The Impact of Foreign Direct Investment on Economic Growth Through the Channels of Human Capital and Innovation:

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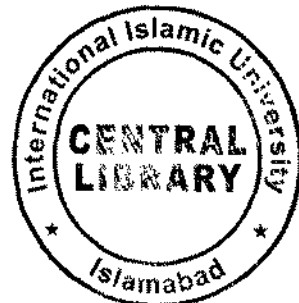
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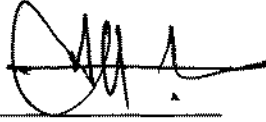
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The Impact of Foreign Direct Investment on Economic Growth through the Channels of Human Capital and Innovation:

by

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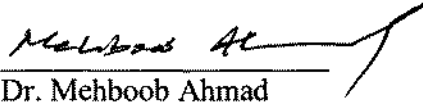
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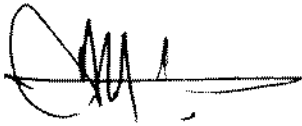Assistant Professor, IIIE,
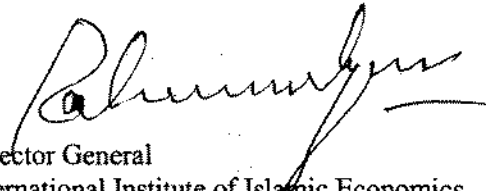International Islamic University, Islamabad

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بِسْمِ اللَّهِ الرَّحْمَٰنِ الرَّحِيمِ

Dedication

Every challenging work needs self efforts as well as guidance of elders especially

those who are very close to our heart.

My humble effort, I dedicate to my sweet and loving

Mother and family,

Whose affection, love, encouragement and prays of day and night make me able to

get such success and honor,

Along with all hardworking and respected

Teachers

Acknowledgement

This acknowledgement would be incomplete without expressing my profound thanks to my friends Mr. Imran Khan for his brotherly support, Mr. Hassan Mansoor for his extraordinary moral support, Mr. Farmanullah for his inexpressible care and encouragement, Mr. Haidar Farooq for exploring my inner ability, my fellows, Mr. Lutfullah Khalid, Mr. Mukaram Khan, Mr. Kaleemullah for their countless support and who have always been there for me whenever I needed.

Last but not the least, I want to express my cardiac and profound thanks and love to my dearest Parents who have always been praying for my lying success in this world and in the hereafter as well. I express my countless thanks to my affectionate brothers, sisters, well wishers and relatives. I am really thankful to my elder brothers Mr. Muhammad Qasim, Mr. Muhammad Ayaz, Mr. Ali Akbar and younger brother Mr. Muhammad Iqbal for their encouragement, financial and moral support throughout my academic career and specially in getting my higher education. They have always motivated me to pursue higher studies. I do believe in their most honest and innocent prayers which are a constant source of strength and inspiration for me. I also do appreciate their key role in my success all the way. I am also thankful to my beloved uncle Mr. Tahir Ali who has always been a source of joy and inspiration for me. May Allah the almighty give me the strength to serve them to my best and make their lives easy; Ameen.

Muhammad Akbar

Declaration

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Muhammad Akbar

Table of Contents

Chapter 4   Results and Discussions

Chapter 5   Conclusions and Policy Recommendations

List of Figures

List of Tables

List of Acronyms

EG	Economic Growth
FDI	Foreign Direct Investment
HC	Human Capital
INO	Innovation
GOV	Government Size
INFL	Inflation
OPEN	Trade Openness
PRIV	Private Credit
INV	Investment in Education
Yo	Initial Real Per Capita GDP

Abstract

This study examines the direct as well as the indirect relationship between foreign direct investment and economic growth through the channels of human capital and innovation. We use a panel data set of 74 countries for the period of 1961-2013. To capture this indirect relationship we use moderated mediation method. To empirically investigate our econometric model we employ Seemingly Unrelated Regression (SUR) technique as suggested by Biorn (2004). We observe a direct and indirect positive relationship between foreign direct investment and economic growth through the channels of human capital and innovation. We conclude that the impact of foreign direct investment on economic growth is positive directly as well as indirectly, but the indirect impact of foreign direct investment on economic growth is more profound.

