan. *Available at SSRN 2463543*, 1-30.

Husain, I. (2009). The role of politics in Pakistan's Economy. *Journal of International Affairs*, *63*(1), 1-18.

Hussain,S.E.(2010). Terrorism in Pakistan: Changing incident patterns in Pakistan. *University of Pennsylvania*. Available at http://repository.upenn.edu/cgi/viewcontent.cgi?article=1163&context=edissertations

Hyder, S., Akram, N., & Padda, I. U. H. (2015). Impact of terrorism on economic development in Pakistan. *Pakistan Business Review*, *839*, 704-722.

IQBAL, Z., & LODHI, S. (2014). Extremist and Religious violence: An Economic overview of Pakistan. *International Journal of Research in Applied, Natural and Social Sciences*, 2(11), 195-212.

Iqbal, Z., & Zahid, G. M. (1998). Macroeconomic determinants of economic growth in Pakistan. *The Pakistan Development Review*, 125-148.

Ismail, A., & Amjad, S. (2014). Determinants of terrorism in Pakistan: An empirical investigation. *Economic Modelling*, *37*, 320-331.

Javaid, W. (2016). Impact of Foreign Direct Investment on Economic Growth of Pakistan-An ARDL-ECM Approach.

Joint Economic Committee, & Congress, U. S. (2002). The Economic Costs of Terrorism. In *United States Congress, Joint Economic Committee*.

Juselius, K. (2006). *The cointegrated VAR model: methodology and applications*. Oxford University Press.

Kazim Alam (2016, July 21). China helps as FDI in Pakistan Surges 38.8%. The Express Tribune. http://tribune.com.pk/story/1146075/2015-16-china-helps-fdi-pakistan-surges-38-8/

Khan, Z. (2016). Sectarian Rise in Pakistan: Role of Saudi Arabia and Iran. *Researcher in Government and Public Policy, National Defence University, Islamabad, Pakistan.*

LINK: http://t.ia-forum.org/Files/ZJJYLP.pdf

Kis-Katos, K., Liebert, H., & Schulze, G. G. (2011). On the origin of domestic and international terrorism. *European Journal of Political Economy*, *27*, S17-S36.

Lequiller, F. (2004). Is GDP a satisfactory measure of growth? *OECD Observer*, *246*.

Li, Q., & Schaub, D. (2004). Economic globalization and transnational terrorism a pooled time-series analysis. *Journal of Conflict Resolution*, *48*(2), 230-258.

Lin, J. L. (2006). Teaching notes on impulse response function and structural VAR. *Institute of Economics, Academia Sinica, Department of Economics, National Chengchi University.*

Link: http://faculty.ndhu.edu.tw/~jlin/files/impulse.pdf

Mayr, J., & Ulbricht, D. (2007). Log versus level in VAR forecasting: 16 Million empirical answers–expect the unexpected. *Ifo Working Paper Series*, (Ifo Working Paper No. 42).

Malik, K. (2015). Impact of Foreign Direct Investment on Economic Growth of Pakistan. *American Journal of Business and Management*, *4*(4), 190-202.

Mehmood, S. (2014). Terrorism and the macro economy: Evidence from Pakistan. *Defense and Peace Economics*, *25*(5), 509-534.

Meierrieks, D., & Gries, T. (2013). Causality between terrorism and economic growth. *Journal of Peace Research*, *50*(1), 91-104.

Mitchell, J. (2000). *The importance of long-run structure for impulse response analysis in VAR models* (No. 172). National Institute of Economic and Social Research.

Mohiuddin, Y. N. (2007). *Pakistan: a global studies handbook*. ABC-CLIO.

Murphy, E. (2012). *The making of terrorism in Pakistan: historical and social roots of extremism*. Routledge.

Najaf, R., & Najaf, K. (2016). Impact of political stability on the macroeconomic variables and FDI of Pakistan. *Scientific Journal of Pure and Applied Sciences*, *5*(2), 351-359.

Pakistan Bureau of Statistics. (2014-15). Macro-Economic Indicators. *Ministry of Pakistan* as accessed on July, 31, 2016,

Link: http://www.pbs.gov.pk/sites/default/files/tables/Table-1.pdf

Pierce, D. A. (1977). Relationships—and the lack thereof—between economic time series, with special reference to money and interest rates. *Journal of the American Statistical Association*, *72*(357), 11-22.

Osemwengie, D. O. P., & Oriakhi, D. E. (2012). The Impact of National Security on Foreign Direct Investment in Nigeria: An Empirical Analysis. *Journal of Economics and Sustainable Development*, *3*, 13.

Qian, X., & Baek, K. (2011). An analysis on political risks and the flow of foreign direct investment in developing and industrialized economies. *Economics, management, and financial markets*, (4), 60-91.

Rasheed, H., & Tahir, M. (2012). FDI and Terrorism: Co-integration & Granger Causality. *International Affairs and Global Strategy*, *4*(0), 1-5.

Rauf, S., Mehmood, R., Rauf, A., & Mehmood, S. (2016). Integrated Model to Measure the Impact of Terrorism and Political Stability on FDI Inflows: Empirical Study of Pakistan. *International Journal of Economics and Finance*, *8*(4), 1-7

Rehman, S. S., & Askari, H. (2010). An Economic Islamicity Index (EI2).*Global Economy Journal*, *10*(3), 1-39.

Romaniuk, S. N. (2015). The making of terrorism in Pakistan: historical and social roots of terrorism, by Eamon Murphy. *Critical Studies on Terrorism*, *8*(2), 328-330.

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.

Said, S. E., & Dickey, D. A. (1984). Testing for unit roots in autoregressive-moving average models of unknown order. *Biometrika*, *71*(3), 599-607.

Schwert, G. (2009). EViews 7 user's guide II. *Quantitative Micro Software, LLC, Irvine, California*.

Shahbaz, M. A., Javed, A., Dar, A., & Sattar, T. (2013). Impact of terrorism on foreign direct investment in Pakistan. *Archives of Business Research*, *1*(1), 1-7.

Shah, M. N. (2014). Evolution of Sectarianism in Pakistan: A Threat to the State and Society. *South Asian Studies*, *29*(2), 441-459.

Shahzad, S. J. H., Zakaria, M., Rehman, M. U., Ahmed, T., & Fida, B. A. (2016). Relationship between FDI, Terrorism and Economic Growth in Pakistan: Pre and Post 9/11 Analysis. *Social Indicators Research*, *127*(1), 179-194.

Sjö, B. (2008). Testing for unit roots and cointegration. *Web adresi*.

United Nations. (2010). Poverty: The official numbers (Chapter II). *United Nations, New York*

Link: http://www.un.org/esa/socdev/rwss/docs/2010/chapter2.pdf

Websites

www.tradingecoomics.com

Global Terrorism Database (GTD)

South Asia Terrorism Portal (SATP)

What is GDP and why is it so important to economists and investors? (March 26, 2016) by Investopedia staff. Retrieved August 7, 2016, from

http://www.investopedia.com/ask/answers/199.asp

Yasin, K., & Ramzan, M. (2013). The Impact of foreign direct investment on Pakistan economic growth. *Interdisciplinary journal of contemporary research in business*, *4*(11), 287-296.

Zafar, M. Pirzada, S. U., & Khan, Z. U. (2016). FDI, trade openness and economic growth, new dynamics in Pakistan. *Science International Journal Lahore 28 (1), 597-602.*

Zakaria, M. (2014). Effects of Trade Liberalization on Exports, Imports and Trade Balance in Pakistan: A Time Series Analysis. *Prague Economic Papers*, *23*(1), 121-139.

Zaman, M. Q. (1998). Sectarianism in Pakistan: The Radicalization of Shi 'i and Sunni Identities. *Modern Asian Studies*, *32*(03), 689-716.

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), 32-38.

PAPER- 2

Analyzing short-run and long-run causality between FDI inflows, Labor productivity and Education in Pakistan

Abstract

FDI inflows play a very important role in increasing the productivity of factors of production through the channel of technology transfer and establishment of MNCs. This study empirically analyzes the causal relationship, for both short and long-run, between FDI inflows, labor productivity, and education in case of Pakistan using time series data from 1971-2016. The present study concentrates only on labor productivity since Pakistan is a labor abundant country using labor-intensive techniques of production. The innovative aspect of this study lies in its proxy measure of education and econometric techniques employed for carrying out empirical analysis. For measuring the impact of education, government spending on education as a percent of GDP has been used whereas for empirical analysis, it uses the latest test for measuring causality i.e., Breitung-Candelon Granger Causality test in frequency domain (both old and new versions) along with the traditional approach of Johansen Cointegration test for analyzing long-run relationship. Two separate models have been constructed. Model 1 is based on measuring bi-variate causality between FDI inflows and labor productivity whereas, model 2 checks a bivariate causality between education and labor productivity. The main reason for measuring separate effects of two variables on labor productivity depends on the argument that education increases labor productivity if it is accessible to a common man but this is not the case in Pakistan since Government of Pakistan is allocating very small amounts to the education sector and therefore, productivity does not increase. But FDI inflows lead to an increase in productivity by providing training to labor converting them into human resource though, in this case, MNCs hire already educated workers and polish them by imparting new skills in them. Both versions of BC test, i.e., Breitung and Candelon (2006), and Breitung and Schreiber (2016), suggest a univariate causality running from FDI to labor productivity only, whereas Johansen Cointegration approach suggests a long-run relationship. Therefore, based on the empirical results of both tests, it will not be wrong to conclude that the Government of Pakistan should give proper attention to the education sector in order to gain maximum benefits from FDI inflows.

Keywords: FDI Inflows, Labor Productivity, Education, Pakistan

List of abbreviations

ARDL	= Autoregressive-Distributed Lag
BC	= Breitung- Candelon
BS	= Breitung- Schreiber
CPEC	= China Pakistan Economic Corridor
FDI	= Foreign Direct Investment
GDP	= Gross Domestic Product
GLS	= Generalized Least Square
GNP	=Gross National Product
HRD	=Human Resource Development
MNCs	= Multinational Companies
NGOs	= Non-government Organizations
OECD	= Organization for Economic Co-operation And Development
R & D	= Research and Development
RPED	= Regional Program for Enterprise Development
VAR	= Vector Auto-regressive
VECM	= Vector Error Correction Model
VMA	= Vector Moving Average

3.1 INTRODUCTION

The benefits of Foreign Direct Investment Inflows (FDI) and its impact on emerging economies is one of the highly debated topics among researchers and policymakers. Despite the flow of capital and modern technology with FDI, its impact on factor productivity is given more importance because development of an economy is the direct result of an efficient use of its factors of production. According to Kipsang (2015), labor productivity being an indicator of technical efficiency depicts the varying pattern of factors of production and their use. Without continuous positive growth in labor productivity, economic growth cannot be achieved.

Pakistan is a developing economy having labor as the most abundant factor of production and consequently, the techniques of production are also labor intensive. Theoretically, it can be argued that FDI inflows increase labor productivity by bringing new technology, innovation, and R&D. In addition, Multinational Companies (MNCs) also play a vital role in increasing productivity through the channel of training and introducing new ideas for production based on modern technology. According to Dar et al (2016), the offshoot of globalization is attracting the developing countries to strive for achieving the same level of technological development as that of the developed countries. In order to get maximum benefit from this technological diffusion, sufficient level of human capital development in the recipient country is the pre-requisite so as to remove all hindrances of absorbing the fruits of technological transmission.

On the other hand, the relationship between labor productivity and education cannot be ignored. High level of quality education leads to an increase in labor productivity which in present times of globalization, is also referred to as Human Capital. Nelson and Phelps (1966), in their study, concluded, that investment in education is directly related to technological progress since educated people act as a catalyst for the development of technology which results in economic growth. According to them, the rate of return on the investment in technology directly reflects in the technological progress of the economy. Through investment in education, society can build more human capital which would result in higher tangible capital through dynamic technology. Though determination of role between education and economic growth has significant implications but no straightforward formula is available to prepare an index for measuring this relationship between education and the dynamics of production.

Same is the case in Pakistan. On the one hand, FDI inflows lead to an increase in labor productivity through technology transfer, establishment of MNCs, technical know-how, and training, whereas on the other hand, due to technological backwardness, labor is unable to completely digest the new

techniques. On the contrary, the government does not make sufficient domestic spending on education which acts as a hurdle in converting labor into human resource. Although no benchmark level of government spending on education, especially in monetary terms, has ever been suggested which could be related to labor productivity, but taking lead from the developed countries, Government of Pakistan must make high school level of education free and compulsory. It has to be ensured that there are no drop-outs and this policy is implemented in letter and spirit. This would go a long way in increasing the labor productivity.

Keeping in view this phenomenon, the present study analyzes the dynamic and causal relationship between FDI inflows, labor productivity, and education. For this purpose, two separate models are constructed. Model 1 analyzes the causality between FDI inflows and labor productivity and Model 2 examines the relationship between labor productivity and education. Since labor productivity is the common factor in both models and focal point of research, the major section of literature review shall be throwing light on labor productivity. For empirical analysis, Breitung and Candelon (Breitung and Candelon, 2006), Granger Causality test in the frequency domain has been applied. Later to check the robustness of results, the new version of Breitung and Candelon (BC) test suggested by Breitung and Schreiber (2016) has been used. Since BC tests are quite new, therefore the traditional Johansen Cointegration test has also been applied in the later part of the paper in order to avoid any possibility of error in the empirical results. For this purpose time series data of Pakistan from 1971-2016 has been used.

This study is divided into 7 sections. Section 1 gives the introduction of the topic and explains the objective of the study. Section 2 throws light at the relevant literature. Section 3 is based on a discussion of literature and explains endeavors of the present study. Section 4 discusses the empirical analysis in detail along with the relevant research available on empirical methods being used in this study. In section 5, empirical tests have been applied whereas results are discussed in section 6. The last section concludes the study. The details of BC graphs and their interpretation is presented in the appendix.

3.1.1 OBJECTIVE OF STUDY

This study is an attempt to analyze the relationship between FDI inflows, labor productivity and education in case of Pakistan. The innovative characteristic of this study is its emphasis on labor productivity while most researches are based on Total Factor Productivity (TFP) which includes both labor and capital. Whereas in the case of Pakistan, the production function is mainly dependent upon the relationship between labor and

output whereas capital is more or less fixed. The use of traditional Cobb Douglas production function may lead to wrong estimations. On the other hand, capital cannot be completely ruled out for which the factor of education has been included which is mainly responsible for converting a simple labor into human resource. Particularly in the case of Pakistan labor can benefit from technological spillovers through FDI inflows if it is professionally trained through education. This relationship will be analyzed by examining government spending (percentage of GDP) on the education sector. For this purpose, time series data of Pakistan over the period of 1971-2016 has been analyzed. The main focus of the study is Breitung and Candelon test in frequency domain (both old and new version with and without conditions) to empirically analyze this relationship. In addition, since this study is based on time series analysis, the traditional tests for stationarity and Cointegration cannot be ignored.

3.2 LITERATURE REVIEW

The relationship between FDI inflows, labor productivity, and education has been discussed comprehensively in the literature. For an in-depth debate, the literature review has been divided into three sub-sections where section 1 discusses the relationship/impact of FDI inflows on labor productivity. Section 2 concentrates on the studies presently available which analyze the relationship and effect of education on labor productivity. These two subsections throw light on international studies related to the subject under discussion. Section 3 purely concentrates on studies related to Pakistan.

3.2.1 Relationship between FDI inflows and labor productivity

According to Ramirez (2006), FDI inflows bring capital and technical know-how to developing economies which result in an increase in labor productivity. The author empirically analyzed the impact of FDI inflows on labor productivity by taking Chile as the subject country and Cointegration technique as the main test for empirical analysis. The econometric results suggested a positive effect of FDI flows on labor productivity during the time period of 1996-2000.

A comprehensive study by Zhu and Tan (2000), empirically examined the causal relationship between labor productivity and inward FDI for different cities of China. For this purpose, they used a pooled city-level dataset with 2032 observations covering a time period of 11 years. Granger Causality technique was used by the authors for empirical analysis. According to them, determinants of labor productivity include the level of education, training, and infrastructure. Their empirical findings are divided into four parts. According to first finding, FDI intensity in terms of per capita amount

has a positive impact on labor productivity. Secondly, the results also suggest that the high level of labor productivity attracts more FDI. Thirdly, FDI intensity in terms of geographical size does not affect labor productivity and high level of labor efficiency draws more FDI inflows per unit geographical area. In the case of infrastructure, FDI is directly related to areas having better infrastructure. Finally, they conclude that coastal cities with better human resource management and good infrastructure, show better performance in case of absorbing the benefits of FDI flows.

Some important implications can be drawn from their study. First labor productivity has a positive relationship with FDI flows and vice versa but quality cannot be ignored. Secondly, the major finding of their study is related to the geographical area. This result can have general implications for developing countries. Geographical areas with better quality of labor/human resource attract more FDI.

Demetic and Rebi (2014), carried out an empirical analysis to investigate the relationship between FDI and labor productivity in the case of Albania. Using the correlation analysis and Granger Causality test, they found a strong correlation between FDI and labor productivity. Whereas the Granger test indicated a unidirectional causation running from labor productivity to FDI but no evidence of "FDI causes productivity" was suggested by the causality test. According to the authors, the reason for such contradictory results may be due to the limited role of MNCs with high technology in Albania. They suggested that to benefit from FDI, Greenfield FDI must be attracted in industries producing exportable products. This will result in more technology transfer and innovation in local firms. Consequently, FDI will have a positive causation with labor productivity of host country.

A detailed and comprehensive study has been undertaken by Mebratie (2010). The author used firm-level cross-sectional data for the years 2003 and 2007 to study South African Manufacturing Industries. Three techniques have been employed for conducting an empirical analysis. In the first case, OLS estimates indicated a positive and significant effect of FDI on the labor productivity of domestic firms. In the second case, pooled data for two years also gave the same results and suggested a positive and significant relationship between foreign presence and productivity of domestic labor. Contradiction arose between the results obtained through Meta-analysis which indicated no impact (positive or negative) of FDI on labor productivity of domestic firms. The author argues that this is due to the controversial role of MNCs which give importance to their own workers and hence productivity of host country labor is not given importance. On

the other hand, due to FDI inflows, technology transfer and innovation takes place resulting in imitation effect; domestic labor learns new techniques which results in an increase of labor productivity of domestic firms. The author finally concludes that foreign firms improve the productivity of local workers through training but it may be limited due to limited horizontal linkages [(1)] between MNCs and domestic firms.

Here an important point is worth mentioning that while discussing about the relationship between FDI inflows and labor productivity, the role of MNCs cannot be ignored but there is no consensus about the exact role of MNCs in increasing the labor productivity as they give more importance to their own workers as compared to workers of host country.

A similar conclusion has been drawn by a study carried out by Contessi and Weinberger (2009), which mainly discusses and analyzes two important macroeconomic relationships; FDI and national growth, MNCs, and labor productivity.

The authors throw light on the studies using growth regression approach and conclude that empirical research that makes use of firm and plant level data leads to an evidence of MNCs having more concentration on productivity of labor in their home country as compared to host country, yet there is a limited positive impact on labor productivity of host country.

Mallick (2013), conducted an empirical analysis on OECD regions taking data for 22 years covering a time period from 1990-91 to 2011-12. The author focused on analyzing the relationship between indicators of globalization and labor productivity. The major indicators included FDI inflows and economic openness. The results of the multiple regression model conveyed a positive and significant relationship between indicators of globalization and labor productivity. The author argues that globalization has a positive link with labor productivity through FDI which is responsible for bringing new technology to developing countries as developed countries have better technology as compared to emerging economies. Developing countries benefit through spillover effects which increase labor productivity through the adoption of the latest technology.

---

(1) In a value chain, horizontal linkages are longer-term cooperative arrangements among firms that involve interdependence, trust and resource pooling in order to jointly accomplish common goals. Both formal and informal horizontal linkages can help reduce transaction costs, create economies of scale, and contribute to the increased efficiency and competitiveness of an industry.

LINK: https://www.microlinks.org/good-practice-center/value-chain-wiki/horizontal-linkages-overview

Tintin (2012) empirically tested the relationship between productivity spillovers and FDI for 20 countries (10 developed countries and 10 developing countries) over the time period of 1984-2008. The author divided the productivity measure into two categories; TFP and labor productivity. The panel Cointegration results indicated a strong significant relationship between FDI and labor productivity through spillover effects but a weak association was observed between FDI and TFP. The findings also suggested that developing countries with good quality of labor benefit more from FDI as compared to low-quality labor countries.

Nozuko (2016), conducted an empirical study to examine the impact of FDI on labor productivity in the industrial sector of South Africa using time period of 1995-2013. The results of Johansen Cointegration discovered a long-run relationship between FDI inflows and labor productivity in the case of South Africa. The author also suggested that policymakers should give more importance towards improving labor productivity through professional training in order to increase the growth rate of the industrial sector and hence economy as a whole.

3.2.2 Relationship between education and labor productivity

Role of education in labor productivity cannot be ignored as more than any other factor, education ranks at the top in converting a simple labor/unskilled worker into a human resource who is not only skilled but contributes to the economic well-being of a country. One of the most renowned research on this topic was carried out by Solow (1956), who debated that fluctuations in national income of a country were significantly dependent upon the country's physical and human capital. Berger and Fisher (2013), in their report, highlighted that investment in education not only increases economic opportunities for workers but also leads to a high wage rate which contributes to a better living standard.

Jones (2008), carried out an empirical study to investigate the relationship between education, productivity, and wages in the case of Ghana. The study used a panel of 200 manufacturing firms organized under the World Bank's 'Regional Program for Enterprise Development' (RPED) and collected data during the summer of 1992, 1993 and 1994. The empirical results suggested that a high level of education has a direct and positive relationship with productivity and wage rate.

Most studies concentrate on the relationship between labor productivity, level of education and wage rate but the role of government spending has not been given much importance. On the other hand, this relationship cannot be ignored especially in the case of developing economies since they need more educated and skilled labor because most of emerging economies are labor

abundant. A study conducted by Arshad and Malik (2015), concluded that the high quality of education is directly linked to high labor productivity. Their study used panel data from 14 states of Malaysia for a time period of 2009-2012. Results of Generalized Least Square (GLS) suggested that in order to achieve high labor productivity, the Government of Malaysia must give attention to health and education sector in order to fulfill their target of achieving the status of a developed country by 2020.

Jung and Thorbecke (2003), studied the patterns of public expenditure on education for the economies of Tanzania and Zambia. They suggested that high expenditures on education led to more employment opportunities and consequently, poverty got reduced. Therefore a significant amount of investment in education is required to increase labor productivity otherwise there would be no gains in the form of more employment opportunities.

Baldacci et al (2008), used panel data of 118 developing countries and concluded that spending on education and health have a significant impact on the accumulation of human capital. Also overall it leads to a high growth of the economy.

The available literature mainly analyzes the relationship between education and economic growth, where education has been discussed with reference to labor productivity and has remained restricted to the levels of education (primary, secondary, tertiary, etc.). The government spending on education, particularly in the case of developing countries, with the view to enhancing labor productivity, has not received much attention from the researchers so far. This paper intends to fill up this gap.

3.2.3 FDI inflows, education, and labor productivity in case of Pakistan

The relationship between FDI inflows and labor productivity has been well explained by Alam et al (2013) [(2)], in their own words

"A productive labor force possesses obligatory as well as additional dexterity and has the ability to improve the overall the economic growth of a nation. However, foreign direct investment fits in the relationship between labor productivity and economic growth in the sense that labor productivity is enhanced by the inflow of capital from foreign investors. Hence, labor productivity and foreign direct investment have significant roles to play in the development of the economy."(Page 133)

---

(2) *http://pubs.sciepub.com/jbms/1/6/3/#*

In case of the effects of FDI inflows, most of the studies concentrate on the relationship between FDI inflows and economic growth but the effect on labor productivity has not been given required attention.

Rehman (2016), carried out an empirical analysis using time series data of Pakistan from 1970-2012. The results of VECM suggested that in order to gain from FDI, policymakers must give importance to literacy rate as technological gains are not possible without educated labor.

Choudhry (2009), in his research, argues that extent of productivity depends on education level but in case of low-income countries, the majority of the population is employed in the agriculture sector and have a poor level of education. These countries are unable to enjoy the full benefits of FDI. Author's results are based on an empirical study which attempts to identify the potential determinants of labor productivity for developing economies belonging to different income groups. The study uses a cross-country panel data set of 45 countries for the period of 1980-2005. The empirical results suggested a strong impact of education and FDI on labor productivity but not in the case of low-income countries which also include Pakistan in the dataset.

Wahab et al (2013), analyzed the relationship between endowment of human capital, government spending on HRD and productivity of labor force in Pakistan.

They concluded that productivity of labor in case of Pakistan is falling because of low government spending on HRD as the percentage of GDP. The only productivity increase is witnessed in more or less services sector in the past few decades. The governance of public sector education must be improved as it is not only important for attracting foreign investors but also for increasing domestic investment. The authors suggested that labor productivity can be increased by investing in education, health, and vocational training.

Ahmad et al (2012), carried out an empirical analysis using time series data of Pakistan from 1971-2007. Their results suggested that FDI inflows play an important role in increasing GDP (economic growth) of Pakistan. Moreover, FDI inflows can stimulate Human Resource Development (HRD) via investment in education and training. This leads to an increase in the stock of human capital resulting in high labor productivity and high rate of economic growth through FDI.

Shafique and Hussain (2015), in their study also concluded that FDI inflows increase the economic growth of Pakistan but to get maximum benefits from FDI inflows, there must be a proper system for providing education in order to make them skilled. For this purpose, investment in education must be

given proper attention as it leads to an increase in labor productivity which in return has positive effects on FDI.

Usman et al (2014), performed a correlation analysis between higher education, infrastructure and FDI using a sample of 22 countries and found a positive correlation between these three variables for the chosen sample of countries. The correlation analysis also suggested that higher education is more significant for attracting FDI as compared to primary education since MNCs hire skilled labor having a high level of education. Based on their results, they recommended that government of Pakistan should give more importance to higher education for attracting more FDI as the level of education is directly related to the level of productivity leading to an increase in human capital.