Chapter 1

Introduction

In the initial section of this chapter we discuss about the background of the current study. We provide and explain the base of our study that what research gap in prior studies which lead us to conduct this research. Similarly, we also give a brief introduction of this study. In the next section we present our research objectives and significance of our study that on what grounds we say this study is important and to place it over the other studies.

1.1 Background of Study

National economies are so connected to the global economic system that leads to an interdependence among the nations in terms of primary, semi finished and manufacturing goods (Helpman et al. 1999). A country's economic growth depends on domestic production capacities like natural resources, physical capital accumulation, levels of human capital, technology and innovation etc, but at the same time how much of these all are available to a country is a matter of concern. Living in a global world, no single nation is in a position of self sufficiency. So, how countries fulfill these gaps of supply and demand is a matter to be thought upon (Tamim et. al 1991). There are several channels responsible for the provision of these pre-requisites of economic growth. Countries have either to engage in trade with other nations, to make ground work and establish infrastructure to attract foreign investment in the form of

Multinational corporations to enhance domestic production and also to imitate and benefit from their technological spillovers, or by investing in a nation's own research and development projects to enhance innovation activities and also to prepare their own human capital force by educational and training programs.

All of the above mentioned factors of economic growth like international trade, foreign investment, technological spillovers, domestic research and development and human capital etc, are very crucial and they play their vital role in attaining economic growth. But the current study is focusing on two of them which are foreign direct investment (FDI) and its effect on human capital leading to economic growth, FDI and its effect on R&D spillovers in terms of innovation leading to economic growth, while we shall also examine the direct effect of FDI on economic growth. In this study we empirically investigate that how much these channels of human capital and innovation, are important while talking about economic growth of a country. Studies are there on these channels of human capital and innovation, but the gap among all previous studies is that these determinants of economic growth are studied individually and that's why the results obtained were sometimes weaker or even ambiguous and unclear. If a positive impact of foreign direct investment on economic growth is found, it is either for advanced economies where, basic infrastructure is available along with the attractive facilitating policies or these studies might be conducted under favorable conditions like good law and order situation, safe investing conditions and less or no risk etc. However, we explore the channels of human capital and innovation simultaneously and their effect on economic growth is found as positive and significant. A strong link between

2

foreign direct investment and economic growth is obtained by channelizing them through human capital and innovation.

Studying literature on economic growth and its determinants, one can find a lot of research on the effect that is made directly by FDI on the economic growth of a country along with international trade and some other endogenous determinants related to the country like government size, inflation, unemployment etc. But one can rarely find that how and to what extent technological spillovers and innovation affect economic growth and how FDI is responsible for such technological spillovers and accumulation of human capital in an economy.

Human capital is also recognized and proved empirically as the most important factor responsible for economic growth. Because to benefit from the advanced technologies of the foreign owned multinational corporations working in country, the host country should have enough technically educated and highly skilled labor to be provided to these MNCs and other domestic corporations and firms to avail and benefit the opportunities of technology spillovers made accessible by these MNCs. Studies have also been conducted on this vital role of human capital in the production and economic growth of a country.

Work of (Mankiw et al. 1990) is a mile stone in this area. Later on (Temple, 1999) finds some weak relationship between human capital and economic growth as this relation is somewhat hidden and unseen, but it led to start a debate on this issue. (Benhabib and

3

Spiegel, 2002) concludes with the positive effect of human capital on catch-up in growth rates while the relationship between stocks of human capital and total factor productivity is found dependent on the capital stocks, as if the country is having large stocks, factor productivity will grow with high rates and vice versa.

Technological change in the sense of innovation in today's modern world is considered as one of the most important determinants of economic growth. The dependence of economic growth on the level and state of domestic technology relative to that of the world is highlighted in the literature (Barrell & Pain, 1997), and (Bayoumi et al. 1999).