Mahmood and Rehman (2012), undertook an empirical analysis using time series data of Pakistan from 1971-2009. Their research basically concentrates on analyzing the impact of human capital on economic development, FDI inflows, and domestic investment in Pakistan. For measuring human capital, the proxies used by authors include high school enrolment, other institutional enrolments e.g. secondary, vocational, colleges and universities, the employed labor force and expenditure on education as a percentage of GNP. The ARDL approach to Cointegration suggested that human capital enhances economic growth, FDI and domestic investment in Pakistan. All proxies of human capital suggested a positive impact except the expenditure on education. They suggested that the enrolment rate must be increased at all levels of education. This would cause growth in the workforce having technical skills and know-how and consequently, productivity would get enhanced, causing an increase not only in economic development but also in foreign and domestic investment.

Although their research is comprehensive and covers all aspects of human capital but more emphasis is given to all other measures for increasing human capital and productivity whereas government expenditure is equally important and cannot be ignored.

According to the working paper series of Akram and Khan (1961), the 1973 Constitution of Pakistan makes it mandatory to provide free and compulsory secondary education within a minimum possible period. The Constitution further makes it obligatory for the State to make technical and professional education accessible to all on the basis of merit. It further enjoins on the State to enable the people of different areas, through the education, training, agriculture and industrial development and other methods to participate fully in the form of National activities including that of women in all the spheres of National life. However, despite these constitutional provisions,

successive governments have failed in allocating sufficient resources to the education sector which could enhance labor productivity.

Although no benchmark can be prescribed in monetary terms for allocation to the education sector but the benchmark in terms of the objectives to be achieved is very much specifically prescribed in the Constitution. The State has to allocate that much of resources which would achieve the specified objectives. However, the insufficient expenditure on education as a proxy for human capital suggests that the government of Pakistan is not giving required importance to this sector. Very low sums are allocated to the education sector. This is also evident from following figures related to government spending on education in the case of Pakistan.

Some Important Figures [3]

Table2.1 Expenditures on Education

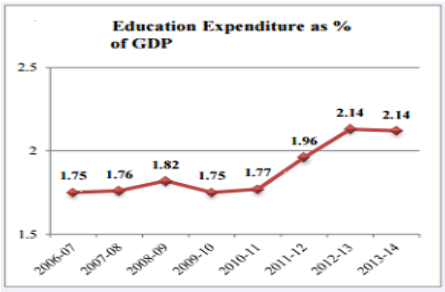
Expenditure on Education (Rs. million)				
Year	**Current**	**Development**	**Total Expenditure**	**As % of GDP**
2006-07	130,313	31,771	162,084	1.75
2007-08	155,622	32,034	187,656	1.76
2008-09	197,723	42,655	240,378	1.82
2009-10	219,933	39,592	259,525	1.75
2010-11	276,239	46,572	322,811	1.77
2011-12	330,228	63,295	393,523	1.96
2012-13	428,944	50,909	479,853	2.14
2013-14	453,735	83,863	537,598	2.14
2014-15 *	219,880	17,556	237,436	-

*July-December (Provisional)

Source: PRSP Budgetary Expenditures, External Finance Policy Wing, Finance Division, Islamabad

Public Expenditure on Education as percentage to GDP is lowest in Pakistan as compared to other countries of the South Asian region. The total expenditure on education has remained around 2.0 percent of GDP for the past decade.

Graph2.1 Expenditures on Education as % of GDP



The Government of Pakistan is determined to enhance the allocated resources to education sector by ensuring proper and timely utilization of funds in order to achieve the UNESCO target of 4.0 percent of GDP by 2018. The graph shows that expenditure on education increasing gradually since 2006-07. An increase of 12.03 percent on education related expenditure recorded as it was Rs. 537.60 billion in 2013-14 as compared to Rs. 479.85 billion in 2012-13.

---

(3) Economic Survey of Pakistan (2014-15)

Source Link: http://www.finance.gov.pk/survey/chapters_15/10_Education.pdf

3.3 DISCUSSION OF LITERATURE AND NEW DIMENSIONS ADDED BY THE PRESENT STUDY

The foregoing discussion of available international literature on the subject reveals that FDI increases labor productivity.

On the other hand, education not only enhances the efficiency of labor but also its productivity on account of acquiring new skills and technical know-how. This analysis gets substantiated by the study of developed countries which achieved rapid economic growth by investing higher amounts in education. In the case of developing countries, mixed results have been obtained by different researchers but the importance of FDI for developing countries has been accepted by all researchers and policymakers.

In the case of Pakistan, it has been argued that FDI inflows do affect labor productivity but the effects may be negative or positive depending on the absorptive capacity of new technology. More educated labor has the high level of productivity and in this case, benefits from FDI can be achieved in a more efficient way.

Here an important point worth mentioning is that most of the studies have related education with the level (primary, secondary, tertiary etc.) while FDI demands an available package of educated and productive labor having skills and technical know-how. Unfortunately, due attention has not been given by the government for providing sufficient financial resources to the education sector. The argument is that FDI inflows do not provide funds for higher education, rather MNCs hire educated labor and polish them through training. In this process, a major portion of the workforce gets ignored since either they are totally uneducated or have a low level of education making them less productive as compared to those who have attained higher education. This problem can be resolved if the Government of Pakistan gives higher priority to the education sector and allocates more funds for the growth of education in the country. The other relationship (labor productivity and education) is also dependent on the government spending on education. In literature, most of the studies have 'recommended' that government must give proper attention to education sector if Pakistan wants to attract more FDI and also to get more gains from FDI but there is a lack of empirical work for testing this relationship since level of education has been taken as a proxy measure for higher productivity and HRD. However, it is the responsibility of the government to not only provide more

opportunities for higher education but also it must make education free and compulsory at least at the level of high school. Although some vocational training schools have been established in rural areas during the last few years but due to a shortage of competent instructors and the paucity of funds coupled with low level of education, both of the trainers and trainees, those are far away from providing a sufficient number of the professionally skilled workers to the foreign investors.

Living example of this phenomenon can be found in the execution of mega projects under CPEC where a large number of Chinese workers are deployed on account of non-availability of the professionally skilled workers to the required extent.

3.4 EMPIRICAL ANALYSIS

The empirical part is divided into four sections. This paper uses Breitung Candelon test as the main test for empirical analysis; the approach needs to be explained in detail. Therefore in section 1, literature related to frequency domain approach has been discussed, while unit root tests have been applied and analyzed in section 2. As for section 3, it deals with empirical analysis using Breitung and Candelon's Granger Causality test (BC) in the frequency domain (both old and new versions with and without conditions). Finally, section 4 shows the traditional cointegration test since BC test is quite new especially the latest version by Breitung and Schreiber, therefore the empirical conclusion cannot be drawn solely on the basis of BC test. Two econometric softwares have been used for the empirical purpose. Unit root tests and cointegration have been conducted using EViews 7.0. Since BC test cannot be applied in EViews, for this purpose gretl has been used.

3.4.1 What is frequency domain causality analysis?

Before explaining the framework of causality tests in frequency domain, it is necessary to highlight the difference between frequency domain and time domain. According to Pavia et al (2008), time domain graph shows how a signal changes over time whereas, frequency domain graph shows how much of a signal lies within each given frequency band over a range of frequencies. Regarding causality tests, Granger (1988), is of the view that causality tests can be useful for explaining cause and effect relationship but the order of integration and control variables must be handled carefully to get a proper evaluation. Earlier Granger (1969), explains that in the case of bivariate causality, the feedback mechanism can be divided into two causal relations. But in the case of trivariate relations, the spectrum cannot be considered as a sum of two spectra and results can be misleading due to the influence of the third variable. Geweke (1982), on the other hand, proposed

that the causality between a bivariate series can be measured at a particular frequency by decomposing spectral density;

"In the case of univariate series, the measure of feedback from X to Y at a given frequency is a monotonic transformation of the fraction of the spectral density of Y due to the innovation in X in a bivariate autoregressive representation rotated so that all instantaneous feedback has been removed from the X-to- Y relation." (Page 313)

A similar concept was introduced by Hosoya (1991), where causality between a multivariate stationary series can be examined in both ways; overall effect and causality at a given frequency. This framework was later adopted by Breitung and Candelon (2006) to construct a causality test in frequency domain both in short-run and long-run. Their empirical analysis was based on quarterly data of US economy covering the time period of 1959 (first quarter) to 1998 (fourth quarter). The traditional test of stationarity suggested the presence of unit root and data was converted into the first difference of logged series.

The present study uses the same technique to measure the bivariate causality between the series of two models; LFDI↔LPROD and LEDU↔LPROD. Moreover, the test uses both 'conditioning out' and 'conditioning' i.e., the causality between two series with and without the presence of exogenous/control variable which in case of the first model is LEDU and in case of the second model is LFDI.

Adopting the econometric framework used by Fritsche and Pierdzioch (2016), the VMA of a bivariate VAR model is explained by the following equation

$y_t = \Psi(L)\eta_t$,

Where η_t = white noise disturbance

L = lag operator

$\Psi(L)$ = the lag polynomial

Following vector shows the partitioning of $\Psi(L)$ into parts as

$$\Psi(L) = \begin{bmatrix} \Psi_{11}(L) & \Psi_{12}(L) \\ \Psi_{21}(L) & \Psi_{21}(L) \end{bmatrix}$$

Gweke (1982) suggests the following measure for testing Granger non-causality at a specific frequencyω

$M_{y1 \rightarrow y2}(\omega)$

Which can be calculated as

$$M_{y1 \rightarrow y2}(\omega) = 1 + \left[\frac{|\Psi_{12}(\exp(-i\omega))|^2}{|\Psi_{11}(\exp(-i\omega))|^2} \right]$$

Where i = imaginary number

Breitung and Candelon (2006) show that for a given frequency ω_0, $M_{y1\rightarrow y2}(\omega_0) = 0 \leftrightarrow \Psi_{12}(\exp(-i\omega)) = 0$, which in turn implies (two) linear restrictions on the VMA representations. Graphical analysis has been explained in Appendix. The results are summarized in table 2.

The same procedure was adopted by Tiwari (2014). The author used frequency domain test to examine the Granger Causality between primary energy consumption and GDP for the economy of US covering the time period from January 1973 to December 2008. The empirical results suggested that the causal relationship varies across frequencies; short term, medium term and long term.

Mermod and Dudzevičiūtė (2011), carried out an empirical analysis to examine the relationship between consumer confidence, economic growth and retailed sales. Their analysis is based on Granger Causality tests in both time domain and frequency domain for a sample of both developed and developing economies. According to authors,

"The Granger causality tests indicate whether the past changes in x (y) have an impact on current changes in y(x) over a specified time period. Nevertheless, these test results can provide results on causality over all frequencies. On the other hand, Geweke's linear measure of feedback from one variable to another at a given frequency can provide detailed information about feedback relationships between growth and consumer confidence over different frequency bands." (Page 6)

They argue that frequency domain test is **superior** in the sense that Granger Causality tests give an average measure of causality whereas frequency domain test decomposes the causality at each frequency. Their study concluded that frequency domain test provides better results as compared to time domain causality test.

Krätschell and Schmidt (2012), in their study, gave similar arguments regarding time domain and frequency domain causality tests. They used frequency domain Granger Causality test of Breitung and Candelon to analyze both short-run and long-run causality between energy prices and prices of food commodities. In addition to BC test, they also used Granger Causality test in time domain to compare the results. According to the authors, frequency domain granger tests is **superior** over time domain granger tests since Granger Causality tests are constructed on one period ahead forecasts which do not clearly distinguish between short-run and long-run fluctuations but frequency domain causality tests do not suffer from loss of information as these tests are applied at different frequencies. Their empirical findings also suggested different results based on the time domain and frequency domain causality tests.

- **The drawback of old version and introduction of the new version**

According to Breitung and Schreiber (2016), BC test suffers from a drawback; it is designed to test at a single frequency point where as many tests require an interval rather than a single point to get a better insight of causality.
The present study also makes use of the new version along with the old version. Since it was introduced in the recent past, not much literature is available, consequently, the framework adopted for carrying out empirical analysis makes use of original empirical framework introduced by Breitung and Schreiber (2016). The null hypothesis in case of the new version does not test 'no causality' at frequency ω_0, rather it tests the null hypothesis of no causality in the interval (ω_L, ω_u).
In this case, the interval has also been defined; the number of frequencies lie within the interval
[0.01; 3.14]

Lowest frequency starts from 0.01 which is almost 0 and maximum frequency of 3.14. It can also be presented as [0, Π]

One of the most important point mentioned by the authors is (in original words)

"Given that strict non-causality over a range of frequencies is impossible in this (linear) framework except if there is no causality at all, accepting the null hypothesis still means that some causality exists in the band of the null hypothesis. For practical purposes it may therefore be advisable to keep the specified frequency band reasonably short." (Page 24)

3.3.2 Why this test?

Since the present study is also based on examining bivariate causality, BC tests (old and new version) are used to get a better insight into both short-run and long-run causality. Moreover, the studies which have used this test have mentioned that why causality test (BC) in frequency domain is superior over traditional Granger Causality test in time domain (see section 4.1 for details). Application of new version also makes this study more innovative and scientific. Three basic benefits of this approach are; firstly it does not cause any loss of information. Secondly, it gives a better insight into both short-run and long-run relationship. Most importantly, the new version of BC test covers the minute details, which have been missed by old

BC test since new version uses interval frequencies instead of a single frequency point. Moreover, the application of both tests with and without conditions of exogenous or control variables will allow comparisons and also check the robustness of results.

3.3.3 Data details and sources

- Data for FDI inflows has been extracted from World Development Indicators (WDI), World Bank.

UNIT = Current Bop US Dollars

- Education (government spending as % of GDP) extracted from unesco.org, theglobaleconomy.com and Pakistan Economic Survey (various issues)

- Labor Productivity (Labor productivity per person employed in 2015 US$ (converted to 2015 price level with updated 2011 PPPs) extracted from The Conference board 2016.

Following abbreviations have been used for presenting data
FDI = FDI inflows
PROD = Labor Productivity
EDU = Education

➢ ABBREVIATIONS FOR TESTS

- ADF = Augmented Dicky Fuller test.
- KPSS = Kwiatkowski–Phillips–Schmidt–Shin test.
- BC = Breitung Candelon test.
- BS = Breitung- Schreiber

(Different notations have been used to differentiate between old (BC) version and the new version (BS).

3.3.4 Model and Hypothesis

Model 1: Relationship between FDI and PROD

Hypothesis: FDI and PROD have bi-directional causality both in the short-run and long-run.

(A positive relationship between FDI and PROD)

Model 2: Relationship between EDU and PROD

Hypothesis: EDU and PROD have bi-directional causality both in the short-run and long-run.
(A positive relationship between EDU and PROD)
As the empirical analysis is based on time series data of Pakistan from 1971-2016.
The data is converted into logarithms.

Rationale:-
According to Lütkepohl and Xu (2012), many time series analyses are based on converting series into their logarithms (logs). This transformation is generally considered useful as it tends to stabilize the variance of series.

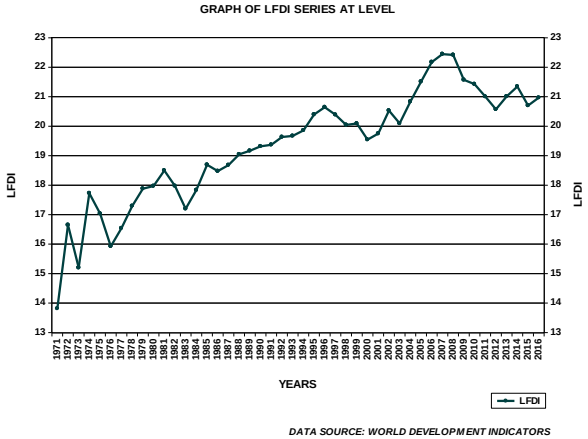
Ariño and Franses (2000), argue that it is a common practice to convert time series into logarithms before carrying out an empirical analysis. The main reasons behind this strategy are that by doing so, the impact of outliers can be controlled. Moreover, this practice is also helpful in controlling the variance of the underlying time series.
Since the present study also uses time series data for empirical analysis, all series are converted into logarithms.

3.5 EMPIRICAL TESTS

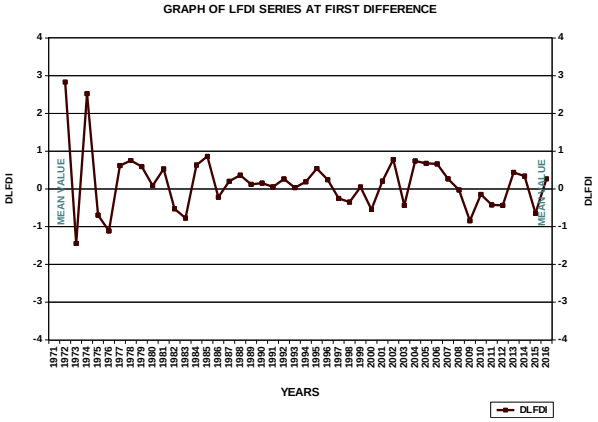
3.5.1 Unit root tests

Unit root tests are the first step in any time series empirical analysis. For this purpose, two tests have been applied; ADF test (most common unit root test) and KPSS test (which has an opposite null hypothesis, i.e., series is stationary). Generally, graphical analysis is carried out before presenting the test statistic values since it gives a quick idea about stationarity status of data. Also, it can be easily observed whether the data has any time trend or deterministic trend which makes it easier to decide for further tests to be applied.

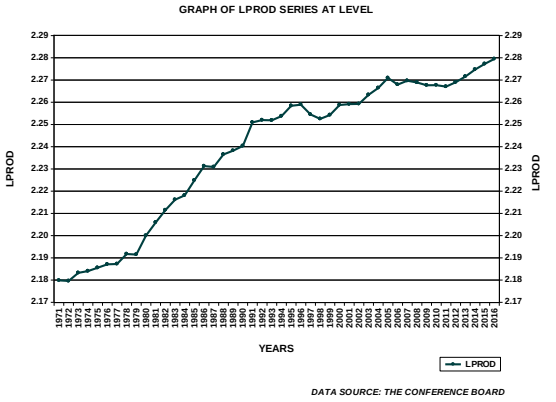
_Graph2.2 LFDI (Log FDI) AT LEVEL



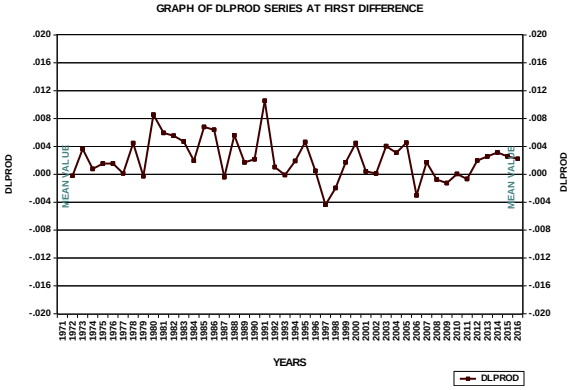
Graph2.3 DLFDI (Log DFDI)



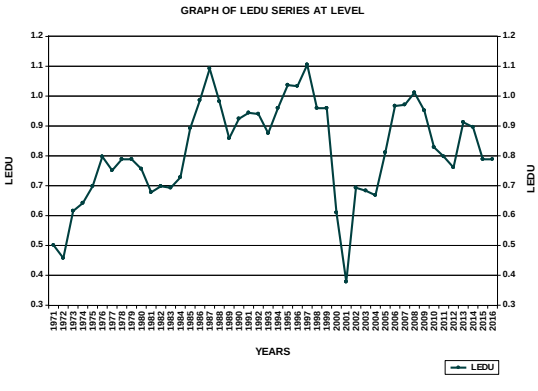
Graph2.4 LPROD (Log LPROD) AT LEVEL



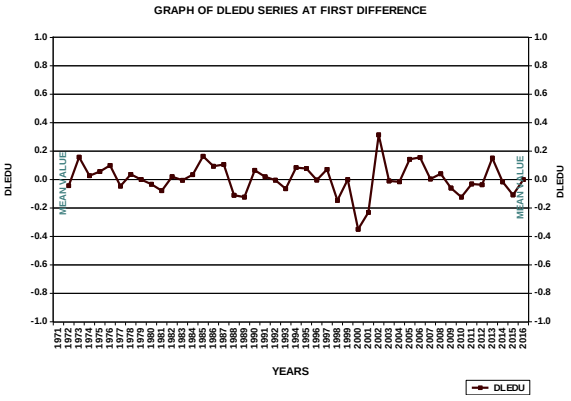
Graph2.5 DLPROD (Log DLPROD)



Graph2.6 LEDU (Log EDU) AT LEVEL



Graph2.7 DLEDU (Log DEDU)



The graphical analysis indicates that series contain trend component and they become stationary at first difference To get more clear results (whether series are trend stationary or difference stationary), unit root tests (ADF and KPSS) have been presented in following tables.

Table2. 2 ADF TEST STATISTIC (*t-values)*

EMPIRICAL RESULTS

VARIABLES	AT LEVEL		AT FIRST DIFFERENCE		ORDER OF INTEGRATION
COMPONENTS OF EQUATION	TREND AND INTERCEPT	INTERCEPT	TREND AND INTERCEPT	INTERCEPT	
LFDI	-4.57***	-2.98*	-10.87***	-10.84***	I(1)
LPROD	-0.74	-1.76*	-6.00***	-5.64***	I(1)
LEDU	-2.68	-2.85**	-6.06***	-6.01***	I(1)

Source: Author's Estimation based on EViews output

- *Null Hypothesis (H_0): Series has a Unit Root (non- stationary)*
- *If t-values (absolute or positive) are greater than critical values at 1%, 5%, and 10%, Null hypothesis (H_0) Is rejected i.e., series does not have unit root (it is stationary)*

***significant at 10% level of significance**

****significant at 5% level of significance**

***** Significant at 1% level of significance**

- **Test details: - Schwarz Info Criterion (Automatic)**
- **Lag Length: - Maximum Lags 9 (Automatic)**

Results: Graphical analysis shows that all series have a trend and are not stationary at level. However, the results of the ADF test indicate that LFDI is stationary at 1% level if the test includes both trend and intercept. But this is not the case if the test includes intercept only. Moreover, LEDU series is stationary at 5% if measured using intercept only. To get the same order of integration, all series are tested again at first difference using both trend and intercept and only intercept. In both cases, all series give the same result and become stationary at the same level of integration. Therefore it can be concluded that all series are integrated of order one i.e., I (1). This leads to

the application of Cointegration test. But before applying the Cointegration test, another test for unit root (KPSS) is used to have a cross check.

Table2. 3 KPSS (Kwiatkowski-Pillips-Schmedt-Shin) TEST STATISTIC (*LM-stat)*

EMPIRICAL RESULTS

VARIABLES	AT LEVEL		AT FIRST DIFFERENCE		ORDER OF INTEGRATION
COMPONENTS OF EQUATION	TREND AND INTERCEPT	INTERCEPT	TREND AND INTERCEPT	INTERCEPT	
LFDI	0.161***	0.825	0.0529***	0.176***	I(1)
LPROD	0.205***	0.816***	0.103***	0.323***	I(1)
LEDU	0.133***	0.253***	0.035***	0.095***	I(1)

Source: Author's Estimation based on EViews output

- *Null Hypothesis (H_0): Series is stationary (absence of unit root).*
- *If LM-stat value is less than critical values at 1%, 5%, and 10%, Null hypothesis (H_0) is accepted i.e., series does not have unit root (it is stationary)*
- ***At level, the * sign shows the level of significance at which null hypothesis of stationarity is rejected. If there is no * sign, it means that the series is stationary at level.***

***significant at 10% level of significance**

****significant at 5% level of significance**

***** Significant at 1% level of significance**

Test details:-

- **Spectrum Estimation Method: Barlett Kernel (Default)**
- **Bandwidth : Newey-West Bandwidth (Automatic)**
- **Lag Length : 3 (Automatic)**

Results: Results of the KPSS test are in consistency with both graphical analysis and ADF test. Since KPSS test has an opposite null hypothesis (series is stationary), all series show stationarity at the level (10%) when both trend and intercept are included, means all series are trend stationary (also evident from Graphical analysis). At first difference, both the graphical analysis and test statistic show that trend has been removed,

therefore it is assumed and concluded that all series are integrated of order one i.e. I(1).

After having a detailed analysis of stationarity status of series (both graphically and empirically), further empirical tests can be applied. The following table explains the causality between variables using BC test (old version).

3.5.2 Breitung Candelon Granger – Causality test in Frequency Domain (for details see Appendix)

Table2. 4 EMPIRICAL RESULTS OF BC TEST

TEST SPECIFICATIONS	**CAUSALITY DIRECTION**			
	VARIABLES			
WITHOUT CONDITION	FDI→PROD	PROD→FDI	EDU→PROD	PROD→EDU
At Level	✓	×	×	×
At First Difference	×	×	×	×
WITH CONDITION				
At Level	✓	×	×	×
At First Difference	×	×	×	×

Source: Author's Estimation based on gretl output

✓ = Reject non-causality

× = Do not reject non-causality.

To check the robustness of results, BC test in frequency band (new version labeled as BS test) is applied and results are shown in table 5.

3.5.3 Breitung Candelon Granger – Causality test:
NEW VERSION BY Breitung- Schreiber
(For details see Appendix)

Assessing causality and delay within a frequency band

In this case, instead of a frequency point, a frequency band (interval) is taken to measure Granger – Causality. All details have been mentioned in the literature. The test has been applied both at levels and at first difference using three bands; [0.01, 0.2], [1.8, 2.4] and [1.58, 3.14]. The same analysis is applicable, i.e., a movement towards left shows oscillations for long-run and towards the right, short-run oscillations are observed. As shorter frequency is linked to a longer time period (Fritsche and Pierdzioch, 2016), the test starts with a band of lowest frequencies. The second band is for the medium and third band, having highest frequency, representing short-run causality.

Table2. 5 EMPIRICAL RESULTS OF BS TEST

TEST SPECIFICATIONS	CAUSALITY DIRECTION IN FREQUENCY BANDS			
WITHOUT CONDITION	VARIABLES			
	FDI→PROD	PROD→FDI	EDU→PROD	PROD→EDU
At Level	For Frequency Band [0.01, 0.2]			
	✓	×	×	×
	For Frequency Band [1.8, 2.4]			
	×	×	×	×
	For Frequency Band [1.58, 3.14]			
	×	×	×	×
At First Difference	For Frequency Band [0.01, 0.2]			
	×	×	×	×

	For Frequency Band [1.8, 2.4]			
	×	×	×	×
	For Frequency Band [1.58, 3.14]			
	×	×	×	×
With Condition				
At Level	For Frequency Band [0.01, 0.2]			
	✓	×	×	×
	For Frequency Band [1.8, 2.4]			
	×	×	×	×
	For Frequency Band [1.58, 3.14]			
	×	×	×	×
At First Difference	For Frequency Band [0.01, 0.2]			
	×	×	×	×
	For Frequency Band [1.8, 2.4]			
	×	×	×	×
	For Frequency Band [1.58, 3.14]			
	×	×	×	×

Source: Author's Estimation based on gretl output

3.5.4 THE TRADITIONAL APPROACH- JOHANSEN COINTEGRATION TEST

Following are the results of Johansen Cointegration test for model 1 and model 2.

- ***Model 1***

  As model 1 uses two variables; FDI inflows and labor productivity, the Johansen test empirically analyzes the relationship between these two variables without using the impact of education which is discussed in Model 2.

Table2. 6 JOHANSEN COINTEGRATION TEST FOR BOTH MODELS

(i) Using LFDI and LPROD

TRACE TEST AND MAXIMUM EIGEN VALUE TEST (RESULTS)

Sample (adjusted): 1974 2016
Included observations: 43 after adjustments
Trend assumption: Linear deterministic trend
Series: LFDI LPROD
Lags interval (in first differences): 1 to 2

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.339472	20.16154	15.49471	0.0092
At most 1	0.052716	2.328726	3.841466	0.1270

Trace test indicates **1 cointegrating eqn(s)** at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.339472	17.83281	14.26460	0.0131
At most 1	0.052716	2.328726	3.841466	0.1270

Max-eigenvalue test indicates **1 cointegrating eqn(s)** at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Source: Author's Estimation based on EViews output

Table 6 shows that there exists a long-run relationship between FDI inflows and labor productivity. Since there can be errors in the Cointegration test, VECM is carried out to remove all errors and the results are shown in table 7.

Table2. 7 VECTOR ERROR CORRECTION MODEL

Vector Error Correction Estimates Sample (adjusted): 1974 2016 Included observations: 43 after adjustments Standard errors in ( ) & **t-statistics in [ ]**		
Cointegrating Eq:	**CointEq1**	
LFDI(-1)	1.000000	
LPROD(-1)	-45.27628 (4.31025) **[-10.5043]**	
C	81.95366	
Error Correction:	**D(LFDI)**	**D(LPROD)**
CointEq1	-0.609825 (0.15148) **[-4.02580]**	-0.001062 (0.00086) **[-1.22819]**
D(LFDI(-1))	0.144389 (0.16157) **[0.89368]**	0.001296 (0.00092) **[1.40550]**
D(LFDI(-2))	0.123377 (0.11956) **[1.03192]**	-0.000157 (0.00068) **[-0.22935]**
D(LPROD(-1))	-9.596191 (30.7156) **[-0.31242]**	0.084855 (0.17536) **[0.48388]**
D(LPROD(-2))	-28.85594 (28.8514) **[-1.00016]**	-0.020001 (0.16472) **[-0.12142]**
C	0.184379 (0.11813) **[1.56084]**	0.001995 (0.00067) **[2.95753]**
R-squared	0.367614	0.106228
Adj. R-squared	0.282157	-0.014552
Sum sq. resids	10.36238	0.000338

S.E. equation	0.529211	0.003021
F-statistic	4.301719	0.879517
Log likelihood	-30.41947	191.7042
Akaike AIC	1.693929	-8.637405
Schwarz SC	1.939677	-8.391657
Mean dependent	0.134147	0.002238
S.D. dependent	0.624617	0.003000
Determinant resid covariance (dof adj.)		2.54E-06
Determinant resid covariance		1.88E-06
Log likelihood		161.4146
Akaike information criterion		-6.856491
Schwarz criterion		-6.283077

Source: Author's Estimation based on EViews output
D (differences represent short-run time period)

UNRESTRICTED COINTEGRATING COEFFICIENTS

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):			
LFDI	LPROD		
-1.911247	9.433070		
-0.803850	8.014995		
Unrestricted Adjustment Coefficients (alpha):			
D(LFDI)	0.328434	0.038980	
D(LPROD)	0.005189	-0.005789	
1 Cointegrating Equation(s):	**Log likelihood**	**65.44582**	
Normalized cointegrating coefficients (standard error in parentheses)			
LFDI	**LPROD**		
1.000000	-4.935559 (0.44766)		
Adjustment coefficients (standard error in parentheses)			
D(LFDI)	**-0.627717** (0.15351)		
D(LPROD)	**-0.009918** (0.00824)		

Source: Author's Estimation based on EViews output

- ***Model 2***

Model two is based upon testing the relationship between education and labor productivity, the cointegration test has been applied and results are

shown in table 8 which indicates the existence of a long-run relationship between education and labor productivity. Again application of VECM shows error-free long-run results for second model (table 8).

Table2. 8 JOHANSEN COINTEGRATION TEST FOR BOTH MODELS

(ii) Using LEDU and LPROD

TRACE TEST AND MAXIMUM EIGEN VALUE TEST (RESULTS)

Sample (adjusted): 1973 2016
Included observations: 44 after adjustments
Trend assumption: Linear deterministic trend
Series: LEDU LPROD
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.277141	16.41007	15.49471	0.0363
At most 1	0.047262	2.130254	3.841466	0.1444

Trace test indicates **1 cointegrating eqn(s)** at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.277141	14.27982	14.26460	0.0497
At most 1	0.047262	2.130254	3.841466	0.1444

Max-eigenvalue test indicates **1 cointegrating eqn(s)** at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Source: Author's Estimation based on EViews output

UNRESTRICTED COINTGRATING COEFFICIENTS

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

LEDU	LPROD
-6.741064	0.148046
2.992155	-3.927138

Unrestricted Adjustment Coefficients (alpha):

D(LEDU)	0.053880	-0.009455	
D(LPROD)	0.005149	0.005458	
1 Cointegrating Equation(s):		**Log likelihood**	**137.9505**
Normalized cointegrating coefficients (standard error in parentheses)			
LEDU	**LPROD**		
1.000000	-0.021962 (0.13369)		
Adjustment coefficients (standard error in parentheses)			
D(LEDU)	**-0.363207** (0.10369)		
D(LPROD)	**-0.034711** (0.02819)		

Source: Author's Estimation based on EViews output

Table2. 9 VECTOR ERROR CORRECTION MODEL

Vector Error Correction Estimates Sample (adjusted): 1973 2016 Included observations: 44 after adjustments Standard errors in ( ) & **t-statistics in [ ]**		
Cointegrating Eq:	**CointEq1**	
LEDU(-1)	1.000000	
LPROD(-1)	-0.021962 (0.13369) **[-0.16427]**	
C	-0.620356	
Error Correction:	**D(LEDU)**	**D(LPROD)**
CointEq1	-0.363207 (0.10369) **[-3.50294]**	-0.034711 (0.02819) **[-1.23137]**
D(LEDU(-1))	0.227252 (0.14392) **[1.57898]**	0.042690 (0.03913) **[1.09103]**

D(LPROD(-1))	-0.075420 (0.56213) [-0.13417]	0.115503 (0.15283) [0.75578]
C	0.007589 (0.01925) [0.39432]	0.018453 (0.00523) [3.52676]
R-squared	0.241079	0.068777
Adj. R-squared	0.184160	-0.001064
Sum sq. resids	0.416388	0.030776
S.E. equation	0.102028	0.027738
F-statistic	4.235466	0.984761
Log likelihood	40.09392	97.40116
Akaike AIC	-1.640633	-4.245507
Schwarz SC	-1.478434	-4.083308
Mean dependent	0.007523	0.021109
S.D. dependent	0.112958	0.027723
Determinant resid covariance (dof adj.)		7.85E-06
Determinant resid covariance		6.48E-06
Log likelihood		137.9505
Akaike information criterion		-5.815931
Schwarz criterion		-5.410433

Source: Author's Estimation based on EViews output
D (differences represent short-run time period)

For both models, Johanson Cointegration test and VECM indicate that there exists a long-run relationship between FDI inflows, labor productivity and education in case of Pakistan. Empirically the main variable of labor productivity is affected by both FDI inflows and education, which supports the main idea of the present study.

3.5.5 DISCUSSION OF RESULTS

According to empirical findings of Breitung and Candelon (2006) test, evidence of causality is found only in case of FDI affecting productivity when the test is conducted at level using both components of the test, i.e., with and without the condition of the exogenous/control variable. There is no evidence of either uni-directional or bi-directional causality between other variables. Same results are obtained in the case of Breitung and Schreiber (2016) Granger Causality test in frequency domain (using a frequency band). A uni-directional causality runs from FDI to productivity for the frequency band of [0.02, 0.2] representing a long-run time period when analyzed at level. This test also uses both the components i.e., with

and without the condition of the exogenous variable. There is no causality in case of other frequency bands (medium term or short term) whether the test uses first differences or conditions. Details are mentioned in the appendix.

Regarding time period, 0.01 corresponds to 628 period's wavelength (app 52 years for annual data). 0.2 represents 32 periods (3 years).

1.8 = 3.5 periods (app)

2.4 = 3 periods (app)

1.58 = 4 periods (app)

3.14 = 2 periods (app)

Considering the results of tradition tests, i.e., Johansen Cointegration, there is an evidence of long-run relationship between FDI inflows, labor productivity, and education. Although the lags are different for both models, yet the evidence of a long run relationship between variables cannot be ignored.

3.6 CONCLUSION AND POLICY RECOMMENDATIONS

The empirical findings of BC test suggest that FDI inflows increase labor productivity in Pakistan, whereas no causality has been observed between education and productivity. Whereas the relationship is evident in the case of Johansen Cointegration test. The difference in results may be due to the difference in approach, yet the results of Cointegration test cannot be ignored and it can be concluded that FDI inflows affect labor productivity and that the labor productivity also gets affected by education in case of Pakistan. This is consistent with the actual scenario of Pakistan. The government of Pakistan is hardly spending 2 percent of GDP (on average) on education. A large number of teenagers are out of schools. Labor, though abundant, but on account of being unskilled, and mostly illiterate, they do not get jobs in the organizations set up by MNCs as a result of FDI. In Pakistan, different systems of education are in vogue simultaneously i.e. Religious schools called Madrasas, government schools and private institutions. Religious schools are managed by NGOs and most are run by contributions from the community and children of lower strata of the society seek admission in such institutions where religious education is free. Most of the government schools charge nominal fees but lack proper facilities and are generally considered to be of low quality. There is a mushroom growth of private educational institutions but those are invariably very costly which a common man cannot afford. In the recent past, technical and vocational institutions have also come up, both in the public and some in the private sector. The institutions in the private sector, being costly, are beyond the reach of common man. On account of paucity of funds as well as the scarcity of trained staff and equipment, the institutions in the public sector are still

far away from catering to the requirements of the set-up of the project by the foreign investors.

The empirical analysis has led to the conclusion that FDI increases labor productivity both over the long and short-run time period. Since the Government of Pakistan is spending a small portion of its GDP on education, educated and a professionally skilled workforce is not available in sufficient numbers to absorb the technological spillovers from FDI. Another important reason behind this unique causality is related to training being provided by foreign investors which leads to an increase in the productivity of labor. Moreover, technology transfer leads to innovation and R&D which results in the establishment of export promotion and import substitution industries either at small scale or large scale depending on absorptive capacity. Although the quality may differ, yet the benefits are gained by the educated workers leading to an increase in productivity. This is not the case in the education sector since the low level of education makes the available labor force ineligible for working with foreign investors and MNCs resulting in unemployment.

It will not be wrong to conclude from the empirical analysis that if the Government of Pakistan wants to achieve maximum gains from FDI, it must allocate proper funds to education sector that can allow an unskilled worker to convert into a human resource, which also acts like capital for any economy. For education to become a source of an increase in productivity, the same level of education is required in government schools as it is being offered by private institutions. Moreover, proper planning is required keeping in view the economic development plans for the future, say 25 years, so that the required number of educated and professionally trained personnel are available for each sector of the economic development plan. While preparing the economic development plan for future, the estimated inflow of FDI has to be figured in, including the possible sectors and sub-sectors which would be attracting the FDI and it would be possible to estimate the productivity level and to prepare the education plan accordingly so that the required number of educated and skilled workforce is available.

REFERENCES

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.

Akram, M., & Khan, F. J. (1961). Public Provision of Education and Government Spending in Pakistan. *Working Papers & Research Reports*, *2007*, 2007-40

Alam, A., Arshad, M. A., & Rajput, W. (2013). Relationship of Labor Productivity, Foreign Direct Investment and Economic Growth: Evidence from OECD Countries. *Journal of Business and Management Sciences*. 1(6), 133-138.

Ariño, M. A., & Franses, P. H. (2000). Forecasting the levels of vector autoregressive log-transformed time series. *International Journal of Forecasting*, *16*(1), 111-116.

Arshad, M. N., & Ab Malik, Z. (2015). Quality of human capital and labor productivity: A Case of Malaysia. *International Journal of Economics, Management and Accounting*, *23*(1), 37-55.

Baldacci, E., Clements, B., Gupta, S., & Cui, Q. (2008). Social spending, human capital, and growth in developing countries. *World development*, *36*(8), 1317-1341.

Berger, N., & Fisher, P. (2013). A well-educated workforce is key to state prosperity. *Economic Policy Institute*, *22*(1), 1-14.

Breitung, J., & Candelon, B. (2006). Testing for short-and long-run causality: A frequency-domain approach. *Journal of Econometrics*, *132*(2), 363-378.

Breitung, J., & Schreiber, S. (2016). Assessing causality and delay within a frequency band. *IMK Working Paper No. 165.*

Choudhry, M. T. (2009). 1 Determinants of Labor Productivity: An Empirical Investigation of Productivity Divergence. Retrieved from http://encuentros.alde.es/anteriores/xiieea/trabajos/pdf/104.pdf

Contessi, S., & Weinberger, A. (2009). Foreign direct investment, productivity, and country growth: an overview. *Federal Reserve Bank of St. Louis Review*, *91*(2), 61-78.

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), 715-719.

Demeti, A., & Rebi, E. (2014). Foreign direct investments (FDI) and Productivity in Albania. *Interdisplinary Journal of Research and Development*, *1*(1), 7-14.

Economics Survey of Pakistan (2014-15). *Ministry of finance.* Retrieved from http://www.finance.gov.pk/survey/chapters_15/10_Education.pdf

Fritsche, U., & Pierdzioch, C. (2016). *Animal spirits, the stock market, and the unemployment rate: Some evidence for German data* (No. 1/2016). DEP (Socioeconomics) Discussion Papers, Macroeconomics and Finance Series.

Geweke, J. (1982). Measurement of linear dependence and feedback between multiple time series. *Journal of the American statistical association*, *77*(378), 304-313.

Granger, C. W. (1969). Investigating causal relations by econometric models and cross-spectral methods. *Econometrica: Journal of the Econometric Society 37*(3), 424-438.

Granger, C. W. (1988). Some recent development in a concept of causality. *Journal of econometrics*, *39*(1-2), 199-211.

Horizontal Linkages--- Overview. As accessed on 4th, March, 2017, https://www.microlinks.org/good-practice-center/value-chain-wiki/horizontal-linkages-overview

Hosoya, Y. (1991). The decomposition and measurement of the interdependency between second-order stationary processes. *Probability theory and related fields*, *88*(4), 429-444.

Jones, P. (2008). Are Educated Really Workers More Productive. *Department of Economics Vassar College,* 1-44, Retrieved from

https://sites.hks.harvard.edu/cid/archive/events/cidneudc/papers/jones.pdf

Jung, H. S., & Thorbecke, E. (2003). The impact of public education expenditure on human capital, growth, and poverty in Tanzania and Zambia: a general equilibrium approach. *Journal of Policy Modeling*, *25*(8), 701-725.

Kipsang, J. K. (2015). *Foreign direct investment and labor productivity growth in Kenya* (Doctoral dissertation, University of Nairobi).

Krätschell, K., & Schmidt, T. (2012). Long-run Trends or Short-run Fluctuations–What Establishes the Correlation between Oil and Food Prices?

Lütkepohl, H., & Xu, F. (2012). The role of the log transformation in forecasting economic variables. *Empirical Economics*, *42*(3), 619-638.

Mahmood, M. T., & Rehman, K. (2012). Does human capital expedite economic development? The case of Pakistan. *Journal of Economics and Behavioural Studies. March*, *4*(3), 163-171.

Mallick, J., 2013. Globalization and labor productivity in OECD economy. Regional Development between Theory and Practice, *University of Pardubice, Czech Republic.* Retrieved from http://www.regionalnirozvoj.eu/sites/regionalnirozvoj.eu/files/clanek16_mallick.pdf

Mebratie, A. D. (2010). Foreign Direct Investment and Labor Productivity in South Africa'. *Research Paper, Institute of Social Studies, The Hague*.

Mermod, A. Y., & Dudzevičiūtė, G. (2011). Frequency domain analysis of consumer confidence, industrial production and retail sales for selected European countries. *Journal of Business Economics and Management*, (4), 589-602.

Nelson, R. R., & Phelps, E. S. (1966). Investment in humans, technological diffusion, and economic growth. *The American economic review*, *56*(1/2), 69-75.

Nozuko, L. (2016). *The impact of foreign direct investment on labor productivity of the automotive sector in South Africa* (Doctoral dissertation, University of Fort Hare).

Pavia, D.L., G.M. Lampman, G.S. Kriz and J.A. Vyvyan. (2008). Introduction to spectroscopy. *Cengage Learning.*

Ramirez, M. D. (2006). Does foreign direct investment enhance labor productivity growth in Chile? A cointegration analysis. *Eastern Economic Journal*, *32*(2), 205-220.

Rehman, N. U. (2016). FDI and economic growth: empirical evidence from Pakistan. *Journal of Economic and Administrative Sciences*, *32*(1), 63-76.

Shafique, S., & Hussain, Z. (2015). The impact of foreign direct investment (FDI) on economic growth. *MPRA Paper No. 66337.*

Solow, R. M. (1956). A contribution to the theory of economic growth. *The quarterly journal of economics*, *70*(1), 65-94.

Tintin, C. (2012). Foreign direct investment, productivity spillovers and labor quality. *International Journal of Economic and Finance Studies, 4*(2), 57-66.

Tiwari, A. K. (2014). The frequency domain causality analysis between energy consumption and income in the United States. *Economia Aplicada*, *18*(1), 51-67.

Usman, S., Masood, S., & Akbar, T.M. (2014). Higher Education, Infrastructure and Foreign Direct Investment in Pakistan. *Journal of Business and Management*, 15(6), 54-59.

Wahab, M, A., Ahmad. V., & Javed, A. (2013). Human Resource Development, Government spending and productivity of Human Resource Development in Pakistan. *SAARC Journal of Human Resource Development, 9(1)*, 32-48.

Zhu, G., & Tan, K. Y. (2000). Foreign direct investment and labor productivity: New evidence from China as the host. *Thunderbird International Business Review*, *42*(5), 507-528.

3.7 APPENDIX

Detailed results of Breitung Candelon Granger – Causality test in Frequency Domain

Test specifications (for all tests):-
Lag order = 3
Frequency Points = 50
Significance level = 0.05

(i) Without condition of exogenous/control variable

- At Level
  Graphical Properties: BC = Breitung Candelon test statistic

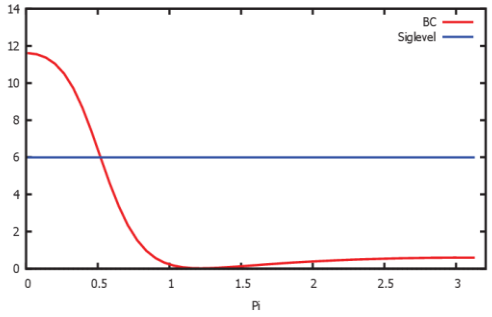
  Siglevel = Significance level

  Pi = Frequency

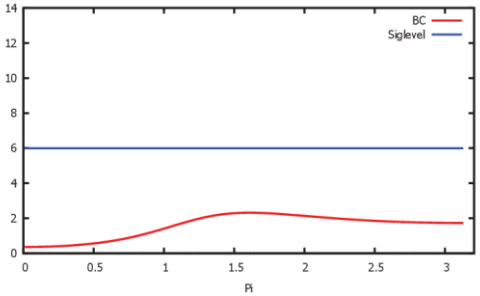
  Null Hypothesis = No causality

Values above the threshold means that the hypothesis of no causality is rejected. A movement towards left side means long-run causality and movement towards the right side means short-run causality.

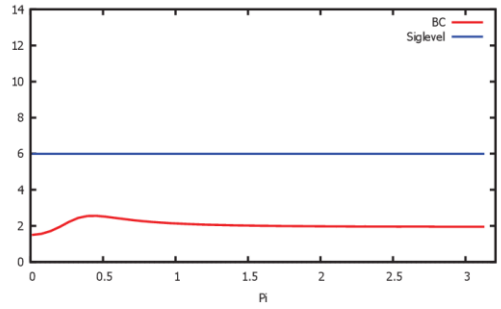
(i) LFDI→LPROD



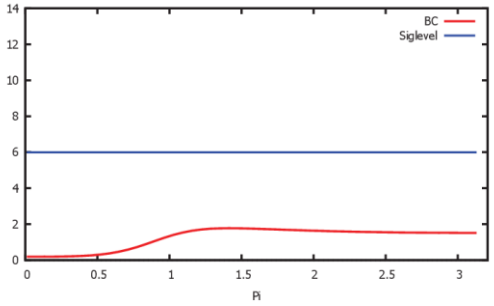
(ii) LPROD → LFDI



(iii) LEDU → LPROD

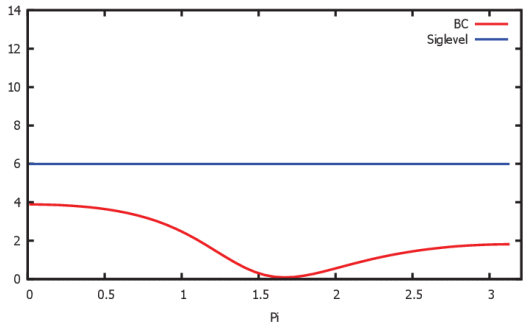


(iv) LPROD → LEDU

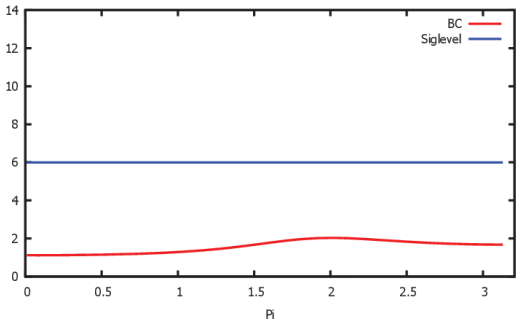


- At First Difference

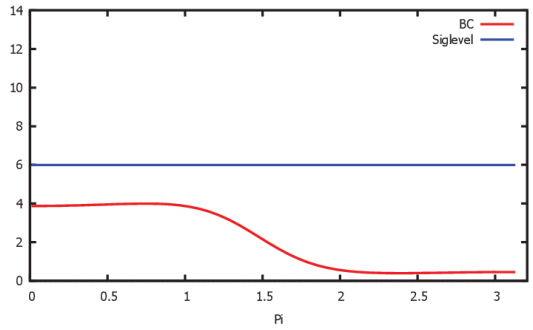
(v) DLFDI → DLPROD



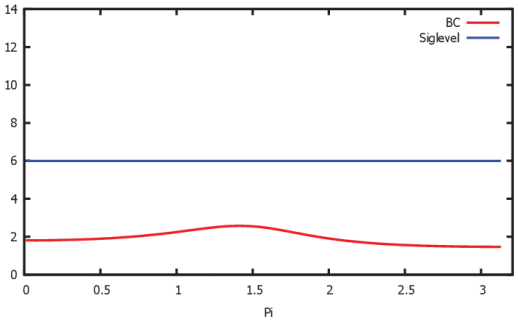
(vi) DLPROD → DLFDI



(vii) DLEDU → DLPROD



(viii) DLPROD → DLEDU



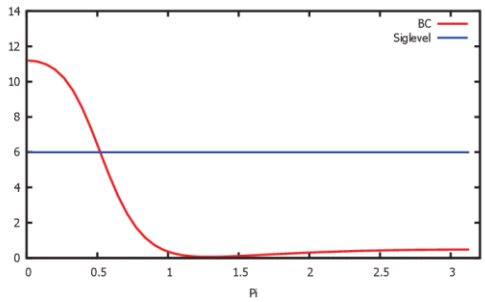
Interpretation of Results:

Referring to long-run and short-run analysis carried out by Krätschell & Schmidt (2012), the evidence of Granger Causality can be found only in case of LFDI→LPROD in the range of [0, 0.5]. As this is a bivariate system, therefore two graphs are shown for each case. The frequencies on x-axis range from [0-3.2]. Since the time period and frequencies are determined using the formula $\omega = 2\Pi/T = 2\Pi f$, Time period T can be determined through $T=2\Pi/\omega$. If frequency is 0.5, it corresponds to time period (T) of more than 12 months. A movement towards left side represents long periods and the movement towards the right shows short-run. In all other cases, test statistic is below significance level, therefore there is no strong evidence of Granger Causality.