Thus, these technology diffusions especially in the developing countries are playing very crucial role in attaining economic growth (Borensztein et al. 1998) finds in case of technology transfer from industrialized nations to 69 developing nations. But how these developing countries adopt technologies from rest of the world and implement them domestically is a question of common interest and to be answered. Various means are found responsible for such diffusions like imports of high-technology products, by the acquisition of human capital, through several means which are very important conduits for such international technology diffusions.

FDI in the form of multinational corporations is found to be the most important and major channel through which these developing countries access to advanced technologies.

(Findlay, 1978) explains the "contagion effect"[1] of technology transfer in the host country through foreign direct investment in the form of imitations from other's knowledge and latest management practices, used by these foreign owned firms. Similarly; (Wang, 1990) finds these technology diffusions as functions of direct investment from abroad.

The role of technology transfer in the economic growth through foreign direct investment is studied from the aspects of two faces (Griffith et al. 2001) finds that international R&D spillovers or technology diffusions affect the domestic economy of host country via two faces; first, it stimulates domestic innovation and second, it helps to imitate from other's discoveries to enhance production and both of these faces further lead to affect economic growth.

The direct effect of foreign direct investment (FDI) on economic growth on micro or firm level as well as on macro level has been studied so widely that a lot of literature is available.

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[1] " The contagion effect explains the possibility of spread of economic crisis or boom across countries or regions. This phenomenon may occur both at a domestic level as well as at an international level. The failure of Lehman Brothers in the United States is an example of a domestic contagion" The Economic Times.

(Borensztein et al. 1997), investigate the link between FDI flow from OECD nations towards developing nations and their economic growth. A clear evidence of positive relationship is found. Similarly; (Khan and Ali, 2011) study this relation for Pakistan and Turkey and their findings suggest positive impact of FDI on economic growth. (Buthe and Milner, 2008), (Contessi and Weinberger, 2009), (Chowdhury and Mayrotas, 2005), (Tiwari and Mutascu, 2010), and a lot of other studies have been made and almost all of the studies come with either weaker or stronger but positive relationship of FDI and economic growth of a country.

It is now clear to us that individually the channels of human capital and innovation are of how much importance when we talk about economic growth, although there are many researchers who find some unclear and even negative specifications about these channels. It is quite possible that ambiguities might be due to their separate study of these channels, data un-availability etc.

It is a matter of great significance to study all these channels of FDI. The FDI and its effect on economic growth. The impact of FDI on economic growth through human capital. The impact of FDI on economic growth through innovation. Therefore, we conduct this study and we obtain results which are not only positive and significant but also clearly indicate that what crucial role foreign investment plays in attaining economic growth. Either we talk about direct effect of foreign investment on economic growth or we channelize it trough human capital and innovation.

1.2   Research Objectives

Keeping in view the importance of human capital (HC) and innovation (INO) for studying the relationship between foreign direct investment (FDI) and economic growth (EG), the research objectives of our study are as follows:

i.   To examine the Direct effect of FDI on Economic Growth

ii. To investigate the effect of FDI on Economic Growth through the channel of Human Capital

iii. To explore the effect of FDI on Economic Growth through the channel of innovation

1.3   Significance of the Study

In the post world war era, Globalization and trade openness, foreign investment, and, research and development, are widely being considered as major factors responsible for economic growth and development of a country (Ben and David, 1996). The FDI has been found as one of the most important and major channel for technology transfer among the developing and developed nations by (Borensztein et al. 1998). For Pakistan (Khan and Ali, 2011) also find a very promising impact of FDI on economic growth. (Damijan et al. 2001) also come with the result that FDI and Trade are the two main channels responsible for enhancing technological spillovers and finally economic growth. But trade openness in some cases does not come with this evidence and might have been fruitful for European and other advanced economies as in (Rodrik, 1995).

However economic growth via foreign investment, research and development has been fruitful so far, for large number of countries including developed and developing as well. That's why the current study has the significance of exploiting FDI and its effects on economic growth form three different angles i.e. FDI's direct effect on economic growth, FDI affecting Human capital and leading forward to affect economic growth, and FDI affecting innovation which further has a forward effect on economic growth. Effects of Human capital on growth, effects of innovation on growth, direct effects of FDI on growth might have been studied separately, while how much greater effect all these channels have on economic growth simultaneously, are to be examined in this study and it is its significance which places it over the other studies.

1.4   Scheme of Study

This research study comprises of five chapters. First chapter named introduction, represents background, introduction, and objectives of current study and significance of the current study. Second chapter named literature review, consists on different themes of prior literature relevant to the current study. Chapter three named data and empirical methodology, in this chapter we discussed about data and variables, estimation methodology, econometric model, equations of direct and indirect effects and brief discussion about estimation technique. Chapter four named results and discussions, explains about direct and indirect empirical results and their interpretations and lastly general discussion about the obtained results. Chapter five named conclusions and

policy recommendations, expresses conclusions about obtained results and their policy

implications.

Chapter 2

Literature Review

In this chapter we discuss about the existing literature on the channels and different factors of economic growth that we are using in our study. We present both the direct and indirect positive and negative results of the foreign direct investment on economic growth. A brief summary of the overall literature is also given at the end of this chapter.

2.1   Background

With the rise of endogenous growth theory in the last two decades of the 20th century, starting from (Romer, 1986 and 1990) and (Lucas, 1988), (Grossman and Helpman, 1991) stress has been given on the importance of domestic technology usage and that of the domestic research and development in terms of innovation and other new discoveries. Domestic technology usage and labor productivity have been acknowledged as endogenous determinants of economic growth.

Many studies have been carried out on this issue in the 1990s and some channels and ways have been identified and put as responsible for the transfer of technology across the nations.

Transfer of technology directly through agreements on international licensing where through mutual agreements, use of patents, trademarks and other property rights are allowed from licenser's to licensee (Branstetter et al. 2005)[1], and (Eaton and Kortum, 1996). (Blomstrom and Kokko, 1997) find FDI as the important and cheapest one among different channels. (Markusen, 1989) also finds international trade as one of the important channels of international technology diffusions.

In literature regarding foreign direct investment (FDI) and economic growth (EG), human capital (HC) and economic growth (EG), technology spillovers or innovation (INO) and economic growth (EG), FDI and human capital (HC) etc, there are different opinions and views. If one group of researchers finds that foreign investment has positive impact on economic growth like (Ben and David, 1996) and (Damijan et al. (2001), studies are also there, where, researchers come out with inverse relationships among these variables like (Kruger and Lindhal, 2001) and (Bils and Klenow, 2004). Another group of researchers can also claim that there is no clear indication of any positive or negative relationship between the foreign investment and economic growth, foreign investment and human capital, foreign investment and innovation like (Nelson and Phelps, 2004).

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[1] Technology licensing is a contractual arrangement in which the licenser's patents, trademarks, service marks, copyrights, trade secrets, or other intellectual property may be sold or made available to a licensee for compensation that is negotiated in advance between the parties.

Similarly, some researchers would have the view the relationship between human capital and economic growth as strong and positive like (Tamim, 1997). But others would have come with weaker relationship like (Lee, 2000).

In case of research and development and innovations, studies might be there where, it is claimed that technological advancement and spillovers are responsible for higher domestic economic growth, and some people obtain outcomes where they might not be talking in this favor.

Literature is also available on the indirect effects of foreign investment on economic growth through several different channels like human capital and technology transfer, but all of the studies might not be necessarily coming with positive or negative or ambiguous results.

Therefore, here we make a distinction among different research studies of different researchers with different outcomes, findings and conclusions.

2.2   Direct and Indirect Positive Effects of Foreign Investment on Economic Growth

Since, many studies have been conducted to establish relationship between foreign investment and economic growth with certain strong and positive outcomes.