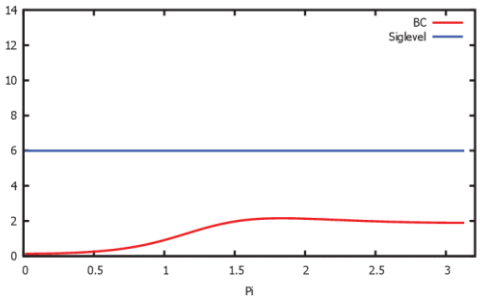
(ii) With condition of exogenous/control variable

- At Level

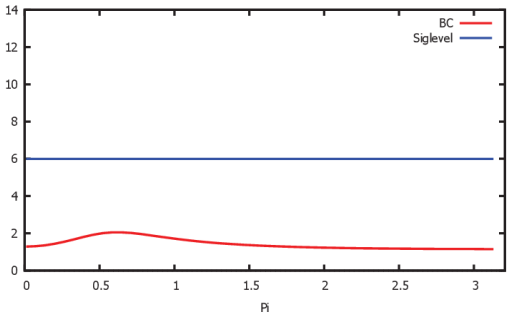
(i) LFDI→LPROD (EXOG=LEDU)



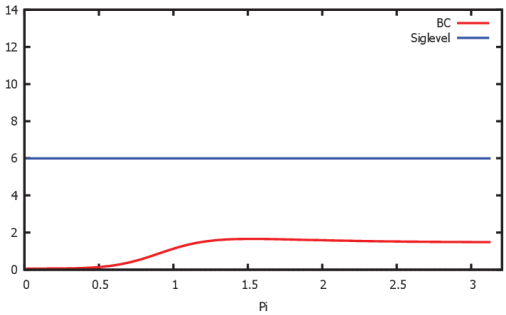
(ii) LPROD→LFDI (EXOG=LEDU)



(iii) LEDU→LPROD (EXOG=LFDI)

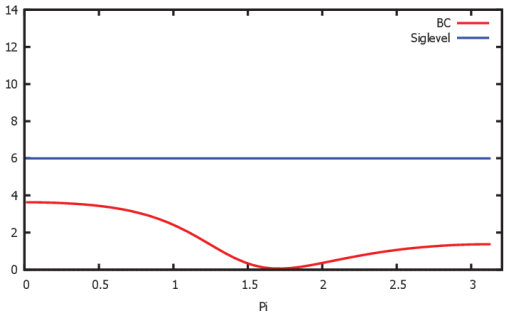


(iv) LPROD→LEDU (EXOG=LFDI)

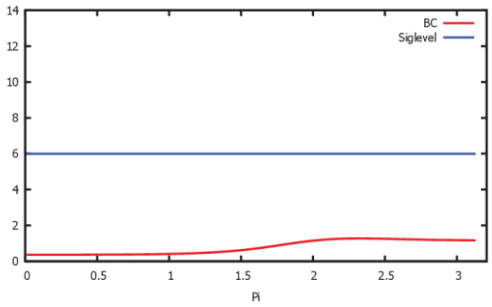


- At First Difference

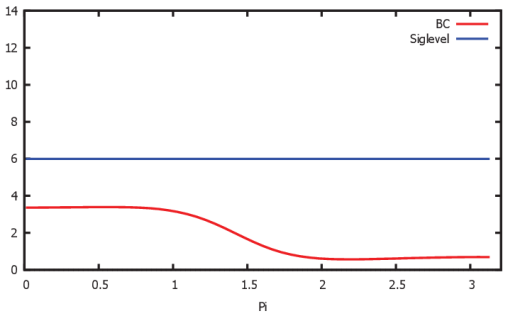
(v) DLFDI→DLPROD (EXOG=DLEDU)



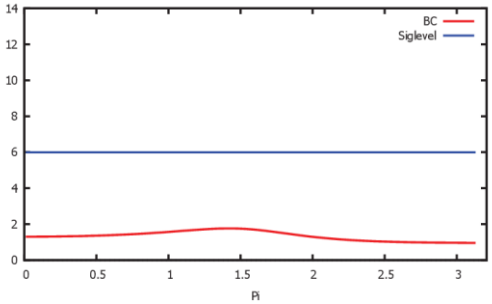
(vi) DLPROD→DLFDI (EXOG=DLEDU)



(vii) DLEDU→DLPROD (EXOG=DLFDI)



(viii) DLPROD→DLEDU (EXOG=DLFDI)



Interpretation of Results:

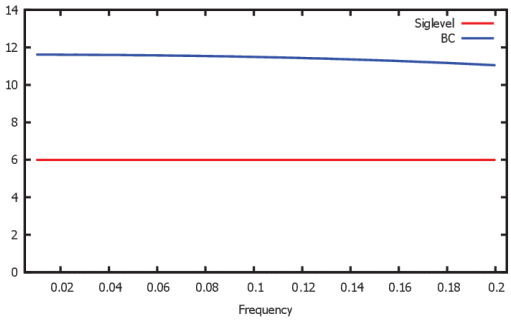
There is not much difference in results as compared to previous analysis (without condition). The evidence of Granger- Causality can be found only in the case of LFDI→LPROD in the range of [0, 0.5]. Since all graphs show bivariate relationships, the evidence of bivariate causality is present only in (i) where rest of the graphs do not show a strong evidence (or no evidence) of Granger Causality at least in long-run. The empirical testing is the same in this case also. The same analysis is used to measure the time period and frequencies.

Detailed results of Breitung Candelon Granger – Causality test:
NEW VERSION BY Breitung- Schreiber
Assessing causality and delay within a frequency band

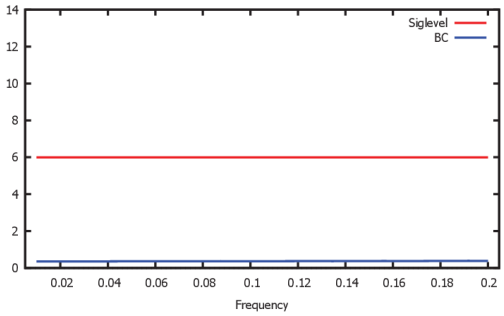
Without the Condition of Exogenous/control variables

- ➢ <u>At Level (with interpretations)</u>
- Frequency Band [0.01, 0.2]

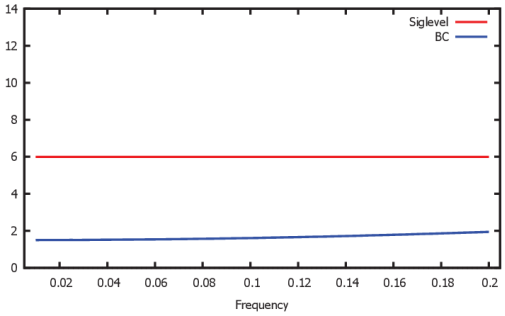
(i) LFDI→LPROD



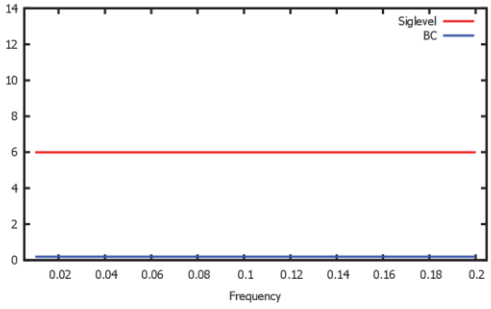
(ii) LPROD→LFD



(iii) LEDU→LPROD



(iv) LPROD→LEDU

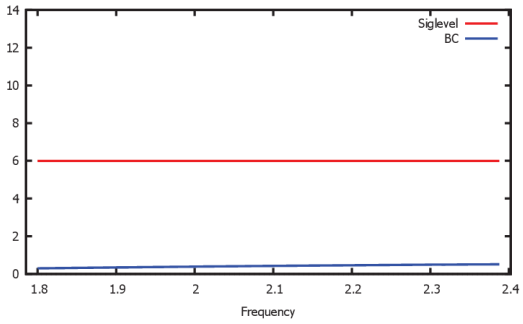


Results:-

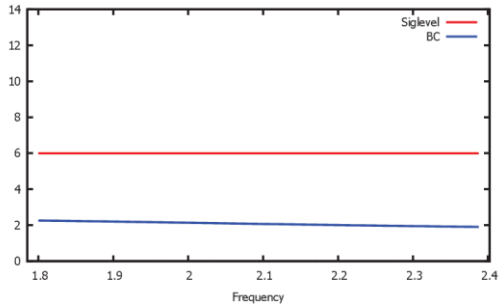
(i) Reject non-causality
(ii) Do not reject non-causality.
(iii) Do not reject non-causality.
(iv) Do not reject non-causality.

- Frequency Band [1.8, 2.4]

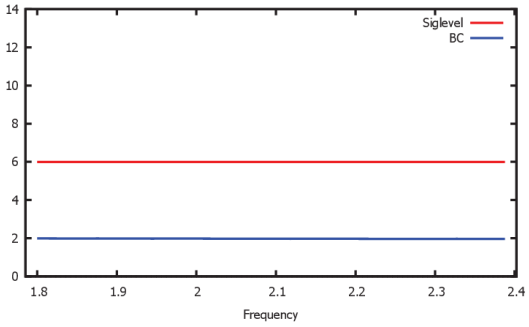
(i) LFDI→LPROD



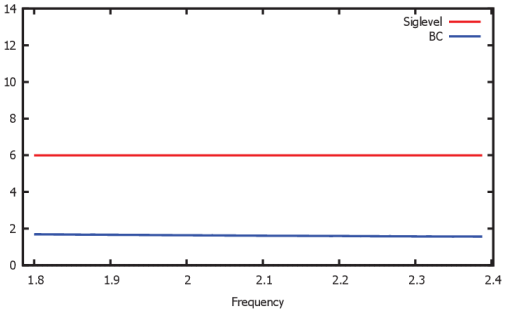
(ii) LPROD→LFDI



(iii) LEDU→LPROD



(iv) LPROD→LED



Results:-

(i) Do not reject non-causality.

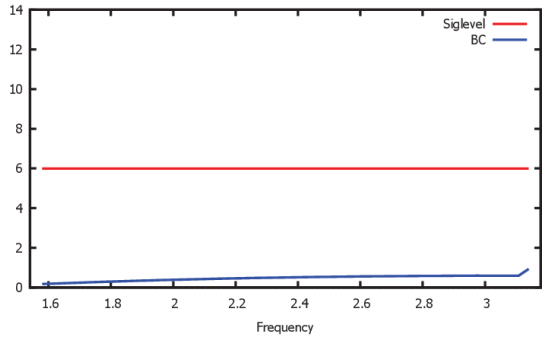
(ii) Do not reject non-causality.

(iii) Do not reject non-causality.

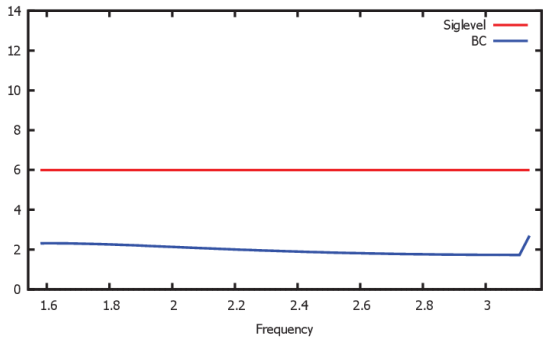
(iv) Do not reject non-causality.

- Frequency Band [1.58, 3.14]

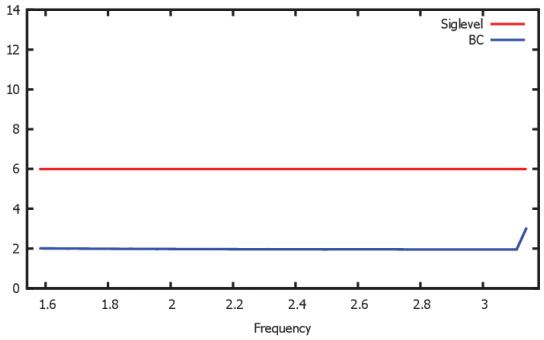
(i) LFDI→LPROD



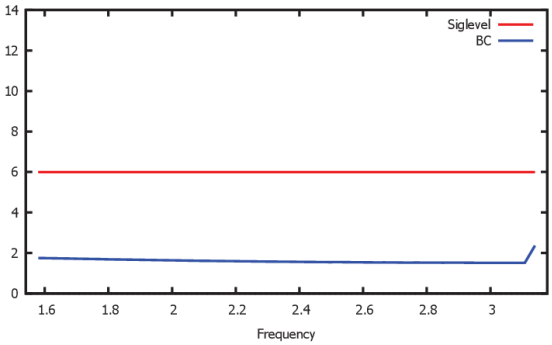
(ii) LPROD→LFDI



(iii) LEDU→LPROD



(iv) LPROD→LEDU



Results:-

(i) Do not reject non-causality.

(ii) Do not reject non-causality.

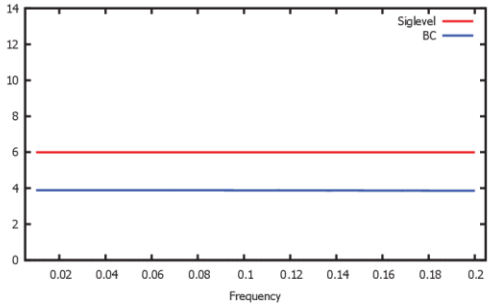
(iii) Do not reject non-causality.

(iv) Do not reject non-causality.

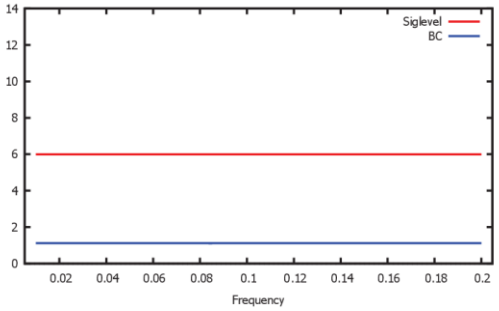
➢ <u>At First Difference (with interpretations)</u>

- Frequency Band [0.01, 0.2]

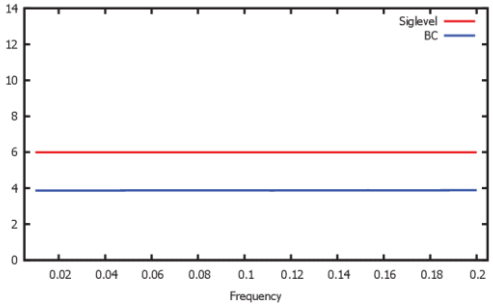
(i) DLFDI→DLPROD



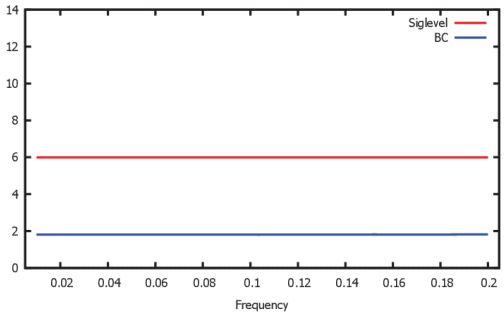
(ii) DLPROD→DLFDI



(iii) DLEDU→DLPROD



(iv) DLPROD→DLEDU



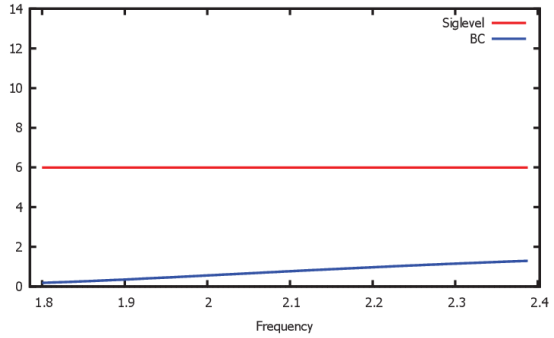
Results:-

(i) Do not reject non-causality.
(ii) Do not reject non-causality.
(iii) Do not reject non-causality.
(iv) Do not reject non-causality.

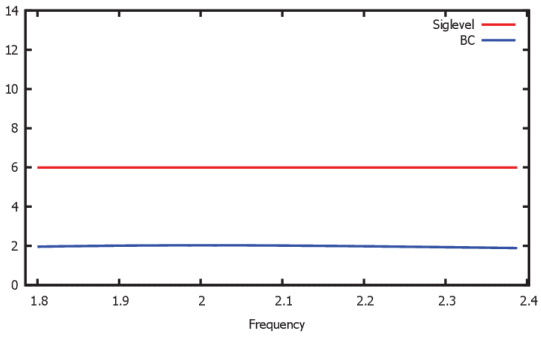
NOTE: (i) and (iii) are different graphs but values are very close.

- Frequency Band [1.8, 2.4]

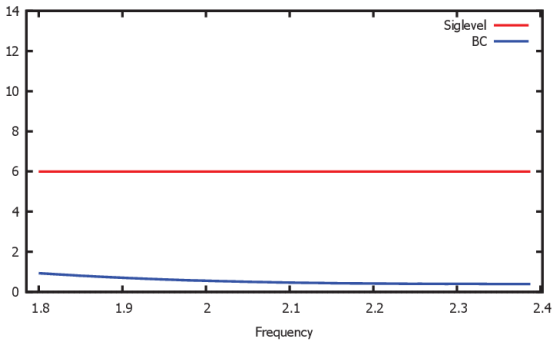
(i) DLFDI→DLPROD



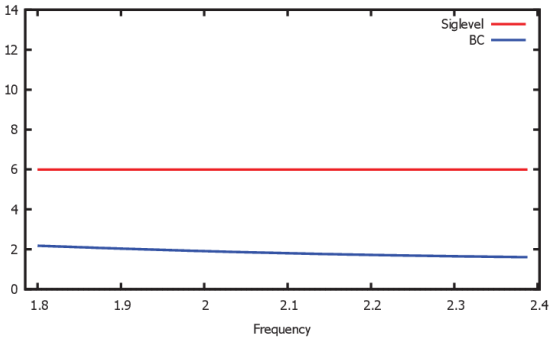
(ii) DLPROD→DLFDI



(iii) DLEDU→DLPROD



(iv) DLPROD→DLEDU



Results:-

(i) Do not reject non-causality

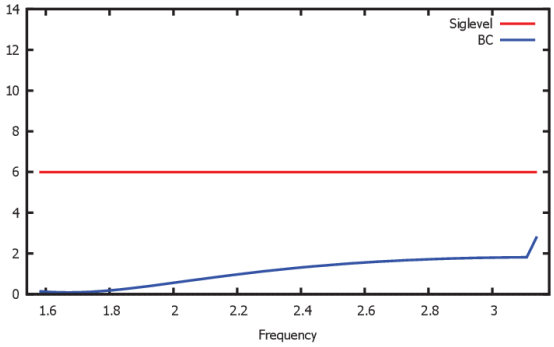
(ii) Do not reject non-causality.

(iii) Do not reject non-causality.

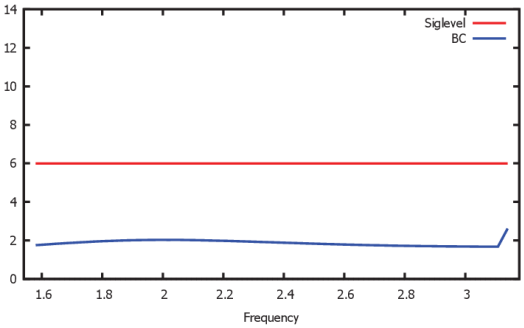
(iv) Do not reject non-causality.

- Frequency Band [1.58, 3.14]

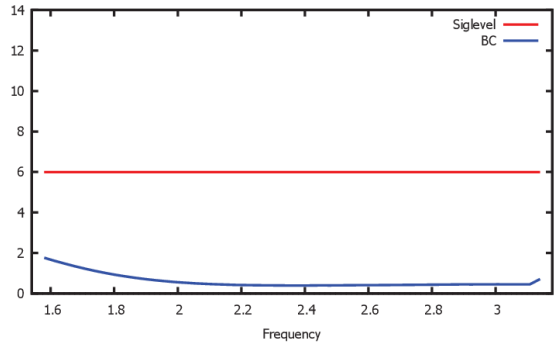
(i) DLFDI→DLPROD



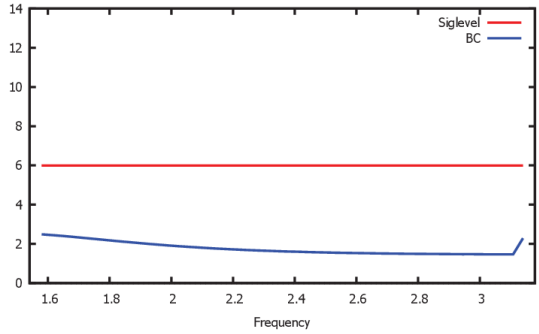
(ii) DLPROD→DLFDI



(iii) DLEDU→DLPROD



(iv) DLPROD→DLEDU



Results:-

(i) Do not reject non-causality

(ii) Do not reject non-causality.

(iii) Do not reject non-causality.

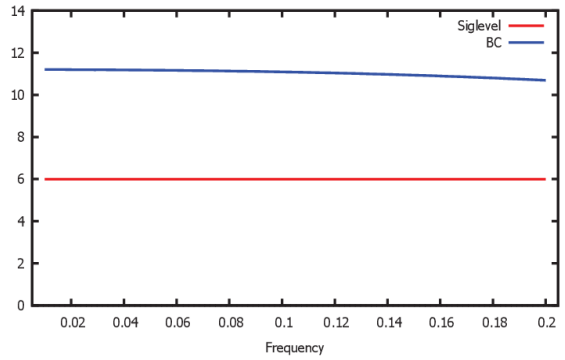
(iv) Do not reject non-causality.

With the Condition of Exogenous/control variables

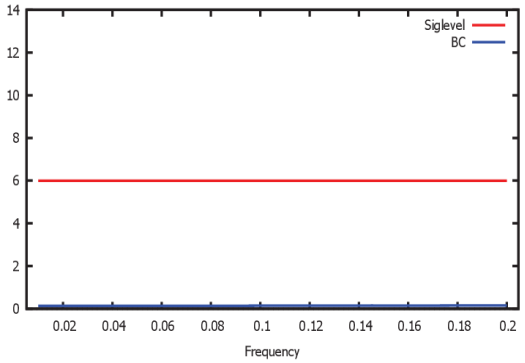
- At Level (with interpretations)

  - Frequency Band [0.01, 0.2]

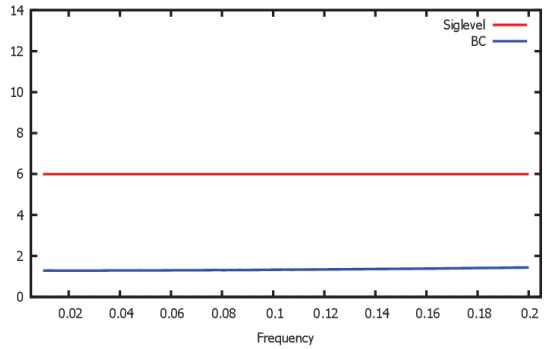
(i) LFDI→LPROD (EXOG=LEDU)



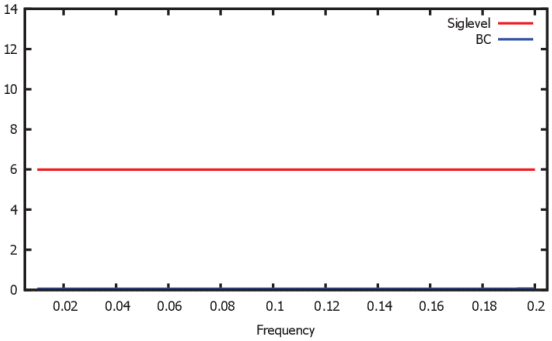
(ii) LPROD→LFDI (EXOG=LEDU)



(iii) LEDU→LPROD (EXOG=LFDI)



(iv) LPROD→LEDU (EXOG=LFDI)



Results:-

(i) Reject non-causality

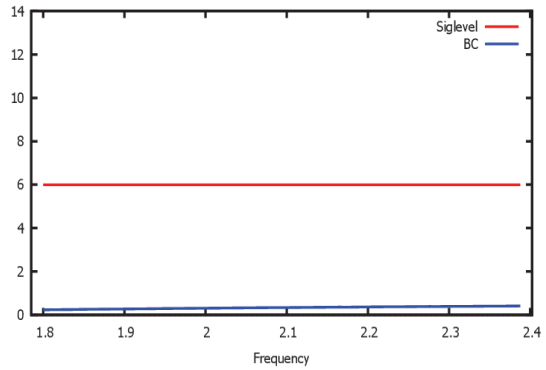
(ii) Do not reject non-causality.

(iii) Do not reject non-causality.

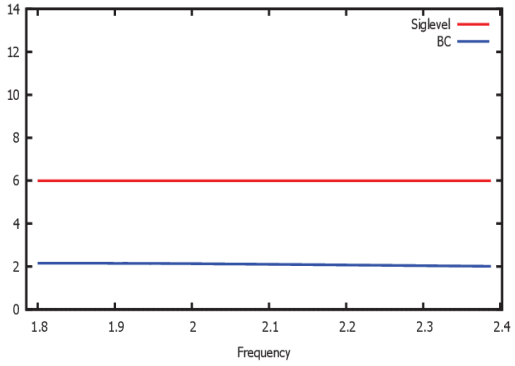
(iv) Do not reject non-causality.