(Damijan et al. 2001) and (Borensztein et al. 1997) find FDI and trade responsible for research and development enhancement and beneficial technological spillovers. (Tamim, 1997) also concludes a strong relationship among the R&D, its spillovers and trade. However, (Lee, 2000) and (Rachel et al. 2001) demonstrate positive but weak link among the variables along with total factor productivity. While some robust effects have been expressed by international R&D spillovers through trade and FDI on total factor productivity and growth (Xu and Wang, 2000).

On the other hand, exploring the relationship between human capital and economic growth has been studied from different aspects and results shown are somewhat robust and establishing strong link between human capital and economic growth as found by (Temple, 1999) and (Pritchett, 1996).

However; human capital as a factor to growth may also be dependent and conditional to some factors as amount of capital stocks and foreign technology (Benhabib and Spiegel, 1995) and (Temple and Hans, 1998). While, in some cases the causal direction is also found reverse (Asteriu and Agiomirgianakis, 2001) where they find the causal direction running from growth to higher education.

The relationship between FDI and economic growth, research and development (R&D), technological spillovers and economic growth, the link between educational attainment, technically skilled labor or simply human capital accumulation and economic growth, all such relations have been explored separately. For instance; the

13

direct effect of FDI on growth, impact of human capital on growth, role of technology spillovers on growth, or somewhere the impact of FDI on any single one of them leading to affect growth.

To explore the relation between foreign direct investment and economic growth a huge literature is available. Some micro and macro level studies are being included here. (Girma et al. 2008) conduct a micro level study on firm level data for Chinese domestic enterprises with the purpose to find out how these enterprises are affected by FDI in terms of productivity level in short run and growth rate in the long run. In short run a weaker while in long run a reasonable effect of FDI on these enterprises has been found. The innovation activity of firms was made conditional to the access to financial institutions and good financial system in the country.

Sector level studies have been carried out to examine the relation between FDI and economic growth for Nigeria (Akinlo, 2004) and for Pakistan (Khan et al. 2011). In case of Nigeria a positive relation was found but with a considerable lag, while for Pakistan also a positive relation between the two was revealed. Furthermore a unidirectional and bidirectional positive relation from FDI to economic growth was found in short and long run respectively for Pakistan. Similarly, a strong positive bidirectional relation between FDI and economic growth was found for Malaysia and Thailand (Mavrotas et al. 2005).

A cross-country macro level study has been carried out for 69 LDCs where the FDI inflow is from OECD economies (Lee et al. 1997). They find strong positive

relationship between FDI and economic growth for these OECD and 69 LDCs but this relationship is made conditionally dependent on level of human capital in these LDCs. (Milner et al. 2008) also conduct a study for 122 developing countries around the world. They come with an empirically strong support for FDI and its positive effect on economic growth for these 122 developing countries. Similarly, another study for 23 developing Asian countries has been conducted (Mutascu et al. 2010). They conclude that for these 23 developing Asian economies this positive relation is not that much strong but it is good enough and reasonable.

(Kalyoncu and Ozturk, 2007) study this relationship between FDI and economic growth for Pakistan and Turkey. They also empirically investigate the causality effect between FDI and economic growth. They come up with uni-directional causality in case of Pakistan where, GDP causes FDI inflow, while in case of Turkey this study shows bi-directional causality between FDI and GDP.

2.3 Direct and Indirect Negative Effects of Foreign Direct Investment on Economic Growth

There are some empirical studies where the impact of FDI and human capital on economic growth are found negative. The negative impact of FDI on economic growth is due to the lack of human capital availability in the host economy or the human capital does not acquire the required skills for the latest technology. Such negative conclusions are drawn by (Kruger and Lindhal, 2001), where they say FDI affects economic growth adversely. Similarly, (Bils and Klenow, 2004), and (Nelson and

15

Phelps, 2004) conclude that there is an inverse relationship between foreign investment and economic growth describing the same reasons. Furthermore, there are some studies where the researchers come out with unclear and ambiguous results. They conclude that the effect of human capital on economic growth is somewhat unclear and ambiguous (Benhabib and Spiegel, 1992, 1994 and 2002).

Likewise, (Girma et al. 2008) and (Bruno et al. 2000) conduct a research to empirically investigate the effect of foreign investment on economic growth on sector as well as on firm level. They conclude that the effect of foreign investment on economic growth is quite weaker and even negative.

2.4   Summary

After coming through the previous literature on FDI and economic growth, it is now obvious that how crucial role FDI is playing in attaining economic growth around the world. But to our best knowledge there is no such literature available which explains the simultaneous effect the two channels of innovation and Human capital accumulation on economic growth along with the effect that FDI directly shows towards economic growth. How these channels are linked with foreign direct investment and simultaneously effect economic growth of a nation along with the direct effect of FDI on economic growth are matters which we are concerned with and to be explored in current study.

Chapter 3

Data and Empirical Methodology

This chapter comprises of data, description of variables and empirical methodology which is used for empirical analysis. Graphs or scatter plots representing correlation among different variables are also part of this chapter. Equations describing direct and indirect relationship among variables have also been discussed in this chapter. Finally, we discuss our estimation technique that is seemingly unrelated regression (SUR) method.

3.1   Data and Variables

Here we discuss about data and variables we are using in this study. We use a panel data set consisting upon 74 countries for the time period 1961-2013. We use annual data to see the impact of foreign direct investment on economic growth through the channels of human capital and innovation. The selection of countries and time span is subject to our explained as well as explanatory variables. Our dependent as well as independent variables are as follows:

Our dependent variable is economic growth (EG) which is taken as real per capita GDP growth. The main explanatory variable is foreign direct investment (FDI) while, Human capital (HC) and innovation (INO) are mediation variables. We use foreign direct investment (FDI) as the % of GDP of each country in the mentioned period. We

also use average years of schooling of population with age 15 years and above, as proxy for human capital (HC). Similarly, we use R&D expenditures as the % of GDP for each country as a proxy for innovation (INO). We also incorporate some control variables in our study. These variables have been used in literature that is why we also use them and they are as follows: Government final consumption expenditures or government size (GOV) as % of GDP for each country. We use Inflation (INFL) which is the percent annual growth rate of consumer price index (CPI). We also use private credit (PRIV), domestic credit provided by commercial banks to private sector as % of GDP for each country. In this study we use trade openness (OPEN), the sum of exports and imports the % of GDP for each country. The domestic investment in education (INV), as the % of GDP for each country is also being used. We use initial real per capita GDP in our study to incorporate the convergence. Definitions along with their sources for all variables are given in Table A-1, Appendix.

After discussing the data and variables the second step is the descriptive analysis of the data. We present the descriptive analysis of our research in the following section.

3.2 Descriptive Analysis

In this section we discuss about the descriptive analysis of our research. In descriptive analysis we incorporate summary statistics of all our variables, correlation matrix of all variables and some scatter diagrams representing correlation between different core variables of the study.

3.2.1   Summary Statistics

Summary statistics of our research represents the number of observations for each variable, the mean values of each variable, and the minimum median and maximum values of each variable. Similarly, it shows that how much the values of each variable deviate from their mean values. In the current study we see that our main variables like economic growth (EG) and foreign direct investment (FDI), have the number of observations 3383 and 2395 respectively. Similarly, we observe that the mean values of these two variables are 2.4 and 4.9 respectively. In the same way we see that the minimum values are -40.75 and -15.04, median values are 2.7 and 1.4, and the maximum values are 42.02 and 564.9 respectively. While the standard deviations for EG and FDI are 4.71 and 26.64 respectively. We see that two variables FDI and INFL have large values of standard deviation describing the scatterings in these variables causing some disturbance in the other variables. In this way we can check these values for all the variables of our study. Table of summary statistics is given in the Table A-2, Appendix