- Frequency Band [1.8, 2.4]

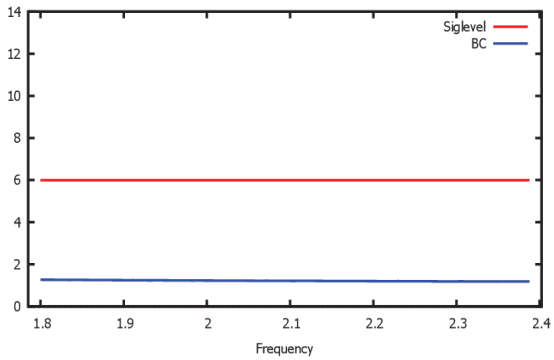
(i) LFDI→LPROD (EXOG=LEDU)



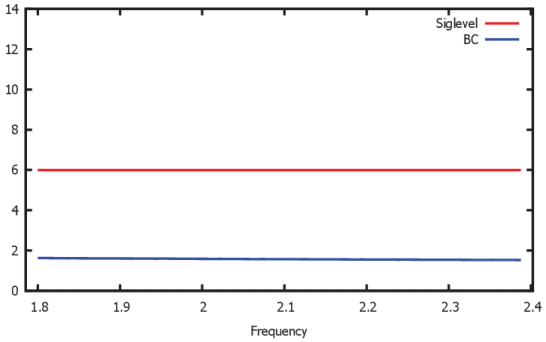
(ii) LPROD→LFDI (EXOG=LEDU)



(iii) LEDU→LPROD (EXOG=LFDI)



(iv) LPROD→LEDU (EXOG=LFDI)



Results:-

(i) Do not reject non-causality

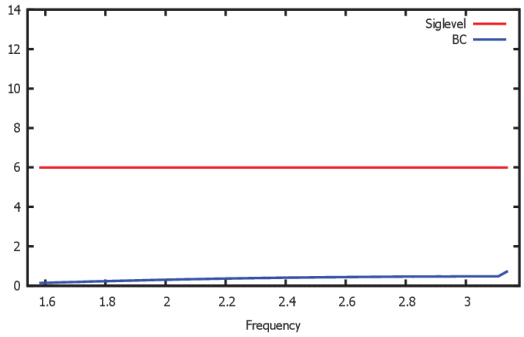
(ii) Do not reject non-causality.

(iii) Do not reject non-causality.

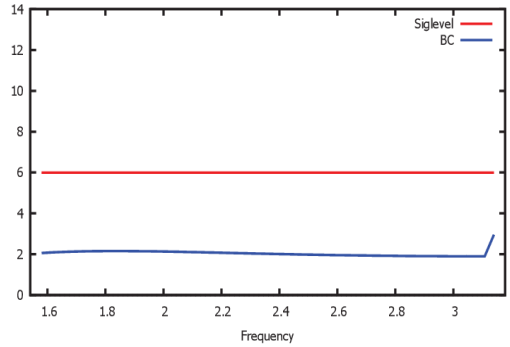
(iv) Do not reject non-causality.

- Frequency Band [1.58, 3.14]

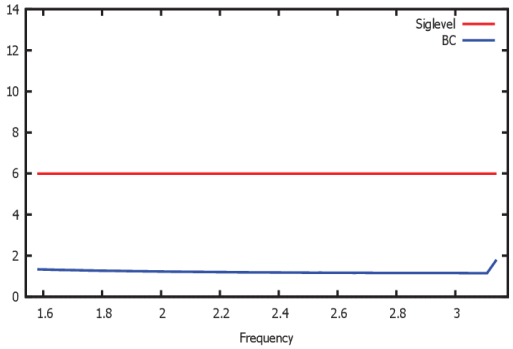
(i) LFDI→LPROD (EXOG=LEDU)



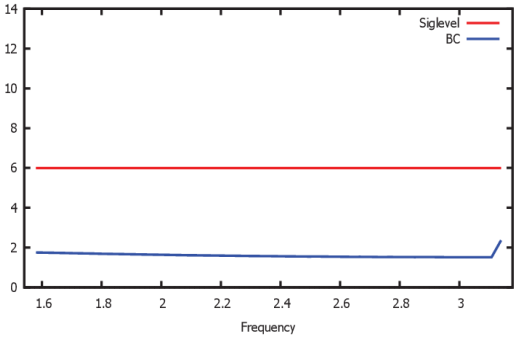
(ii) LPROD→LFDI (EXOG=LEDU)



(iii) LEDU→LPROD (EXOG=LFDI)



(iv) LPROD→LEDU (EXOG=LFDI)



Results:-

(i) Do not reject non-causality

(ii) Do not reject non-causality.

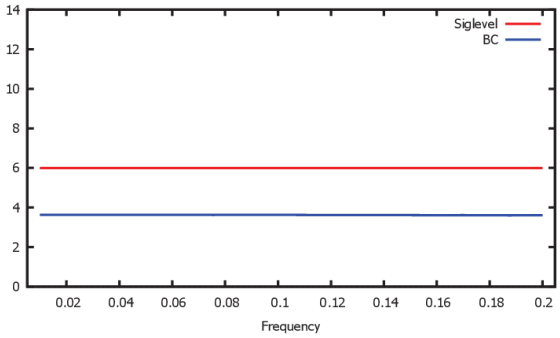
(iii) Do not reject non-causality.

(iv) Do not reject non-causality.

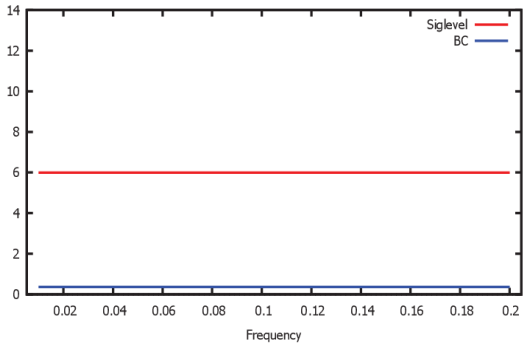
➢ <u>At First Difference (with interpretations)</u>

- Frequency Band [0.01, 0.2]

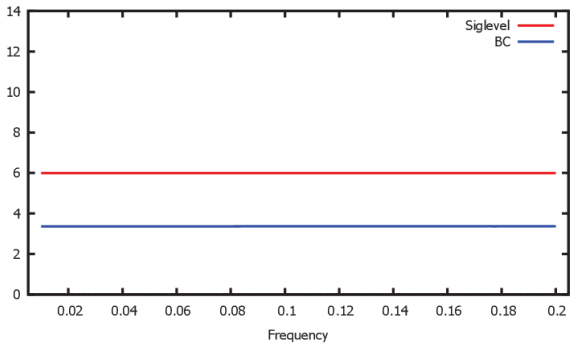
(i) DLFDI→DLPROD (EXOG=DLEDU)



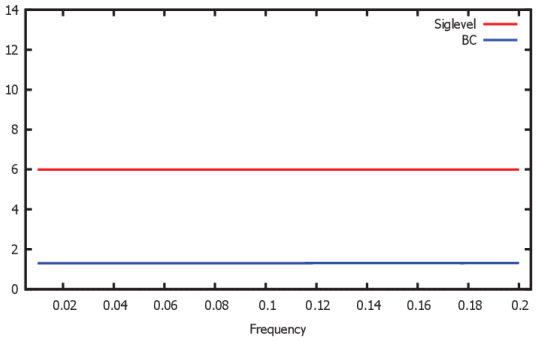
(ii) DLPROD→DLFDI (EXOG=DLEDU)



(iii) DLEDU→DLPROD (EXOG=DLFDI)



(iv) DLPROD→DLEDU (EXOG=DLFDI)



Results:-

(i) Do not reject non-causality

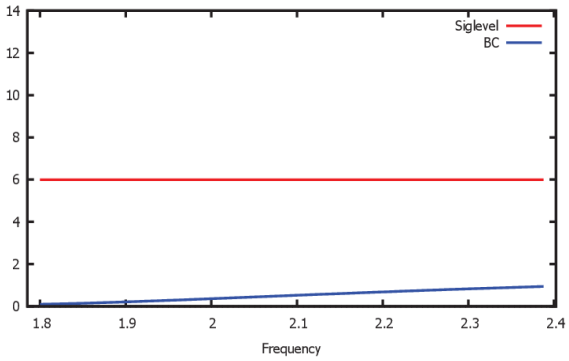
(ii) Do not reject non-causality.

(iii) Do not reject non-causality.

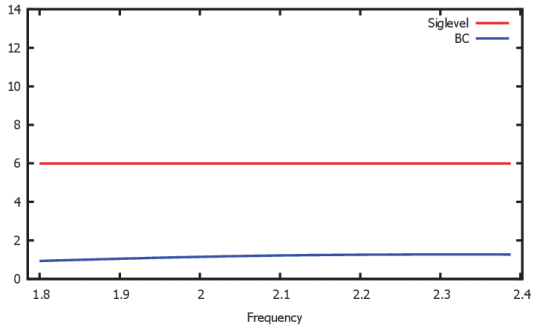
(iv) Do not reject non-causality.

- Frequency Band [1.8, 2.4]

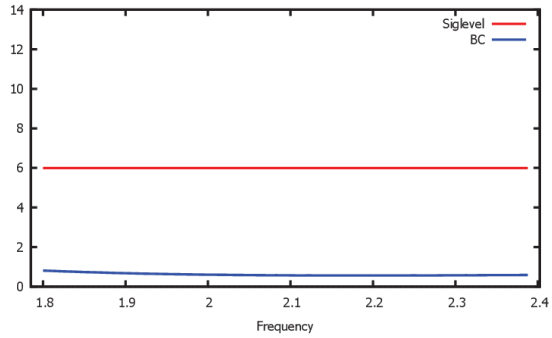
(i) DLFDI→DLPROD (EXOG=DLEDU)



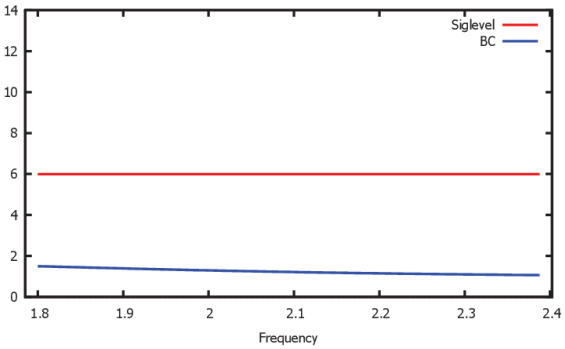
(ii) DLPROD→DLFDI (EXOG=DLEDU)



(iii) DLEDU→DLPROD (EXOG=DLFDI)



(iv) DLPROD→DLEDU (EXOG=DLFDI



Results:-

(i) Do not reject non-causality

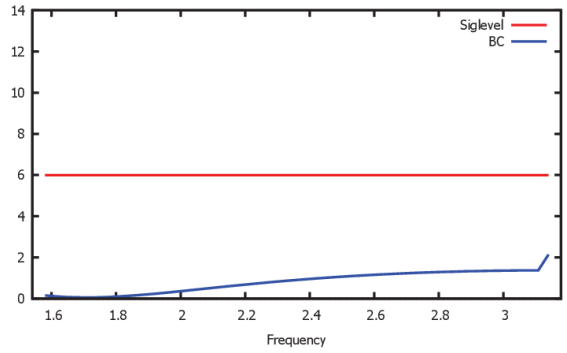
(ii) Do not reject non-causality.

(iii) Do not reject non-causality.

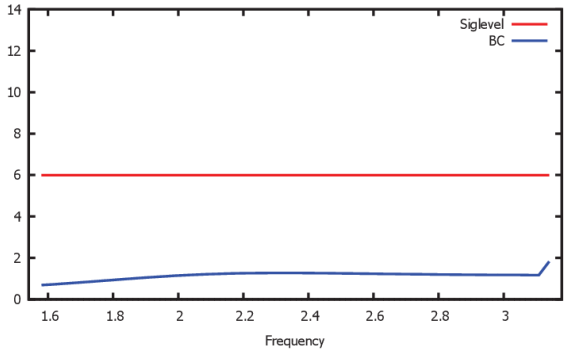
(iv) Do not reject non-causality.

- Frequency Band [1.58, 3.14]

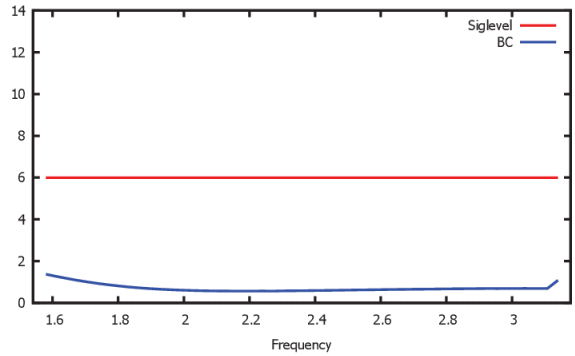
(i) DLFDI→DLPROD (EXOG=DLEDU)



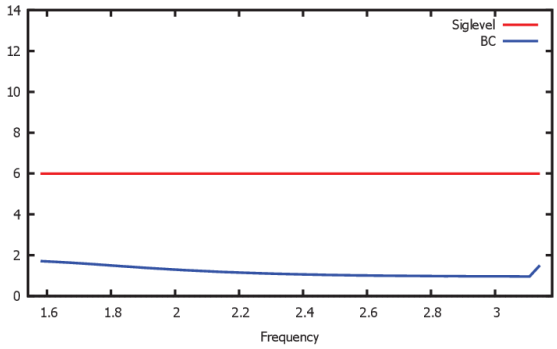
(ii) DLPROD→DLFDI (EXOG=DLEDU)



(iii) DLEDU→DLPROD (EXOG=DLFDI)



(iv) DLPROD→DLEDU (EXOG=DLFDI



Results:-

(i) Do not reject non-causality

(ii) Do not reject non-causality.

(iii) Do not reject non-causality.

(iv) Do not reject non-causality.

PAPER- 3

Foreign Direct Investment Inflows and Labor Productivity in Pakistan: A Sector-Wise Panel Cointegration Analysis

Abstract

Developing economies tremendously benefit from FDI inflows since it leads to their economic growth. This study empirically analyzes the effects of sector-wise FDI inflows on respective sector-wise labor productivity for a panel of seven major sectors of Pakistan's economy covering a time period of 1997-2016. In empirical analysis, the variable of sector-wise FDI inflows has been used as an independent variable while sector-wise labor productivity is a dependent variable. Initial tests conclude that the LSDV fixed effects model is the most appropriate test for the data being used for empirical analysis. Further tests confirm the existence of a long-run Cointegration between these two variables. Wald test shows that a uni-directional short-run causality exists, running from sector-wise labor productivity to sector-wise FDI inflows. Pair-wise Granger Causality test further shows that the effects of FDI inflows are not limited to one sector, rather there is an evidence of spillover effects from one sector to another. All empirical tests conclude that sector-wise FDI inflows positively affect sector-wise labor productivity in case of Pakistan.

Keywords: Sector-wise FDI Inflows, Sectors-wise labor Productivity, Panel Cointegration, Pakistan

List of Abbreviations

FDI	= Foreign Direct Investment
GMM	= Generalized Method of Moments
IPS	= Im, Pearson & Shin
LLC	= Levin, Lin & Chu
LSDV	= Least Square Dummy Variable
MNCs	= Multinational Companies
OECD	= Organization of Economic Cooperation & Development
OLS	= Ordinary Least Square
R & D	= Research & Development
TFP	= Total Factor Productivity
WDI	= World Development Indicators

4.1 INTRODUCTION

It is generally accepted by researchers that foreign direct investment (FDI) inflows cause a positive impact on recipient country by way of boosting economic growth through transfer of better technology, knowledge and skills, training, education opportunities and many more. Further as added by Kurtishi (2013), FDI inflows lead to the capacity building of labor and entrepreneurs. In addition, it leads to an improvement in social conditions. Johnson (2005) adds that FDI helps in the growth of international trade by the flow of goods and capital from one part of the world to the other part. This invariably takes place through MNCs and thus FDI has become an important factor in the process of globalization. Regarding labor productivity, particularly in developing economies, recent debates have resulted in different answers. In some countries FDI inflows do increase labor productivity by providing more technical know-how especially in case of MNCs which are responsible for providing better training, resulting in an increase in wages and that in turn raises the standard of living and thus causes an enhancement in labor productivity. This relationship has been discussed theoretically and tested empirically in the recent paper by the same author i.e., Serfraz (2017). On the other hand, labor productivity may fall due to the replacement of labor by capital in the form of high technology, especially in case of labor abundant countries, since the absorptive capacity of labor serves as a hurdle. MNCs cause wage differentials by hiring the already better-trained labor and refining their skills by providing higher training. Also, education plays a very important role in increasing labor productivity. Although the role of MNCs results in unequal distribution of income and misallocation of resources, but the afore-mentioned advantages cannot be ignored. The extent of productivity growth caused by FDI varies from country to country. Therefore it would be incorrect to claim that FDI inflows do not increase productivity at all. It does increase productivity and growth but not at a uniform level. Pakistan has also benefitted from FDI inflows and presently, it is attracting a higher amount of FDI due to liberalization policies. The advantages have been observed in the form of technology transfer, increase in labor productivity, reducing saving-investment gap etc. If the research is narrowed down to analyze the impact of FDI inflows on individual sectors rather than the economy as a whole, many studies have argued that FDI inflows benefit individual sectors though not equally. It may be due to the biasedness of foreign investors caused by the ease of doing business in a particular sector as compared to the other. Mostly industrial and services sectors attract more FDI inflows as compared to other sectors like the agriculture because these two sectors hire more educated and skilled people viz a viz labor force employed in agriculture sector. Consequently, it becomes easy for foreign investors to train the already skilled labor.

The overall economic growth of any country is a measure of its level of development but sectoral growth cannot be ignored since sectors of any country are its building blocks and play a vital role in increasing economic growth. According to Pakistan Bureau of Statistics [(1)], the three main sectors of Pakistan's economy are agriculture, industry, and services.

But these sectors are further divided into sub-sectors like food, mining, trade, transport, construction etc. Majority of discussion related to sectors is confined to these three main sectors. Moreover, the relationship between sector-wise FDI inflows with reference to the growth of respective sectors does not focus on sector-wise labor productivity. Regarding growth, it has been established in the literature that sector-wise FDI inflows increase sector-wise growth especially related to the industrial sector.

Pakistan needs to introduce more investment-friendly policies, particularly for foreign investors, to increase FDI since more FDI inflows will not only increase the growth of individual sectors but also the overall growth of the economy. Many authors (detailed discussion in literature review) have suggested the same for other developing countries. At the same time, there are controversies related to the impact of FDI inflows on various sectors. There is a lot of discussion about sector-wise FDI inflows and economic growth but not much has been discussed about sector-specific labor productivity. Whether sector-wise FDI inflows increase respective sector labor productivity or not, this is the main innovative point of the present study and is actually an addition to the present knowledge on the subject. This paper is an extension of the previous research carried out by the same author, i.e. Serfraz (2017) in which an empirical analysis has been conducted to analyze short-run and long-run causality between FDI inflows and labor productivity in Pakistan. Now the main focus is to find out the relationship between sector-wise FDI inflows and related labor productivity for seven major sectors of Pakistan's economy.

A panel of seven sectors has been taken along with sector-specific labor productivity to empirically analyze the relationship. For this purpose, sector-wise FDI inflows and sector-wise labor productivity data has been used.

---

(1) *http://www.pbs.gov.pk/content/what-are-major-sectors-economy-pakistan*

Panel unit root tests have been applied. Since panel data tests can be applied as fixed effects, random effects or pooled LSDV model, the empirical part first proves that which test and static panel data model is suitable for the data being used to carry out empirical analysis. After getting confirmed results about the type of static panel data model, panel Cointegration tests have been conducted. Therefore, this study does not directly jump to the type of model to be used, but all initial tests have been presented in the empirical section and the conclusion is drawn on the basis of results. Also, empirical section throws light on characteristics of panel data models and as to what are their advantages and disadvantages.

The seven sectors used in this study are:-

1- AGRICULTURE
2- MANUFACTURING AND MINING
3- CONSTRUCTION
4- ELECTRICITY AND GAS DISTRIBUTION
5- TRANSPORT
6- TRADE
7- OTHERS (FINANCING, REAL ESTATE, BUSINESS SERVICES, EXTRA-TERRITORIAL AND OTHER PUBLIC AND PRIVATE SERVICES).

For this purpose, the data from 1997-2016 has been used. Data prior to 1997 has not been estimated, therefore this puts a limitation on the study.

For each sector, FDI inflows have been estimated along with the labor specific to the sector. The details of data are also mentioned in the coming chapters of the paper.
This paper is divided into four main sections. Section 1 explains the introduction and objective of the study. Section 2 throws light on literature review with sub-sections dealing with available literature, both national and international studies, relating to the topic under discussion. Also, it highlights the gaps in the existing body of knowledge and contributions made by the present study. Detailed empirical analysis has been presented in section 3 with sub-sections explaining different steps, empirical tests, and their interpretations. The last section concludes the study along with policy recommendations.

4.1.1 OBJECTIVE OF STUDY

After establishing a positive relationship between FDI inflows and labor productivity in case of Pakistan in the previous paper (Serfraz (2017), this study, instead of analyzing FDI's impact on the growth of different sectors of Pakistan's economy, aims at examining the impact of sector-wise FDI

inflows on respective sector-wise labor productivity in Pakistan. For this purpose, seven major sectors have been taken along with the data of labor force hired in those particular sectors. This study is unique in the sense that it analyzes the relationship between each sector's FDI inflows and its corresponding impact on labor productivity, whereas the majority of studies have concentrated on the relationship between sector-wise FDI inflows and growth. Also instead of taking one or two sectors, this study uses seven major sectors for empirical analysis. The reason behind taking these seven sectors and not more is due to the limitation on the availability of data. Those sectors have been included for which data is available for all the years (1997-2016).

4.2 LITERATURE REVIEW

The literature review is divided into three sections. Section 1 deals with the relevant literature on the topic available in international studies. Also, the established relationships of individual sectors will be discussed in detail since the available literature has used different sectors for analyzing the relationship. In section 2, studies related to Pakistan will be analyzed. Section 3 sums up the literature explaining the gaps which will be filled by the present study.

4.2.1 International Studies

Maathai & Sahoo (2008), carried out an empirical analysis to examine the effects of FDI inflows to nine major sectors of India using panel Cointegration approach covering the time period from 1991-92 to 2004-05. Their empirical findings suggested a positive impact of FDI inflows on output, labor productivity, and exports on drugs and pharmaceuticals sectors. In case of transport and metallurgical sectors, FDI inflows and labor productivity revealed a positive Cointegration whereas FDI inflows did not show a positive impact on labor-intensive sectors like transport and chemicals due to the backwardness of labor. Their overall conclusion showed a negative impact on labor productivity and an increase in FDI inflows did not reveal any positive impact on Indian economy at the sectoral level both in terms of output and labor productivity.

Dürnel (2012), empirically investigated the effects of FDI inflows on ten individual sectors of the Turkish economy. Using panel Cointegration and Granger Causality test for the time period of 2000-2009, the study concluded that FDI inflows seemed to benefit growth rate mostly in the Manufacturing, Electricity, Gas and Water, Wholesale and Retail Trade sectors. The essential findings of the study suggested that Foreign Direct Investment contributed towards an overall growth rate of the Turkish

economy. The results indicated that though all the sectors were not benefitting from FDI inflows equally but, it was found that FDI inflows increased labor productivity which resulted in an increase in sectoral growth at different levels and to various extents.

Bang et al (2007), carried out an empirical analysis to study the impact of FDI inflows on economic growth of China and Vietnam, using sectoral data of China from 1997-2004 and 1995-2003 for Vietnam. The results revealed that though FDI directly showed a significant and positive effect on economic growth as well as through its interaction with labor productivity in both countries, but, the impact was not evenly distributed across sectors. In both the countries, the industrial sector seemed to be the only sector to consistently benefit from FDI inflows as compared to other sectors.

According to Alam et al (2008), Eastern European countries and the Former Soviet Union have observed high economic growth in recent years due to the increased level of investment. According to the author, productivity growth is the most important factor for increasing overall economic growth. An increase in productivity leads to an increase in profits and consequently investment increases. As a result, wages grow upwards, leading to an increase in standard of living which enhances labor productivity. Thus, the sectors which receive higher investment also have more productive labor force. The author focuses on three main sectors of the economy, i.e., agriculture, manufacturing, and services. The allocation of resources to relevant sectors directly affects sector-wise productivity and the labor attached to that sector. An increase in investment in a particular sector leads to transfer of labor from the less productive sector (agriculture) towards more productive sectors (manufacturing and services). At the same time, labor moving to more productive sectors also showed an increase in productivity relevant to that sector.

From this study it can be inferred that labor productivity cannot be determined in isolation, rather sectoral productivity and labor productivity are related and dependent on each other.

The same conclusion has been derived from a study conducted by Mallick (2015). The author carried out an empirical analysis for examining the structural changes and effects of globalization in the form of FDI inflows and economic integration, on labor productivity growth in BRICS countries using shift-share analysis, dynamic panel data method and input-output tables covering the time period of 1990-91 to 2011-12. The empirical findings suggested a high labor productivity growth in BRICS due to globalization and economic integration policies. FDI inflows resulted in a

two-way causality, i.e., FDI inflows affect labor productivity and in turn, labor productivity increases sectoral growth resulting in a reallocation of labor towards more productive sectors. In addition, the results also suggested that due to FDI inflows, labor is shifting to non-agriculture sectors in case of India and China, and towards services sector in Brazil, Russia, and South Africa.

Ilboudo (2014) tested the hypothesis that Solow Residual or TFP can be targeted to increase sectoral growth for mining sector of Chile. Highlighting the importance, the author mentions that the mining sector of Chile is one of the most important sectors of Chilean economy and almost one-third of government income comes from copper exports. Using Cobb-Douglas production function, the study revealed a long-run relationship between FDI inflows and labor productivity for mining sector of Chile.

Vu and Noy (2009) conducted an empirical study using sector-wise data for a group of six member countries of OECD. They analyzed the relationship between sector-specific impacts of FDI on growth in developed economies. Using cross-country regression, they found that the impact of FDI inflows may be positive or negative depending on the direct impact on the economy or through an increase in labor productivity. Also, different results were obtained across countries and sectors. For some sectors, there was a positive relationship and for others it was negative; the real estate and financial sector showed a negative but significant effect. Only mining and quarrying showed positive and significant results. In the end, they suggested that FDI in certain sectors is more productive and has high labor productivity but the level of productivity differs across sectors.

Msuya (2007), examined the impact of FDI inflows on the agricultural sector of Tanzania. The qualitative study by the author suggests that the crops produced by small farmers organized in smallholders' set-ups attract more FDI as compared to others. Labor productivity depends on many macroeconomic variables including investment regulatory frameworks, policies that promote macroeconomic stability, and improved physical infrastructure. In addition, author recommended that creation of 'strong bonds' between smallholders and investors through more integration, would help in attracting more FDI inflows to agricultural sector but this should be extended to developing strong institutions in all sectors. This would lead to more FDI inflows which would further increase the productivity and result in poverty reduction.

Moving on to the industrial sector, Fillat and Woerz (2011) conducted an empirical analysis for examining the impact of FDI on output and

productivity using industry level data for a panel of 35 OECD, Asian and Eastern European countries. Their study concluded that FDI inflows lead to higher labor productivity and output in the industrial sector of 'catching-up' or developing countries as compared to developed countries but the productivity differs across industries. Therefore such policies must be devised which can attract more FDI especially in those industries where labor is more productive as it would lead to a higher output.

Bijsterbosch and Kolasa (2010) carried out an empirical analysis for investigating the effect of FDI inflows on productivity by using industrial level data of Central and Eastern European countries. Their findings suggested that FDI leads to increase in productivity both at country and industrial sector level but it depends on the area and absorptive capacity. If labor is more efficient and productive, the absorptive capacity results in more benefits from FDI inflows. They also found the evidence that level of labor productivity or human capital is positively associated with a larger impact of FDI though labor productivity levels have throughout remained depressed outside the euro area as compared to the euro area. In the year 2006, the output of the industry was almost one-third of the euro area. The productivity level in the services sector was almost half of the euro area while the pattern varied across the countries in the sector of construction.

Azeroual (2016) undertook an empirical analysis for examining the impacts of FDI inflows from France and Spain on the TFP of the manufacturing sector of Morocco. The author used GMM system in dynamic panels for a subset of 22 branches of this sector between 1985 and 2012 and found that the impact varied depending on the source from which the FDI originated. The impact on TFP from French FDI was negative, and significant, in medium and high-level technology industries while the impact of Spanish FDI was significantly positive. The negative impact of French FDI could be attributed to (i) productivity gap between Moroccan and French companies due to the high difference in labor productivity and efficiency (ii) the investment rate and control on technology transfer in the hands of French investors. FDI from Spain seemed significant and positive on TFP though the positive impact was weak. French participation, being mostly concentrated in medium and high technology sectors, ranging between 30 percent of foreign ownership, and sometimes going above 70 percent in the case of automotive industry and transport equipment manufacturing.

Morrar and Gallouj (2016) in their empirical study examined the main factors which contribute to the growth in the services sector of Palestine. The results of panel data analysis suggested a positive and significant effect of FDI on the labor productivity growth while capital intensive services sector exercised greater influence on labor productivity growth. Other public services like retail trade, the sale, and repair of motor vehicles and

land transport are on a weaker growth trajectory. The political instability adds fuel to the fire by further affecting the productivity growth of the services sector. The author recommends that government should concentrate on policies which create new jobs for those thousands who lost their jobs inside Israel along with increasing productivity of its unskilled workers.

Alam et al (2013), conducted an empirical analysis to examine the causality between economic growth, FDI inflows and labor productivity by using a panel of 19 OECD member countries for the time period of 1980-2009. The results suggested the evidence of causality but after 1995, the policies favored in shifting FDI inflows towards manufacturing and services sectors where technological spillovers were high due to higher labor productivity in these sectors which resulted in both short-run and long-run causality.

Mallick (2013) argues that due to globalization, advancement in technology, and factor of competition, the demand for productive labor is increasing since skilled and productive labor in every economic sector leads to an overall economic growth. For empirically analyzing this relationship, the author conducted an analysis using panel estimation on data extracted from OECD and WDI covering the time period from 1990-91 to 2011-12. The results of multiple regression also suggested that the indicators of globalization like FDI inflows and openness of economy have a positive and significant impact on labor productivity both in individual sectors and the economy as a whole.

Kirti and Prasad (2016) studied the impact of FDI inflows on Indian economy taking both sectoral analysis and combined effect together. The OLS estimation results revealed that FDI has both positive and negative effects on sectors and economy. They found that FDI leads to unemployment due to the use of capital-intensive technology which replaces labor. Regarding sector-wise analysis, they suggested that if capital-intensive technology is used in the agricultural sector (most backward sector of the economy), this will lead to an increase in output based on high labor productivity due to spillover effects from technology transfer. However, the manufacturing and services sectors are attracting more FDI due to high labor productivity in the respective sectors.

Thangavelu et al (2015) analyzed the impacts of trade on labor productivity of the services sector for five ASEAN countries—Indonesia, Malaysia, the Philippines, Singapore, and Thailand. They used fixed effects and GMM estimators for the time period of 1990-2005. Four subsectors have been used for empirical analysis, i.e., (i) wholesale, retail, and hotel; (ii) transport,

storage, and communications; (iii) finance, insurance, and real estate; and (iv) community, social, and personal sectors. The results show that the more exposure to exports leads to an increase in labor productivity in all these five countries. Furthermore, higher FDI inflows lead to an increase in productivity and output of the services sector which then provides inputs for the manufacturing sector in the region. Therefore author suggests that such policies must be adopted which would lead to more openness and exposure to foreign investment for the advancement of services sector since it supports manufacturing sector as well. Their results also highlight that an increase in labor productivity and mobility of skilled labor will enable the services sector to contribute to overall growth of both domestic and regional economies.

Thuy (2007) investigated the effects of FDI inflows on industrial sector of Vietnam using industry-level panel data for 29 industrial sectors during the periods of 1995-1999 and 2000-2002. The author also made an attempt to estimate the extent to which FDI inflows generate spillover effects on the industrial sector. The empirical results revealed that FDI inflows lead to a reduction in government budget deficit, an increase in exports and employment opportunities and exert a positive impact on industrial growth and productivity. The results also indicate that FDI inflows lead to an increase in industrial labor productivity in the form of spillover effects.

Contessi and Weinberger (2009) in their study analyzed the empirical literature on the studies analyzing the relationship between FDI, productivity and growth. Their main emphasis was on studies that used aggregate data and focused on finding the answers to two questions: Is there evidence of a positive relationship between foreign direct investment and national growth? And does the output of the "multinational sectors" exhibit higher labor productivity? According to authors, the available literature provides ambiguous results but a majority of studies have concluded that MNCs and FDI inflows lead to an increase in labor productivity, wages, and employment. These results are specifically true if compared with domestic firms who do not have enough resources to provide better opportunities to domestic labor, FDI not only increases labor productivity but also makes use of human capital by providing more employment opportunities and higher wage rate which leads to sectoral and overall economic growth.

This section of literature review has some important implications. First, all studies agree that FDI inflows and openness lead to an increase in labor productivity and sectoral growth. Also, an important point to highlight is that not all sectors enjoy the same level of benefits. In most of the studies, the agricultural sector has been given less importance due to its

backwardness and low return. Industrial and services sectors show better performance and attract more FDI because of higher return as well as the availability of skilled and productive labor force working in these sectors. Basically, there is a bi-directional causality. FDI leads to increase in sectoral productivity along with the increase in labor productivity of respective sectors which in turn attracts more FDI inflows.

4.2.2 Studies related to Pakistan

This section reviews studies relevant to Pakistan, including studies relating to Asian countries or a panel of countries which includes Pakistan, though the majority of the studies focus on the impact of FDI inflows on sectoral growth rather than sectoral labor productivity.

Khan et al (2012), empirically analyzed the role of FDI inflows using data of agriculture and industrial sectors of Pakistan for the time period of 1979-2009. The services sector was also incorporated as an independent variable in the equations of agricultural and industrial sectors. The results of two-stage least square (2SLS) suggested a negative impact on the agriculture sector and a positive impact on the industrial sector. Their results also suggested that an increase in the growth rate of agriculture and industrial sector leads to a higher growth of services sector. Consequently employment increases which causes an inclination towards attaining more education. This facilitates the availability of an increased number of educated and skilled workers which leads to enhancement in labor productivity both at sectoral and macro level. As a result, economic growth picks up.

Khan and Khan (2011) are of the view that although Pakistan has great potential for attracting FDI inflows, but it has not been successful in attracting sufficient amounts due to an ineffective institutional framework, poor law and order situation and low labor productivity. Their empirical analysis basically focuses on testing the impact of sector-wise FDI inflows on growth and output using data of Pakistan from 1981-2008. The panel Cointegration and Granger Causality results suggested that although sectoral FDI inflow increases output and growth of three major sectors i.e., agriculture, industry, and services but it is not satisfactory due to above-mentioned factors.

Kasi and Zafar (2016) examined the productivity and spillover effects of FDI inflows in four member countries of SAARC including Bangladesh, India, Nepal, and Pakistan for the period of 1990-2013. Authors used 3 main sectors for analysis, i.e., primary, manufacturing, and services and applied

Fully Modified Least Square technique. According to their results, although FDI inflows have a positive and significant impact on the productivity of all sectors but the effect varies across sectors. They found that the maximum productivity effect of FDI is found in the services sector through spillover effects where FDI plays an important role and increases labor productivity through technology, training, and education.

Majority of studies argue that Pakistan has a high potential for attracting FDI inflows but there are many factors which are acting as a hurdle and low labor productivity is one of the most important factors. This is applicable not only at sectoral level but as a whole, as Khan (2011) states,

'On the whole, Pakistan has a lot of potential to attract foreign investment. Although the rising trend of FDI in various sectors reflects the success of policy; however, FDI inflows are considerably hindered by institutional weakness, corruption, ineffective legal institutions, political uncertainty, poor laws, weak regulatory systems, deteriorating law and order situation, labor productivity and unsustainable international political relations.' (Page 20)

Sahoo (2006) carried out an empirical analysis to examine the impact of FDI inflows and its determinants on the growth of five South Asian countries including India, Pakistan, Bangladesh, Sri Lanka and Nepal. According to the author, since these countries have been following liberalization policies to attract FDI, all benefitted from FDI but Pakistan is at the bottom of the list. FDI inflows in South Asian countries is basically concentrated in the manufacturing and services sectors. The panel Cointegration analysis suggested that market size, labor for growth, infrastructure index and trade openness are the main determinants of FDI inflows in these countries. Regarding low benefits from FDI inflows to Pakistan, the author points out that major reason is poor labor laws which result in low labor productivity even in those sectors which are attracting high FDI inflows. In addition, Pakistan has a 'decent' FDI policy but low labor productivity is acting as a hurdle in both attracting and benefitting from FDI inflows.

Suleman and Amin (2015), in their study, examined the impact of sectoral FDI inflows on industrial growth of Pakistan. They used Cobb-Douglas production function for three sectors of Pakistan's economy including manufacturing, construction, mining, and quarrying by using panel Cointegration analysis covering the time period of 1997-2011. Their empirical results suggested that sectoral FDI, capital and labor productivity affect the industrial growth of Pakistan both positively and significantly.

Authors recommended that such policies should be devised which provide a better standard of living, reduce poverty and unemployment so that labor productivity can increase.

Park and Shin (2012) studied services sector of 12 major Asian economies including Pakistan. Authors mainly focused on examining that whether services sector can become the new engine of growth for developing Asia based on high labor productivity in the services sector. Authors added that since services sector had already contributed to Asian economies in past, the panel Cointegration analysis suggested that services sector (as compared to other sectors) has future potential to increase GDP growth of these countries since FDI inflows to services sector is positively affecting the labor productivity of this sector, consequently employment opportunities are increasing. In addition, it was found that labor productivity in the services sector is increasing at a high rate in Asian economies, and in case of Pakistan the performance of services sector is on higher trajectory due to which it has become the strongest sector of the economy since the labor productivity has direct and positive relationship with FDI inflows to this sector.

Slimane et al (2013) empirically examined the direct and indirect impact of FDI inflows on food security for 63 developing economies including Pakistan. For empirical analysis, they used Cobb-Douglas agriculture production function and covered the time period from 1995-2009. Their empirical results did not suggest a direct significant effect of sectoral FDI on food security but a significant and positive indirect impact was found for FDI in agriculture and secondary sector through the growth of agriculture production but it did not show any impact on mining sector. Negative effects in the tertiary sector were observed through FDI inflows. Their results also suggested that the secondary sector benefitted through high employment and wage rate which increased labor productivity. Spillover effects were observed in agriculture food security and labor productivity through the transfer of technology and knowledge spillovers.

Yusuf (2013), discussed whether Chinese FDI would accelerate Pakistan's growth and argued that Chinese FDI would have positive impacts if China began off-shoring more of its labor-intensive manufacturing activities, Pakistan's textile, leather, white goods and auto industries. Pakistan has been facing problems in benefitting from FDI inflows due to technological backwardness and low labor productivity. Although there is a high potential since it has a large number of urban centers but poor investment policies and low factor productivity are main hindrances. Labor laws need to be implemented so that technological spillovers can be enjoyed in

manufacturing and export-producing sectors. Labor productivity in growth increasing sectors needs attention since Pakistan can gain more from FDI inflows if proper investment is made in modern sectors especially manufacturing and export producing industries.

This section of literature shows that undoubtedly policymakers and researchers have a consensus that in general FDI inflows increase labor productivity. Moreover, the agriculture sector is the most backward sector compared to the manufacturing and services sectors. Yet the discussion mainly concentrates on sector-wise FDI inflows and sectoral growth or overall growth instead of labor productivity of each sector.
The empirical part of this paper is aimed at concentering on the impact of sector-wise FDI on respective sector-wise labor productivity.

Some important figures related to country-wise and sector-wise FDI inflows to Pakistan have been shown in following tables:-

Table3. 1 Country Wise FDI Inflows ($ Million)

Country	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17 (Jul-May)
USA	1,309.3	869.9	468.3	238.1	227.7	227.1	212.1	208.9	40.5	40.8
UK	460.2	263.4	294.6	207.1	205.8	633.0	157.0	169.6	138.4	54.2
U.A.E	589.2	178.1	242.7	284.2	36.6	22.5	(47.1)	218.8	138.6	51.2
Japan	131.2	74.3	26.8	3.2	29.7	30.1	30.1	71.1	35.2	42.0
Hong Kong	339.8	156.1	9.9	125.6	80.3	242.6	228.5	136.2	119.5	10.1
Switzerland	169.3	227.3	170.6	110.5	127.1	149.0	209.8	3.2	53.4	15.9
Saudi Arabia	46.2	(92.3)	(133.8)	6.5	(79.9)	3.2	(40.1)	(64.8)	24.0	1.9
Germany	69.6	76.9	53.0	21.2	27.2	5.5	(5.7)	(20.3)	(11.6)	(6.1)
Korea (South)	1.2	2.3	2.3	7.7	25.4	25.8	24.4	14.3	(2.3)	7.3
Norway	274.9	101.1	0.4	(48.0)	(275.0)	(258.4)	(21.6)	2.7	172.5	(12.6)
China	13.7	(101.4)	(3.6)	47.4	126.1	90.6	695.8	256.8	626.2	878.8
Others	2,005.2	1,964.2	1,019.6	631.3	289.7	285.5	255.4	(73.6)	566.8	944.5
Total including Pvt. Proceeds	5,409.8	3,719.9	2,150.8	1,634.8	820.7	1,456.5	1,698.6	922.9	1,901.2	2,028.0
Privatisation Proceeds	133.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FDI Excluding Pvt. Proceeds	5,276.6	3,719.9	2,150.8	1,634.8	820.7	1,456.5	1,698.6	922.9	1,901.2	2,028.0

SOURCE: Board of Investment, Pakistan http://boi.gov.pk/ForeignInvestmentinPakistan.aspx

22.6% increase in Net FDI in July-May, 2016-17 as compared to July-May, 2015-16. Note: Pakistan's Fiscal Year runs from 1st July till 30th June. The figures in brackets are in negative.

Table3. 2 Sector Wise FDI Inflows ($ Million)

Sectors	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17 (Jul-May)
Oil & Gas	634.8	775.0	740.6	512.2	629.4	559.6	502.0	299.0	248.9	135.6
Financial Business	1,864.9	707.4	163.0	310.1	64.4	314.2	192.8	256.4	289.0	62.8
Textiles	30.1	36.9	27.8	25.3	29.8	10.0	(0.2)	43.9	20.0	14.1
Trade	175.9	166.6	117.0	53.0	25.3	5.7	(3.2)	50.0	26.8	28.1
Construction	89.0	93.4	101.6	61.1	72.1	46.0	28.8	53.5	36.8	418.2
Power	70.3	130.6	(120.6)	155.8	(84.9)	28.4	71.4	219.3	751.3	548.0
Chemicals	79.3	74.3	112.1	30.5	96.3	71.6	94.9	55.3	88.5	10.6
Transport	74.2	93.2	132.0	104.6	18.7	44.1	2.7	6.2	70.1	38.1
Communication (IT&Telecom)	1,626.8	879.1	291.0	(34.1)	(312.6)	(385.7)	434.2	45.1	236.8	20.0
Others	764.5	763.4	586.3	416.3	282.2	765.5	375.2	105.8)	133.0	752.5
Total including Pvt. Proceeds	5,409.8	3,719.9	2,150.8	1,634.8	820.7	1,456.5	1,698.6	922.9	1901.2	2,028.0
Privatisation Proceeds	133.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FDI Excluding Pvt. Proceeds	5,276.6	3,719.9	2,150.8	1,634.8	820.7	1,456.5	1,698.6	922.9	1901.2	2,028.0

SOURCE: Board of Investment, Pakistan http://boi.gov.pk/ForeignInvestmentinPakistan.aspx

22.6% increase in Net FDI in July-May, 2016-17 as compared to July-May, 2015-16.

Note: Pakistan's Fiscal Year runs from 1st July till 30th June. The figures in brackets are in negative.

4.2.1 Summary of Literature Review and Gaps to be filled by the present study

Numerous studies (national and international) have been discussed in the literature review. The international literature has thrown light on the relationship between sector-wise FDI inflows and sector-wise labor productivity concluding that sector-wise FDI inflows do increase sector-wise labor productivity especially in case of manufacturing and services sectors. Generally, they are in the form of technology transfer, innovation, R & D and an increase in labor productivity but agriculture and related sectors show either no impact or negative because of backwardness and low labor productivity. In the case of Pakistan, most of the studies have emphasized on 'growth' instead of labor productivity. Moreover, the literature has also given a hint that spillovers may exist, i.e., FDI inflows to one sector may lead to an increase in labor productivity in one or more

sectors like in case of developing economies such as Pakistan, agricultural output affects industrial output or productivity by providing inputs for the industrial sector (textile sector is the main sector which is affected by agricultural output).

This study aims to fill the gap by empirically analyzing the impact of sector-wise FDI inflows on sector-wise labor productivity. It also tests the spillover effects empirically through Granger Causality test.

4.3 EMPIRICAL ANALYSIS

The empirical part is divided into three sections. Section 1 deals with data details, empirical model, and hypothesis. Section 2 shows the result of unit root tests. Section 3 is a detailed analysis of panel data models. All panel data models have been applied in order to know that which static panel model suits best to the data being used for this study. The purpose of the detailed analysis is to substantiate the relevance of the model applicable for empirical analysis rather than jumping directly to the empirical model itself. Also, the empirical rationale is shown as to which test is pragmatic and what assumptions it holds. In the end, section 4 shows pair-wise Granger Causality test to see the spillover effects from one sector to another. Section 5 provides a complete interpretation of empirical results.

SECTION- 4.3.1

4.3.1.1 Data details and sources

- Data for FDI inflows has been extracted from World Development Indicators (WDI), World Bank.

UNIT= Current BoP US Dollars

- Data for Sector-wise FDI inflows has been taken from the Handbook of Statistics on Pakistan, chapters 1-2, State Bank of Pakistan and Pakistan Economic Survey (Various issues).

UNIT=Percentage

- Data for sector-wise FDI inflows has been constructed by carrying out various steps. It is represented as value added per hour for each sector. Data for the total labor force is taken from WDI. Distribution of employed persons of 10 years and above by major industries has been taken from Pakistan Economic Survey 2014-15 and 2015-16 (chapter 12).

UNITS = Value added per hour (Million Dollars)

• Data for sector-wise FDI inflows has been taken from the Board of Investment (BOI), Pakistan.
UNITS = Million Dollars

Following abbreviations have been used for presenting data

FDI = FDI Inflows
LPROD = Labor Productivity
AGRI = Agriculture
Manuf = Manufacturing
CONST = Construction
E & G = Electricity and Gas
TRANS = Transport
TRADE = Trade
OTHERS = Others

Following abbreviations have been used for presenting empirical tests

LLU = Levin, Lin & Chu.
IPS = Im, Pearon & Shin.
LSDV = Least Square Dummy Variable.

4.3.1.2 Model and Hypothesis

Model: Relationship between Sector-wise FDI Inflows and Sector-wise LPROD
Hypothesis: sector-wise FDI inflows increase sector-wise LPROD
For this purpose panel models have been applied using seven sectors and their respective labor productivity of Pakistan covering time period of 1997-2016. In all cases LPROD is the dependent variable and INFLOW is the independent variable since the aim is to check whether FDI inflows to each sector increase respective labor productivity or not.

Empirical equation:-
$yit = f(xit) + \mathcal{E}\,it$
Where $\mathcal{E}\,it$ = error term
(To check robustness of results, the model has also been tested other way round)

In case of Wald test and Granger Causality test, variables get automatically inter-changed to check bi-directional causality. Also, Granger Causality test has been applied to empirically check the spillover effects.

The empirical section does not directly jump to panel model, rather all initial steps have been conducted and presented to confirm the reliability of the model for panel data.

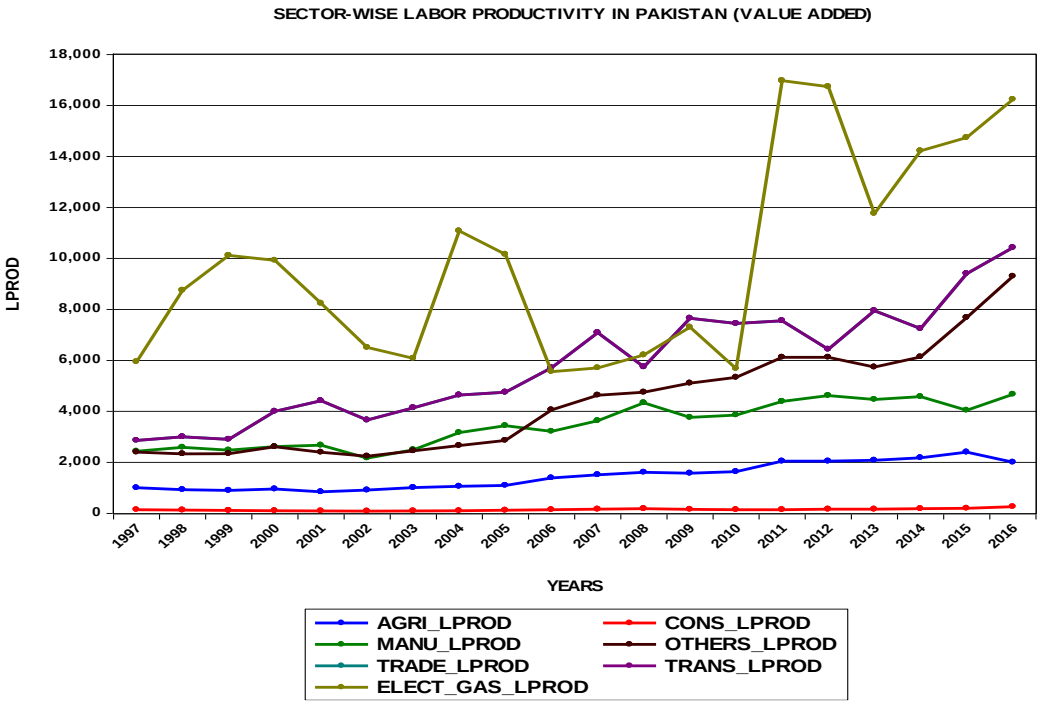
All tests are applied in EVIEWS 9.0.

SECTION- 4.3.2

4.3.2.1Panel Unit Root Tests

The first step in any empirical study is to check the stationarity status of data. Depending on that, further tests are applied. Initially, all series have been presented in graphical form and the results are presented in tabular form. For this purpose, two famous tests are applied for checking unit root, i.e. LLC and IPS. Results and interpretation are presented in table-3.

Graph3.1 SECTOR-WISE LABOR PRODUCTIVITY



Graph3.2 SECTOR-WISE FDI INFLOWS

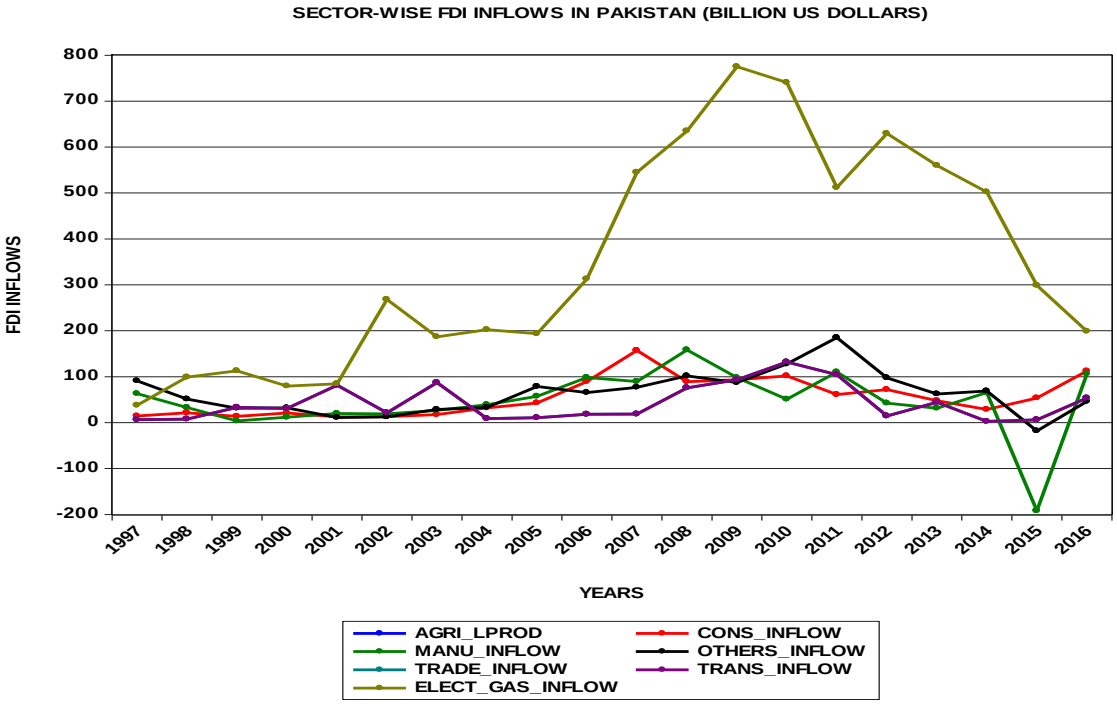


Table3. 3 Panel Unit Root Tests

Method	Levin, Lin & Chu				Im, Pesaran and Shin (IPS)				Order of Integration
Variables	At Level		At First Difference		At Level		At First Difference		
	Intercept	Trend & Intercept	Intercept	Trend & Intercept	Intercept	Trend & Intercept	Intercept	Trend & Intercept	
LPROD	2.11491 (0.9828)	-1.52993* (0.0630)	-7.07647*** (0.0000)	-5.74151*** (0.0000)	3.18318 (0.9999)	-1.46509* (0.0714)	-7.70225*** (0.0000)	-6.25492*** (0.0000)	I(1)
INFLOW	-1.34872 (0.0887)	0.16407 (0.5652)	-4.42893*** (0.0000)	-3.91451*** (0.0000)	-2.31312* (0.0104)	-0.95487 (0.1698)	-5.75636*** (0.0000)	-4.77672*** (0.0000)	I(1)

Source: Author's Estimation based on EViews output

Values in Parenthesis represent Probability values

T-statistic values are taken as absolute values (positive)

***significant at 10%**

**** Significant at 5%**

***** Signficant at 1%**

Levin, Lin & Chu test (LLC, 2002) test has a null hypothesis of unit root which assumes a common unit root whereas, Im, Pearson & Shin test (IPS, 2003) also has the same null hypothesis but this test assumes individual unit root process. According to both tests, series are co-integrated of order 1, i.e., they become stationary at first difference (taking all significance level) which is a necessary condition for Cointegration test.

Before applying panel Cointegration test, it is required to check that which kind of static panel data model is appropriate.

SECTION- 4.3.3

4.3.3.1 Panel Data Models

Three basic panel data models have been applied one by one along with interpretations.

(i) Pooled OLS

Table3. 4 Pooled OLS (empirical results)

Dependent Variable: LPROD **Method: Panel Least Squares** **Assumption: All sectors are same (no individuality)** Sample: 1997 2016 Periods included: 20 Cross-sections included: 7 Total panel (balanced) observations: 140				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	3102.485	327.0495	9.486287	0.0000
INFLOW	9.191757	1.698498	5.411699	**0.0000**
R-squared	0.175068	Mean dependent var		4083.403
Adjusted R-squared	0.169090	S.D. dependent var		3533.585
S.E. of regression	3221.013	Akaike info criterion		19.00696
Sum squared resid	1.43E+09	Schwarz criterion		19.04899
Log likelihood	-1328.487	Hannan-Quinn criter.		19.02404
F-statistic	29.28648	Durbin-Watson stat		0.335267
Prob(F-statistic)	**0.000000**	***DECISION: Inflow is significant but the assumption of no individuality cannot be accepted***		

Source: Author's Estimation based on EViews output

Although results are significant, yet this test is not preferred since it pools all seven sectors and denies the individuality.

(ii) Pooled OLS Vs Fixed effects (F-test)

Now testing that which test is appropriate, fixed effect or pooled Regression Model? Also, is there any requirement for testing a model with heterogeneity? For this purpose, dummy variables are used to estimate the fixed effect model. Since the panel consists of 7 sectors, 7dummy variables are created. The equation to be estimated is

LPROD=C(1)+C(2)*INFLOW+C(3)*D1+C(4)*D2+C(5)*D3
+C(6)*D4+C(7)*D5+C(8)*D6+C(9)*D7

Where LPROD (sector-wise labor productivity) is the dependent variable and INFLOW (sector-wise FDI inflow) is the independent variable.

C(1) is the Coefficient of constant

C(2) is the Coefficient of INFLOW

C(3), C(4), C(5), C(6), C(7), C(8) and C(9) are co-efficient of dummy1, dummy2, dummy3, dummy4, dummy5, dummy 6 and dummy7 respectively.

The null and alternative hypothesis of Panel Least Square model are:
Null: Pooled regression model is appropriate (all dummy variables are zero)

Alternative: Fixed effect model is more appropriate (all dummy variables are not zero)

To check whether all dummy variables are zero or not, the Wald test is used.

Table3. 5 Results of Wald Test (F-statistic)

Wald Test: F-statistic based test			
Test Statistic	Value	df	Probability
F-statistic	**32.31158**	(7, 131)	**0.0000**
Chi-square	226.1811	7	0.0000
Null Hypothesis: C(3)=C(4)=C(5)=C(6)=C(7)=C(8)=C(9)=0			
Null Hypothesis Summary:			
Normalized Restriction (= 0)		Value	Std. Err.
C(3)		-8072.629	2159.858
C(4)		-5910.032	2175.133
C(5)		-9262.234	2077.298
C(6)		22.57162	2055.820
C(7)		-3533.529	2175.990
C(8)		-6024.004	2173.176
C(9)		-5055.283	2171.676

Source: Author's Estimation based on EViews output

Since the Probability value is almost zero, the null hypothesis is rejected and the alternative is accepted, i.e., **Fixed effect model is appropriate according to the F-Statistic model.**

(iii) Pooled Least-square Dummy variable Model

Table3. 6 Results of Pooled LSDV Model (Fixed Effect)

Dependent Variable: LPROD
Method: Panel Least Squares

Sample: 1997 2016
Periods included: 20
Cross-sections included: 7
Total panel (balanced) observations: 140

LPROD=C(1)+C(2)*INFLOW+C(3)*D1+C(4)*D2+C(5)*D3+C(6)*D4+C(7)*D5+C(8)*D6+C(9)*D7

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	9317.984	2139.559	4.355097	0.0000
C(2)	**1.595601**	1.378895	1.157159	0.2493
C(3)	-8072.629	2159.858	-3.737574	0.0003
C(4)	-5910.032	2175.133	-2.717090	0.0075
C(5)	-9262.234	2077.298	-4.458790	0.0000
C(6)	22.57162	2055.820	0.010979	0.9913
C(7)	-3533.529	2175.990	-1.623872	0.1068
C(8)	-6024.004	2173.176	-2.771982	0.0064
C(9)	-5055.283	2171.676	-2.327826	0.0215
R-squared	0.697447	Mean dependent var		4083.403
Adjusted R-squared	0.678971	S.D. dependent var		3533.585
S.E. of regression	2002.109	Akaike info criterion		18.10392
Sum squared resid	5.25E+08	Schwarz criterion		18.29302
Log likelihood	-1258.274	Hannan-Quinn criter.		18.18076
F-statistic	37.74779	Durbin-Watson stat		0.551877
Prob(F-statistic)	0.000000			

Source: Author's Estimation based on EViews output

Since LPROD is the dependent variable, the Coefficient of the independent variable (INFLOW), which is C(2), must be the same for fixed effect model estimation. The highlighted values in red show that in all tests the value of INFLOW Coefficient is same. Which test is more appropriate? The Hausman test clarifies it.

(iv) Fixed effects or Random effects

Now the question is that which test is more appropriate? To find out, the Hausman test is applied.

Table3. 7 Results of Hausman Test

Correlated Random Effects - Hausman Test Test cross-section random effects				
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.	
Cross-section random	4.017557	1	**0.0450**	
Cross-section random effects test comparisons:				
Variable	Fixed	Random	Var(Diff.)	Prob.
INFLOW	**1.596216**	**2.007554**	**0.042115**	**0.0450**

Source: Author's Estimation based on EViews output

Prob. value is significant at the 10 percent level, therefore it can be concluded that the fixed effect Model is more appropriate.

DECISION: Both Hausman test and F-statistic suggest that Fixed Effect Model is appropriate.

Now Cointegration tests are applied to find out whether long-run Cointegration exists or not?

4.3.3.2 Panel Cointegration Tests

Table3. 8 Results of Panel Cointegration test

- ***Pedroni test with Individual intercepts***

Pedroni Residual Cointegration Test
Series: LPROD INFLOW

Sample: 1997 2016
Included observations: 140
Cross-sections included: 7

Null Hypothesis (H_0): No Cointegration between variables.
Alternative Hypothesis (H_1): Cointegration between Variable.

Automatic lag length selection based on SIC with a max lag of 3
Newey-West automatic bandwidth selection and Bartlett kernel

Alternative hypothesis: common AR coefs. (within-dimension)

Test type	Statistic	Prob.	Weighted Statistic	Prob.
Panel v-Statistic	-0.590388	0.7225	-1.295781	0.9025
Panel rho-Statistic	0.542161	0.7061	1.556694	0.9402
Panel PP-Statistic	0.788221	0.7847	1.942475	0.9740
Panel ADF-Statistic	0.779412	0.7821	3.131847	0.9991

Alternative hypothesis: individual AR coefs. (between-dimension)

Test Type Test Type	Statistic	Prob.
Group rho-Statistic	2.789980	0.9974
Group PP-Statistic	3.911325	1.0000
Group ADF-Statistic	4.684392	1.0000

DECISION: Accept H_0 (No Cointegration)

Source: Author's Estimation based on EViews output

- ***Pedroni test with Individual intercepts and trend***

Pedroni Residual Cointegration Test **Series: LPROD INFLOW**				
Sample: 1997 2016 Included observations: 140 Cross-sections included: 7				
Null Hypothesis (H_0): No Cointegration between Variables. **Alternative Hypothesis (H_1): Cointegration between Variables.**				
Automatic lag length selection based on SIC with a max lag of 3 Newey-West automatic bandwidth selection and Bartlett kernel				
Alternative hypothesis: common AR coefs. (within-dimension)				
Test Type	Statistic	Prob.	Weighted Statistic	Prob.
Panel v-Statistic	0.266400	0.3950	2.707674	0.0034**
Panel rho-Statistic	-1.576706	0.0574*	-0.640072	0.2611
Panel PP-Statistic	-2.851450	0.0022**	-2.012096	0.0221*
Panel ADF-Statistic	-2.909437	0.0018**	-2.386335	0.0085**
Alternative hypothesis: individual AR coefs. (between-dimension)				
Test Type	Statistic	Prob.		
Group rho-Statistic	0.616731	0.7313		
Group PP-Statistic	-1.219229	0.1114		
Group ADF-Statistic	-1.810697	0.0351*		
DECISION: Accept H_1 (There is Cointegration)				

Source: Author's Estimation based on EViews output

***significant at 10%**
**** Significant at 5%**
***** Signiant at 1%**

The results indicate that there is long-run Cointegration between sector-wise labor productivity and sector-wise FDI inflows when the test is carried out using both trend and intercept. Out of total 11 outcomes, 7 are significant, therefore, it is concluded that there is a strong evidence of Cointegration. For cross check, now applying Fisher Cointegration Test.

Table3. 9 Johansen Fisher Panel Cointegration Test

- ***Johansen Fisher Panel Cointegration Test (empirical results)***

Series: LPROD INFLOW				
Sample: 1997 2016 Included observations: 140 Trend assumption: Linear deterministic trend (restricted) Lags interval (in first differences): 1 1				
Unrestricted Cointegration Rank Test (Trace and Maximum Eigenvalue)				
Hypothesized	**Fisher Stat.***		**Fisher Stat.***	
No. of CE(s)	(from trace test)	**Prob.**	(from max-eigen test)	**Prob.**
None	25.46	0.0303	27.92	0.0146
At most 1	9.371	0.8066	9.371	0.8066
* Probabilities are computed using asymptotic Chi-square distribution.				

Source: Author's Estimation based on EViews output

Individual cross section results

Cross Section	**Trace Test Statistics**	**Prob.****	**Max-Eign Test Statistics**	**Prob.****
Hypothesis of no Cointegration				
Agri	23.2648	0.1020	15.9062	0.1493
manuf	17.3666	0.3881	14.6940	0.2108
const	21.7021	0.1515	16.9830	0.1080
e&g	27.6196	0.0300	24.4816	0.0083
trans	25.8957	0.0497	16.7830	0.1149
trade	14.5430	0.6126	7.7133	0.8463
others	15.4050	0.5410	13.1481	0.3162
Hypothesis of at most 1 Cointegration relationship				
Agri	7.3587	0.3086	7.3587	0.3086
manuf	2.6726	0.9130	2.6726	0.9130
const	4.7191	0.6371	4.7191	0.6371
e&g	3.1380	0.8597	3.1380	0.8597
trans	9.1128	0.1735	9.1128	0.1735
trade	6.8297	0.3626	6.8297	0.3626
others	2.2569	0.9508	2.2569	0.9508

Source: Author's Estimation based on EViews output

****MacKinnon-Haug-Michelis (1999) p-values**

Fisher test has a Null hypothesis that there is no cointegrated equation (the two variables are not cointegrated). In case of none, both trace test and max eigen value test reject the null hypothesis (the values are highlighted in red). At the most one hypothesis has high probability values (more than 5%) for both trace cointegrated and max eigen value test which leads to the conclusion that there is cointegration between two variables (sector-wise labor productivity and sector-wise FDI inflows are).

4.3.3.3 Panel Vector Error Correction Model

Although the basic model deals with LPROD being a dependent variable but for robustness of test, separate VECM and system equation models are estimated taking INFLOW as a dependent variable.

Table3.10 Results of Panel Vector Error Correction Model (VECM)

- when LPROD is dependent

Vector Error Correction Estimates Sample (adjusted): 2000 2016 Standard errors in ( ) & t-statistics in [ ]		
Cointegrating Eq:	**CointEq1**	
LPROD(-1)	1.000000	
INFLOW(-1)	-74.83640 (20.8250) **[-3.59359]**	
C	4203.830	
Error Correction:	**D(LPROD)**	**D(INFLOW)**
CointEq1	-0.039096 (0.01282) **[-3.05035]**	0.001254 (0.00110) **[1.14450]**
D(LPROD(-1))	-0.245484 (0.08641) **[-2.84080]**	-0.008062 (0.00739) **[-1.09094]**
D(LPROD(-2))	-0.355847 (0.08495) **[-4.18900]**	-0.005610 (0.00726) **[-0.77221]**
D(INFLOW(-1))	-3.756347 (1.44851) **[-2.59324]**	-0.471644 (0.12388) **[-3.80729]**
D(INFLOW(-2))	0.216792 (1.39912) **[0.15495]**	-0.307120 (0.11965) **[-2.56672]**

C	351.5799 (121.786) **[2.88687]**	12.99057 (10.4153) **[1.24726]**
R-squared	0.243475	0.210100
Adj. R-squared	0.210001	0.175149
Sum sq. resids	1.88E+08	1376352.
S.E. equation	1290.479	110.3635
F-statistic	7.273447	6.011222
Log likelihood	-1018.145	-725.5252
Akaike AIC	17.21252	12.29454
Schwarz SC	17.35264	12.43466
Mean dependent	231.6261	8.627731
S.D. dependent	1451.903	121.5172
Determinant resid covariance (dof adj.)		1.96E+10
Determinant resid covariance		1.76E+10
Log likelihood		-1741.524
Akaike information criterion		29.50460
Schwarz criterion		29.83155

Source: Author's Estimation based on EViews output

D (differences represent short-run time period)

VECM shows error-free long-run results for the model. It also estimates short-run relationships. The estimates confirm a long-run relationship between the variables under discussion. But the probability values are not available, for which system equation model is required. Since LPROD is the dependent variable, the first model is the main model of interest. VECM doesn't show probability values, therefore, construction of system equation model is required to get probability values.

Table3.11 Results of System Equation Model

- Taking LPROD as dependent variable

Estimation Method: Panel Least Squares Sample: 2000 2016 Included observations: 119 Total system (balanced) observations 238 **Equation: D(LPROD) = C(1)*(LPROD(-1) - 74.8363953179*INFLOW(-1) + 4203.8300597) + C(2)*D(LPROD(-1)) + C(3)*D(LPROD(-2)) + C(4) *D(INFLOW(-1)) + C(5)*D(INFLOW(-2)) + C(6)**				
	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	**-0.039096**	0.012817	**-3.050354**	**0.0026****
C(2)	-0.245484	0.086414	-2.840799	**0.0049****
C(3)	-0.355847	0.084948	-4.188996	**0.0000****
C(4)	-3.756347	1.448514	-2.593242	**0.0101***
C(5)	0.216792	1.399120	0.154949	0.8770
C(6)	351.5799	121.7859	2.886868	**0.0043****
C(7)	0.001254	0.001096	1.144501	0.2536
C(8)	-0.008062	0.007390	-1.090941	0.2765
C(9)	-0.005610	0.007265	-0.772207	0.4408
C(10)	-0.471644	0.123879	-3.807294	**0.0002****
C(11)	-0.307120	0.119655	-2.566724	**0.0109****
C(12)	12.99057	10.41530	1.247258	0.2136
Determinant residual covariance 1.76E+10				
Observations: 119				
R-squared	0.243475	Mean dependent var		231.6261
Adjusted R-squared	0.210001	S.D. dependent var		1451.903
S.E. of regression	1290.479	Sum squared resid		1.88E+08
Durbin-Watson stat	2.162215			
Equation: D(INFLOW) = C(7)*(LPROD(-1) - 74.8363953179*INFLOW(-1) + 4203.8300597) + C(8)*D(LPROD(-1)) + C(9)*D(LPROD(-2)) + C(10) *D(INFLOW(-1)) + C(11)*D(INFLOW(-2)) + C(12) Observations: 119				
R-squared Adjusted R-squared	0.210100 0.175149	Mean dependent var S.D. dependent var		8.627731 121.5172
S.E. of regression Durbin-Watson stat	110.3635 1.828057	Sum squared resid		1376352.

Source: Author's Estimation based on EViews output

***Significant at 10%**

****Significant at 5%,**

***** Significant at 1%**

C(1) = Error Correction Term or speed of adjustment towards long-run equilibrium

Since C(1) is negative and significant, it can be concluded that there is a long-run causality running from the independent variable (sector-wise FDI

inflows) to the dependent variable (sector-wise labor productivity). Or in simple words, an increase in sector specific FDI inflows leads to an increase in labor productivity working in that specific sector. This model explains long-run causality which has already been established.

- When INFLOW is a dependent variable

Table3.12 Results of Panel Vector Error Correction Model (VECM)

Vector Error Correction Estimates Sample (adjusted): 2000 2016 Included observations: 119 after adjustments Standard errors in ( ) & **t-statistics in [ ]**		
Cointegrating Eq:	**CointEq1**	
INFLOW(-1)	1.000000	
LPROD(-1)	-0.013362 (0.01282) **[-1.04245]**	
C	-56.17360	
Error Correction:	**D(INFLOW)**	**D(LPROD)**
CointEq1	-0.093882 (0.08203) **[-1.14450]**	2.925767 (0.95916) **[3.05035]**
D(INFLOW(-1))	-0.471644 (0.12388) **[-3.80729]**	-3.756347 (1.44851) **[-2.59324]**
D(INFLOW(-2))	-0.307120 (0.11965) **[-2.56672]**	0.216792 (1.39912) **[0.15495]**
D(LPROD(-1))	-0.008062 (0.00739) **[-1.09094]**	-0.245484 (0.08641) **[-2.84080]**
D(LPROD(-2))	-0.005610 (0.00726) **[-0.77221]**	-0.355847 (0.08495) **[-4.18900]**
C	12.99057 (10.4153) **[1.24726]**	351.5799 (121.786) **[2.88687]**
R-squared	0.210100	0.243475
Adj. R-squared	0.175149	0.210001
Sum sq. resids	1376352.	1.88E+08
S.E. equation	110.3635	1290.479
F-statistic	6.011222	7.273447
Log likelihood	-725.5252	-1018.145
Akaike AIC	12.29454	17.21252

Schwarz SC	12.43466	17.35264
Mean dependent	8.627731	231.6261
S.D. dependent	121.5172	1451.903
Determinant resid covariance (dof adj.)		1.96E+10
Determinant resid covariance		1.76E+10
Log likelihood		-1741.524
Akaike information criterion		29.50460
Schwarz criterion		29.83155

Source: Author's Estimation based on EViews output

D (differences represent short-run time period)

Again constructing system equation model for obtaining probability values.

Table3.13 Results of System Equation Model

Estimation Method: Least Squares Sample: 2000 2016 Included observations: 119 Total system (balanced) observations 238 **Equation: D(INFLOW) = C(1)*(INFLOW(-1) - 0.0133624821954*LPROD(-1) - 56.1736043251) + C(2)*D(INFLOW(-1)) + C(3)*D(INFLOW(-2)) + C(4) *D(LPROD(-1)) + C(5)*D(LPROD(-2)) + C(6)**				
	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	**-0.093882**	0.082028	-1.144501	**0.2536**
C(2)	-0.471644	0.123879	-3.807294	**0.0002****
C(3)	-0.307120	0.119655	-2.566724	**0.0109***
C(4)	-0.008062	0.007390	-1.090941	0.2765
C(5)	-0.005610	0.007265	-0.772207	0.4408
C(6)	12.99057	10.41530	1.247258	0.2136
C(7)	2.925767	0.959157	3.050354	**0.0026****
C(8)	-3.756347	1.448514	-2.593242	**0.0101***
C(9)	0.216792	1.399120	0.154949	0.8770
C(10)	-0.245484	0.086414	-2.840799	**0.0049****
C(11)	-0.355847	0.084948	-4.188996	**0.0000*****
C(12)	351.5799	121.7859	2.886868	0.0043
Determinant residual covariance		1.76E+10		
Observations: 119				
R-squared	0.210100	Mean dependent var		8.627731
Adjusted R-squared	0.175149	S.D. dependent var		121.5172
S.E. of regression	110.3635	Sum squared resid		1376352.
Durbin-Watson stat	1.828057			
Equation: D(LPROD) = C(7)*(INFLOW(-1) - 0.0133624821954*LPROD(-1) -				

56.1736043251) + C(8)*D(INFLOW(-1)) + C(9)*D(INFLOW(-2)) + C(10) *D(LPROD(-1)) + C(11)*D(LPROD(-2)) + C(12)			
Observations: 119			
R-squared	0.243475	Mean dependent var	231.6261
Adjusted R-squared	0.210001	S.D. dependent var	1451.903
S.E. of regression	1290.479	Sum squared resid	1.88E+08
Durbin-Watson stat	2.162215		

Source: Author's Estimation based on EViews output

***Significant at 10%**
****Significant at 5%**
***** Signiant at 1%**

C(1) = Error Correction Term or speed of adjustment towards long-run equilibrium
Since C(1) is negative though insignificant, it cannot be concluded that there is a long-run causality running from the dependent variable (sector-wise FDI inflows) to independent variable (sector-wise labor productivity). Therefore there is one-way causality which is the main model i.e., sector-wise labor productivity is affected by sector-wise FDI inflows. Now checking short-run causality through the Wald Test.

4.3.3.4 Wald Test

- when LPROD is dependent

Table3.14 Results of Panel Wald Test (estimating short-run causality)

C(4)= coefficient of inflow (-1)

C(5)= coefficient of inflow (-2)

Null Hypothesis states that C(4)=C(5)=0 which means that C(4) and C(5), jointly are zero.

Wald Test:			
Test Statistic	Value	df	**Probability**
Chi-square	9.551606	2	**0.0084**
Null Hypothesis: C(4)=C(5)=0 Null Hypothesis Summary:			
Normalized Restriction (= 0)		Value	Std. Err.
C(4)		-3.756347	1.448514
C(5)		0.216792	1.399120
Restrictions are linear in coefficients			

Source: Author's Estimation based on EViews output

Since the probability is less than 5 percent, Null hypothesis can be rejected. There exists a short-run causality from independent variable (sector-wise FDI inflows) to dependent variable (sector-wise labor productivity)

- When INFLOW is a dependent variable

C(10)= coefficient of lPROD (-1)

C(11)= coefficient of LPROD (-2)

Null Hypothesis states that C(10)=C(11)=0 which means that C(10) and C(11), jointly are zero.

Table3.15 Results of Panel Wald Test (estimating short-run causality)

Wald Test:			
Test Statistic	Value	df	**Probability**
Chi-square	21.79722	2	**0.0000**
Null Hypothesis: C(10)=C(11)=0 Null Hypothesis Summary:			
Normalized Restriction (= 0)		Value	Std. Err.
C(10)		-0.245484	0.086414
C(11)		-0.355847	0.084948
Restrictions are linear in coefficients			

Source: Author's Estimation based on EViews output

In this case too, as the probability is less than 5 percent, the Null hypothesis can be rejected. There exists a short-run causality from independent variable (sector-wise labor productivity) to the dependent variable (sector-wise FDI-inflows).

The **overall conclusion** suggested by the empirical analysis proves that the random effect or LSDV model is the most appropriate model for the data. Unit root tests suggest that all variables become stationary at first difference i.e., I (1). Pedroni and Fisher panel Cointegration models show that there exists a long-run Cointegration between variables. The same is supported by VECM. System equation model shows that the independent variable has a long-run causality on the dependent variable, whereas, Wald test provides a strong evidence of short-run causality between independent and dependent variables.

SECTION- 4.3.4

This section deals with an extended segment of empirical part based on spillover effects suggested in literature review. Some studies have suggested that there exists spillover effects in the form of one sector affecting the other; both in case of FDI inflows and labor productivity. For empirically testing spillover effects, pair-wise Granger Causality test is applied. This part also adds further to the innovative contribution of the present study. Test has been carried out both at level and at first difference.

Table3.16 PAIRWISE GRANGER CAUSALITY TEST AT LEVEL

DIRECTION OF CAUSALITY	F-Statistic	Prob.	STRENGTH OF CAUSALITY
AGRI_LPROD → AGRI_INFLOW	6.80832	0.0095**	**Strong Causality**
CONS_LPROD →AGRI_INFLOW	16.9054	0.0002**	**Strong Causality**
ELECT_GAS_LPROD →AGRI_INFLOW	4.15488	0.0403*	Weak Causality
MANU_INFLOW →AGRI_INFLOW	4.03740	0.0433*	Weak Causality
MANU_LPROD →AGRI_INFLOW	5.91312	0.0149*	Weak Causality
OTHERS_INFLOW →AGRI_INFLOW	7.42717	0.0071**	**Strong Causality**
OTHERS_LPROD →AGRI_INFLOW	8.85650	0.0037**	**Strong Causality**
TRADE_LPROD →AGRI_INFLOW	3.80538	0.0500*	Weak Causality
AGRI_INFLOW →TRADE_LPROD	3.14026	0.0772*	Weak Causality
TRANS_LPROD →AGRI_INFLOW	3.80538	0.0500*	Weak Causality
AGRI_INFLOW →TRANS_LPROD	3.14026	0.0772*	Weak Causality
AGRI_LPROD →CONS_INFLOW	2.84937	0.0942*	Weak Causality
AGRI_LPROD →CONS_LPROD	4.24308	0.0382*	Weak Causality

ELECT_GAS_INFLOW →AGRI_LPROD	2.96506	0.0869*	Weak Causality
MANU_INFLOW →AGRI_LPROD	3.59211	0.0573*	Weak Causality
AGRI_LPROD →MANU_INFLOW	2.85021	0.0941*	Weak Causality
MANU_LPROD →AGRI_LPROD	2.77625	0.0991*	Weak Causality
AGRI_LPROD →MANU_LPROD	4.10974	0.0414*	Weak Causality
OTHERS_INFLOW →AGRI_LPROD	7.18636	0.0079**	**Strong Causality**
TRADE_LPROD →AGRI_LPROD	4.11145	0.0413*	Weak Causality
TRANS_LPROD →AGRI_LPROD	4.11145	0.0413*	Weak Causality
CONS_INFLOW →CONS_LPROD	3.21053	0.0736*	Weak Causality
CONS_INFLOW →ELECT_GAS_INFLOW	7.52173	0.0068**	**Strong Causality**
CONS_INFLOW →MANU_INFLOW	3.23694	0.0723*	Weak Causality
CONS_INFLOW →MANU_LPROD	3.72899	0.0525*	Weak Causality
CONS_INFLOW →OTHERS_INFLOW	4.44847	0.0337*	Weak Causality
OTHERS_LPROD →CONS_INFLOW	9.90378	0.0024**	**Strong Causality**
MANU_INFLOW →CONS_LPROD	5.16748	0.0223*	Weak Causality
OTHERS_LPROD →CONS_LPROD	9.94203	0.0024**	Weak Causality
TRADE_LPROD →CONS_LPROD	11.9232	0.0011**	**Strong Causality**
TRANS_LPROD →CONS_LPROD	11.9232	0.0011**	**Strong Causality**
ELECT_GAS_INFLOW →ELECT_GAS_LPROD	9.45353	0.0029**	**Strong Causality**
MANU_INFLOW →ELECT_GAS_INFLOW	4.26847	0.0376*	Weak Causality
ELECT_GAS_INFLOW →TRADE_INFLOW	3.88697	0.0475*	Weak Causality
ELECT_GAS_INFLOW →TRANS_INFLOW	3.88697	0.0475*	Weak Causality
ELECT_GAS_LPROD →OTHERS_INFLOW	2.87770	0.0923*	Weak Causality
MANU_INFLOW →OTHERS_INFLOW	8.17106	0.0050**	**Strong Causality**
MANU_INFLOW →TRADE_INFLOW	3.31218	0.0688*	Weak Causality
OTHERS_LPROD →MANU_LPROD	4.75293	0.0282*	Weak Causality
TRADE_LPROD →MANU_LPROD	7.16874	0.0080**	**Strong Causality**
TRANS_LPROD →MANU_LPROD	7.16874	0.0080**	**Strong Causality**
OTHERS_INFLOW →OTHERS_LPROD	4.86832	0.0264*	Weak Causality
TRADE_INFLOW →TRADE_LPROD	3.45733	0.0625*	Weak Causality
TRADE_INFLOW →TRANS_LPROD	3.45733	0.0625*	Weak Causality
TRANS_INFLOW →TRADE_LPROD	3.45733	0.0625*	Weak Causality
TRANS_INFLOW →TRANS_LPROD	3.45733	0.0625*	Weak Causality

Source: Author's Estimation based on EViews output

***Significant at 10%**
****Significant at 5%,**
***** Significant at 1%**

The Test has been conducted using 2 Lags and 18 observations

Strong or weak causality is based on the level of significance. 5% and 1% level represent strong causality where 10% represents weak causality.

The results can be explained with the help of some causality relationships.

AGRI_LPROD → AGRI_INFLOW shows strong causality which means that a high labor productivity in agriculture sector causes high FDI inflows in the same sector.

Similarly, CONS_LPROD →AGRI_INFLOW shows that labor productivity in construction sector has strong causality with high FDI inflows in agriculture sector, i.e. agriculture sector attracts high FDI inflows because of high labor productivity in construction sector. This causality may be due to various factors; if labor is productive in construction sector, it may lead to better infrastructure connecting both agricultural areas to commercial areas which not only provides better quality of inputs but at a fast pace. In addition, the storage places for output can be easily reached if there are good infrastructure facilities.

Many spillover effects work in different ways, benefitting either in the form of an increase in productivity or assist in attracting more FDI inflows.

Table3.17 PAIRWISE GRANGER CAUSALITY TEST AT FIRST DIFFERENCE

DIRECTION OF CAUSALITY	F-Statistic	Prob.	STRENGHT OF CAUSALITY
DCONS_LPROD →DAGRI_INFLOW	4.61474	0.0326*	Weak Causality
DELECT_GAS_LPROD →DAGRI_INFLOW	3.44244	0.0658*	Weak Causality
DAGRI_INFLOW →DMANU_LPROD	8.54178	0.0049**	**Strong Causality**
DOTHERS_INFLOW →DAGRI_INFLOW	9.27609	0.0037**	**Strong Causality**
DTRADE_INFLOW →DAGRI_INFLOW	3.14080	0.0800*	Weak Causality
DAGRI_INFLOW →DTRADE_LPORD	4.13372	0.0431*	Weak Causality
DTRANS_INFLOW →DAGRI_INFLOW	3.14080	0.0800*	Weak Causality
DAGRI_INFLOW →DTRANS_LPROD	4.13372	0.0431*	Weak Causality
DOTHERS_INFLOW →DAGRI_LPROD	4.29300	0.0392*	Weak Causality
DCONS_INFLOW →DMANU_INFLOW	7.53099	0.0076**	**Strong Causality**
DCONS_INFLOW →DMANU_LPROD	3.38722	0.0682*	Weak Causality
DOTHERS_LPROD →DCONS_INFLOW	8.40304	0.0052**	**Strong Causality**

DELECT_GAS →DCONS_LPROD	3.67455	0.0569*	Weak Causality
DMANU_INFLOW →DCONS_LPROD	4.27188	0.0397*	Weak Causality
DOTHERS_LPROD →DCONS_LPROD	4.13602	0.0430*	Weak Causality
DTRADE_LPORD →DCONS_LPROD	9.54526	0.0033**	**Strong Causality**
DTRANS_LPROD →DCONS_LPROD	9.54526	0.0033**	**Strong Causality**
DELECT_GAS →DELECT_GAS_LPROD	3.56908	0.0608*	Weak Causality
DMANU_INFLOW →DELECT_GAS	3.61941	0.0589*	Weak Causality
DMANU_INFLOW →DELECT_GAS_LPROD	4.64914	0.0320*	Weak Causality
DMANU_LPROD →DELECT_GAS_LPROD	5.93716	0.0161*	Weak Causality
DMANU_INFLOW →DOTHERS_INFLOW	2.93467	0.0917*	Weak Causality
DTRADE_LPORD →DMANU_LPROD	3.13544	0.0803*	Weak Causality
DTRANS_LPROD →DMANU_LPROD	3.13544	0.0803*	Weak Causality

Source: Author's Estimation based on EViews output

***Significant at 10%**
****Significant at 5%,**
***** Significant at 1%**

The Test has been conducted using 2 Lags and 18 observations

D represents Difference

Strong or weak causality is based on level of significance. 5% and 1% level represent strong causality where as 10% represents weak causality.

Granger Causality test suggests the existence of spillover effects both in case of labor productivity and FDI inflows.

4.4 Interpretation of Empirical Results

According to panel unit root tests, all series become stationary at first difference having the same order of integration, i.e., I(1). Panel data models reveal that the most appropriate model is fixed effects models (LSDV). Same order of integration leads to the application of Cointegration tests for checking long-run relationship. For this purpose, Pedroni test and Johansen Fisher Panel Cointegration tests are applied. Evidence of Cointegration takes the empirical analysis to the application of Panel vector error correction model. For testing short-run relationship, Wald test is applied which shows that a uni-directional short-run causality exists running from sector-wise labor productivity to sector-wise FDI inflows. The pair-wise Granger Causality test shows a broader picture, i.e., there exist spillover effects both in case of FDI inflows and labor productivity in all sectors, although in some cases, there is weak causality, yet it cannot be ignored.

4.5 CONCLUSION AND POLICY RECOMMENDATIONS

In this study, an empirical analysis has been carried out to analyze the relationship between sector-wise FDI inflows and respective sector labor productivity in case of Pakistan. A panel of seven major sectors of the economy has been made for which the results confirm that sector-wise FDI inflows increase respective sector-wise labor productivity. Moreover, the evidence of spillover effects from one sector to another has been found through Granger Causality test.

Amongst the three sectors, agriculture is the most backward sector while industrial and services sectors (including their sub-sectors) attract more FDI inflows and consequently labor productivity of these sectors also increases on account of technology transfer, innovation and R & D. However in comparison to industrial and services sectors, agriculture sector, on account of its inherent weaknesses caused by continuous fragmentation of land holdings, non-adoption of modern technologies due to lack of resources as well as awareness, does not attract substantial FDI and consequently remains deprived of higher labor productivity despite this sector's contribution of more than 21 percent to national GDP and absorption of 44 percent of entire labor force (Pakistan Economic Survey, 2015-16). Not only this, 66 percent of Pakistan's exports and the major portion of services sector (transport, wholesale, trading etc.) are directly related to agriculture sector. Textile is the largest industrial sector of Pakistan and it is dependent on the cotton crop grown in the country and further textile products like yarn, fabrics, bed sheets, towels and garments etc. are related with cotton. Therefore, the Pakistani leadership has to accept agriculture to be the growth engine for the economic development of Pakistan and the prosperity of its people and to invest more, both internally as well as through international resources for not only increasing the average per acre yield but also to enhance the productivity of the labor employed in this sector. Pakistan has to transform its agriculture, presently at the subsistence level, to suit the requirements of the market economy.

REFERNCES

Alam, A., C.P. Anós, F. Khan and C. Udomsaph. (2008). Unleashing prosperity: Productivity growth in Eastern Europe and the former Soviet Union. Washington, DC: World Bank. © *World Bank. License: Creative Commons Attribution CC BY 3.0 IGO.* Retrieved: https://openknowledge.worldbank.org/handle/10986/6588

Alam, A., Arshad, M. U., & Rajput, W. (2013). Relationship of Labor Productivity, Foreign Direct Investment and Economic Growth: Evidence from OECD Countries. *Journal of Business and Management Sciences*, *1*(6), 133-138.

Azeroual, M. (2016).The Impact of Foreign Direct Investment on the Productivity Growth in the Moroccan Manufacturing Sector: Is Source of FDI important? *Azeroual, Journal of International and Global Economic Studies, 9(1),* 29-45.

Bang, T., Gangnes, V. B., & Noy, I. (2007). Is Foreign Direct Investment Good for Growth? Evidence from Sectoral Analysis of China and Vietnam. *(No. 07-17). Working Papers, Santa Cruz Center for International Economics.*

Bijsterbosch, M., & Kolasa, M. (2010). FDI and productivity convergence in Central and Eastern Europe: an industry-level investigation. *Review of World Economics*, *145*(4), 689-712.

Contessi, S., & Weinberger, A. (2009). Foreign direct investment, productivity, and country growth: an overview. *Federal Reserve Bank of St. Louis Review*, *91*(2), 61-78.

Country-Wise FDI inflows, *Board of Investment, Government of Pakistan*. Retrieved July, 4th, 2017, from
http://boi.gov.pk/ForeignInvestmentinPakistan.aspx

Dürnel, J. C. (2012). The Effects of Foreign Direct Investment on Turkish Economy.

Fillat, C., & Woerz, J. (2011). Good or bad? The influence of FDI on productivity growth. An industry-level analysis. *The Journal of International Trade & Economic Development*, *20*(3), 293-328.

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.

Ilboudo, P. S. (2014). Foreign Direct Investment and Total Factor Productivity in the Mining Sector: the Case of Chile. *Economics Honors Papers. 18*.

LINK:https://pdfs.semanticscholar.org/aea8/39ad18c51d104ff85def2985504ede082b77.pdf

Im, K. S., Pesaran, M. H., & Shin, Y. (2003). Testing for unit roots in heterogeneous panels. *Journal of econometrics*, *115*(1), 53-74.

Johnson, A. (2005). Host country effects of foreign direct investment: The case of developing and transition economies (*Doctoral dissertation, Jönköping International Business School).*

Kasi, N., and M, Zafar. (2016). Horizontal and Vertical spillover effects on sectoral productivity in selected SAARC country. *S³H Working Paper Series No. 8, NUST, Islamabad*.

LINK: https://www.coursehero.com/file/23828365/Noreen-08-16/

Khan, M. A. (2011). Foreign direct investment in Pakistan: The role of international political relations. *University of Oxford, Department of International Development, ISSN*, 2045-5119. *TMD Working Paper Series, No. 38,* 1-59.

LINK:http://www.oxfordtmcd.org/sites/www.tmd-oxford.org/files/SLPTMD-WP-039.pdf

Khan, M. A., & Khan, S. A. (2011). Foreign direct investment and economic growth in Pakistan: A sectoral analysis. *Working Papers & Research Reports*, *2011*.

Kirti, R., & Prasad, S. (2016). FDI Impact on Employment Generation and GDP Growth in India. *Asian Journal of Economics and Empirical Research*, *3*(1), 40-48.

Kurtishi-Kastrati, S. (2013). The effects of foreign direct investments for host country's economy. *European Journal of Interdisciplinary Studies*, *5*(1), 26.

Maathai, K.M. and D. Sahoo, 2008. Do foreign direct investment inflows benefit the major sectors in India? *ISAS Working Paper No. 38, National University of Singapore, 1-25.*

LINK: http://citeseerx.ist.psu.edu/viewdoc/summary?doi=10.1.1.604.7711

MacKinnon, J. G. (1990). *Critical values for Cointegration tests* (pp. pp-267). San Diego: Department of Economics, University of California.

Mallick, J. (2013). Globalization and Labor Productivity in OECD Regions. In *Faculty of Economics and Administration, Paper prepared for "Regional Development Conference" May*.

Mallick, J. (2015). *Globalisation, Structural Change and Labor Productivity Growth in BRICS Economy* (No. 141). FIW Working Paper.

Morrar, R., & Gallouj, F. (2016). The growth of the service sector in Palestine: the productivity challenge. *Journal of Innovation Economics & Management*, (1), 179-204.

Msuya, E. (2007). The impact of foreign direct investment on agricultural productivity and poverty reduction in Tanzania. *Munich Personal RePEc Archive, 1-15.* Available at https://mpra.ub.uni-muenchen.de/3671/

Pakistan Economic Survey. (2015-16). Ministry of Finance, Government of Pakistan, Retrieved July, 15th, 2017, from
http://www.finance.gov.pk/survey/chapters_16/02_Agriculture.pdf

Park, D., & Shin, K. (2012). The service sector in Asia: Is it an engine of growth? *Asian Development Bank Working Paper Series No. 322.*

LINK: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2198154

Sahoo, P. (2006). Foreign direct investment in South Asia: Policy, trends, impact and determinants (No. 56). *ADB Institute Discussion Papers.*

Serfraz, A. (2017). Analyzing short-run and long-run causality between FDI flows, labor productivity and education in Pakistan (No. 61). *Discussion Papers, Zentrum für Ökonomische und Soziologische Studien.*

Slimane, M.B., M. Huchet-Bourdon & Zitouna, H. (2013). Direct and indirect effects of FDI on food security: A sectoral approach. *Workshop MAD Macroeconomics of Agriculture and Development*-What Challenges Food Security? pp: 27.
LINK: https://hal.archives-ouvertes.fr/hal-01189920/document

Suleman, M. T., & Amin, M. T. (2015). The Impact of Sectoral Foreign Direct Investment on Industrial Economic Growth of Pakistan. *Journal of Management Sciences*, *2*(1), 102-23.

Thangavelu, S. M., Ing, L. Y., & Urata, S. (2015). Services Productivity and Trade Openness: Case of ASEAN. *ERIA Discussion Paper*, *56*.

Thuy, L. T. (2007). Does Foreign Direct Investment Have an Impact on the Growth in Labor Productivity of Vietnamese Domestic Firms? *Faculty of International Economics and Business, Hanoi Foreign Trade University, Hanoi, Vietnam, March*.

Ullah, A., Khan, M. U., Ali, S., & Hussain, S. W. (2012). Foreign direct investment and sectoral growth of Pakistan economy: Evidence from agricultural and industrial sector (1979 to 2009). *African Journal of Business Management*, *6*(26), 7816.

Vu, T. B., & Noy, I. (2009). Sectoral analysis of foreign direct investment and growth in the developed countries. *Journal of International Financial Markets, Institutions and Money*, *19*(2), 402-413.

Yusuf, S. (2013). Can Chinese FDI Accelerate Pakistan's Growth? *International Growth Centre*, *4*, 1-46.

5 OVERALL CONCLUSION

5.1 The Results

As it has been mentioned earlier that in this dissertation, an empirical analysis of the impacts of FDI inflows on the economy of Pakistan has been undertaken along with identifying hurdles in the way of foreign investment; what kind of benefits are being enjoyed? And what are the disadvantages of FDI inflows? Moreover, three individual papers have been written to analyze the relationship amongst variables. In addition, many questions arose during the discussion of literature and many new things came to surface. Also, the connecting link among three papers has also been mentioned in the earliest part of the dissertation.

The first paper uses time series data of Pakistan covering a period of 1989 – 2016 and it empirically analyzes the relationship between FDI inflows and economic growth of Pakistan in the light of sectarian terrorism. The study concludes that FDI inflows lead to an increase in economic growth but this relationship is affected by sectarian terrorism in Pakistan. A detailed discussion of results is presented in the conclusion section of the individual paper.

The second paper uses a new empirical technique to find whether FDI inflows increase labor productivity in Pakistan or not? The empirical findings of BC test suggest that FDI inflows increase labor productivity in Pakistan, whereas no causality has been observed between education and productivity. However, the relationship is evident in the case of Johansen Cointegration test. The difference in results may be due to the difference in approach, yet the results of Cointegration test cannot be ignored and it can be concluded that FDI inflows affect labor productivity and that the labor productivity also gets affected by education in case of Pakistan. This is consistent with the actual scenario of Pakistan. The Government of Pakistan is hardly spending 2 percent of GDP (on average) on education. A large number of teenagers are out of schools. Labor, though abundant, but on account of being unskilled, and mostly illiterate, they do not get jobs in the organizations set up by MNCs as a result of FDI. In Pakistan, different systems of education are in vogue simultaneously i.e. Religious schools called Madrasas, government schools and private institutions. Religious schools are managed by NGOs and most are run by contributions from the community and children of lower strata of the society seek admission in such institutions where religious education is free. Most of the government

schools charge nominal fees but lack proper facilities and are generally considered to be of low quality. There is a mushroom growth of private educational institutions but those are invariably very costly which a common man cannot afford. In the recent past, technical and vocational institutions have come up, both in the public and some in the private sector. The institutions in the private sector, being costly, are beyond the reach of a common man. On account of paucity of funds as well as the scarcity of trained staff and equipment, the institutions in the public sector are still far away from catering to the requirements of the project's set-up by the foreign investors.

The third paper carries out an empirical analysis to analyze the relationship between sector-wise FDI inflows and respective sector labor productivity in case of Pakistan. A panel of seven major sectors of the economy has been made for which the results confirm that sector-wise FDI inflows increase respective sector labor productivity. Moreover, the evidence of spillover effects from one sector to another has been found through Granger Causality test. The spillover effects can be explained with the help of one causality relationship which shows that an increase in labor productivity in the construction sector has strong causality with high FDI inflows in the agriculture sector, i.e. agriculture sector attracts high FDI inflows because of high labor productivity in the construction sector. This causality may be due to various factors; if labor is productive in the construction sector, it may lead to better infrastructure connecting both agricultural areas to commercial areas which not only provides a better quality of inputs but at a fast pace also. In addition, the storage places for output can be easily reached if there are good infrastructure facilities. This has also been explained in the third paper.

While a comparison of the three sectors shows that agriculture is the most backward sector while industrial and services sectors (including their sub-sectors) attract more FDI inflows and consequently labor productivity of these sectors also increases on account of technology transfer, innovation, and R & D. However in comparison to industrial and services sectors, agriculture sector, due to its inherent weaknesses caused by continuous fragmentation of land holdings, non-adoption of modern technologies due to lack of resources as well as awareness, does not attract substantial FDI and consequently remains deprived of higher labor productivity despite this sector's contribution of more than 21 percent to national GDP and absorption of 44 percent of entire labor force.

5.2 The future/policy recommendations

Before presenting an overall future scenario, a short review/policy recommendations of individual papers are discussed.

In case of paper one, both the empirical findings and theoretical discussion lead to the same conclusion i.e., economic growth rate increases as a result of an increase in FDI inflows but sectarian terrorism acts as an obstacle. Nonetheless, presently terrorist activities have been controlled in Pakistan after the Military Operation of Zarb-e-Azab. This is also evident from CPEC which is one of the biggest investment in Pakistan being carried out by China, but the impact of Zarb-e-Azab on terrorism in Pakistan and the effects of CPEC cannot be tested empirically as both these plans are ongoing and started recently. Also, there is no long-run or enough data which could be used for carrying out empirical analysis. Although there are many theoretical studies on both topics but long-run empirical study can be conducted only after some years when the effects are clearer and ample data is available for empirical analysis. *(Paper 1*)

In addition, if Government of Pakistan wants to achieve maximum gains from FDI, it must allocate proper funds to education sector that can allow an unskilled worker to convert into a human resource, which also acts like capital for any economy. For education to become a source of an increase in productivity, the same level of education is required in government schools as it is being offered by private institutions. Moreover, proper planning is required keeping in view the economic development plans for the future, say 25 years, so that the required number of educated and professionally trained personnel are available for each sector of the economic development plan. While preparing the economic development plan for future, the estimated inflow of FDI has to be figured in, including the possible sectors and sub-sectors which would be attracting FDI inflows making it possible to estimate the productivity level and to prepare the education plan accordingly so that the required number of educated and skilled workforce is available. *(Paper 2)*

Regarding the sectoral discussion, the agriculture sector not only contributes more than 21 percent to national GDP and absorbs 44 percent of the entire labor force but also provides substantial support (up to 66 percent) to Pakistan's exports and to services sector in the form of transport, wholesale, trading etc. Since Textile is the largest industrial sector of Pakistan and it is dependent on the cotton crop being grown (agricultural output) in the country and further textile products like yarn, fabrics, bed sheets, towels and garments etc., mechanization of agriculture sector will not only increase agriculture output and labor productivity in the respective sector, but spillovers' will also lead to a stronger industrial sector.

Therefore, the Pakistani leadership has to accept agriculture to be the growth engine for the economic development of Pakistan and the prosperity of its people and to invest more, both internally as well as through international resources for not only increasing the average per acre yield but also to enhance the productivity of the labor employed in this sector. Pakistan has to transform its agriculture, presently at the subsistence level, to suit the requirements of the market economy. *(Paper 3)*

The future research needs to be carried out to have an empirical analysis, both on the impact of Military operation 'Zarb-e-Azab' in controlling Sectarian terrorism and of investment through CPEC on Sectoral productivity by way of enhancement of productivity in the respective sectors in which CPEC investment took place. The future research also needs to look into the number of skilled and trained work-force provided by Pakistan in the CPEC projects as a result of better investment in education sector. Lastly, it needs to be looked into whether the Government of Pakistan has paid due attention to agriculture by way of investment, both internally and externally, for transforming the subsistence level agriculture to market economy agriculture, by creating an export surplus.

Now the present Government of Pakistan under Prime Minister Imran Khan has given the mandate to work on all issues mentioned in the individual papers of cumulative dissertation. There is a lot of potential for future research related to sectarianism, education, labor productivity, sectoral productivity, and especially the focus of dissertation; FDI INFLOWS in Pakistan, since the new government has given priority to take measures for attracting FDI inflows. For this purpose, education, health, terrorism, international relations, tourism, exports, monetary and fiscal policies have been kept above construction of roads and metro lines, which have been a focus of previous government for a long time period. If these commitments are fulfilled to a reasonable extent, the whole scenario may change and Pakistan may face a stable political, economic and social condition along with better working of law enforcing agencies. In case the new government succeeds in delivering, by the expiry of its term of five years, it would need further research by employing the same methodology and variables but with new data to see whether a positive change has taken place or not. Moreover, these issues have now attracted more attention than ever since no previous government has ever given due attention to these particular issues.