3.2.2   Correlation Matrix

Correlation matrix in the descriptive analysis comprises of relationship of each variable with rest of the variables in the model. But in the table this relationship is represented between any two variables separately, while the principal diagonal describes the 100% correlation of each variable with itself. In this study for instance we observe the positive correlation between our core variables economic growth (EG)

and foreign direct investment (FDI) and that is 0.03. Similarly, we see that the correlation between FDI and HC is also positive and it is 0.069. Likewise, the correlation between FDI and INO is also positive and it is 0.049. In the same way we see that there is an inverse relationship between FDI and inflation which is -0.02. as a matter of concern we are interested in our inferential analysis and if the significance levels of all variables are up to the mark then what ever the relationships are there in the correlation matrix and how much the magnitude and strength of this relationship is not our concern. We can also check this relationship between any two variables of our study and the correlation matrix is presented in the Table-3, Appendix.

After discussing summary statistics and correlation matrix, now we present a diagrammatical description of the correlation among different variables of our study.

Figure 3.1   Correlation between FDI and EG

The following figure represents the relationship between foreign direct investment (FDI) and economic growth (EG).
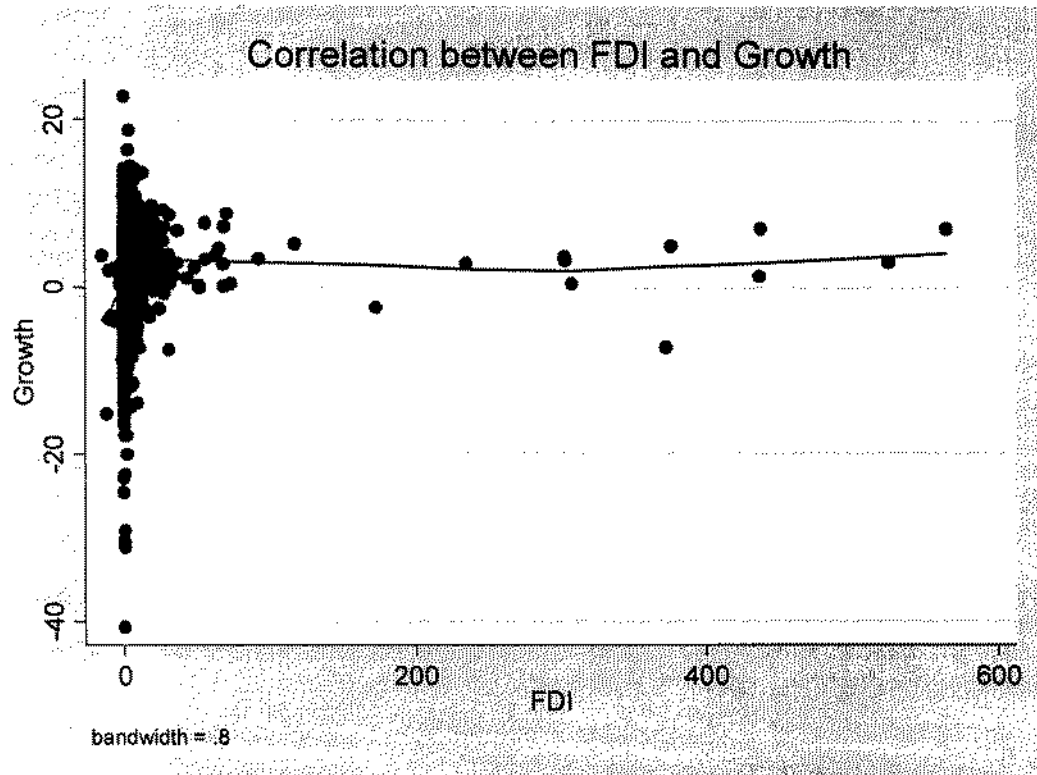
Economic growth (EG) and foreign direct investment (FDI) are key variables in our research. We observe a non-linear relationship between these two variables. It means, as the level of foreign direct investment grows it leads to decreased economic growth to a certain point and then starts to increase. In our panel data analysis this correlation describes the overall positive correlation between the level of inward foreign direct investment and economic growth.

Figure 3.2   Correlation between FDI and HC

This diagram demonstrates the relationship between foreign direct investment (FDI) and human capital (HC).
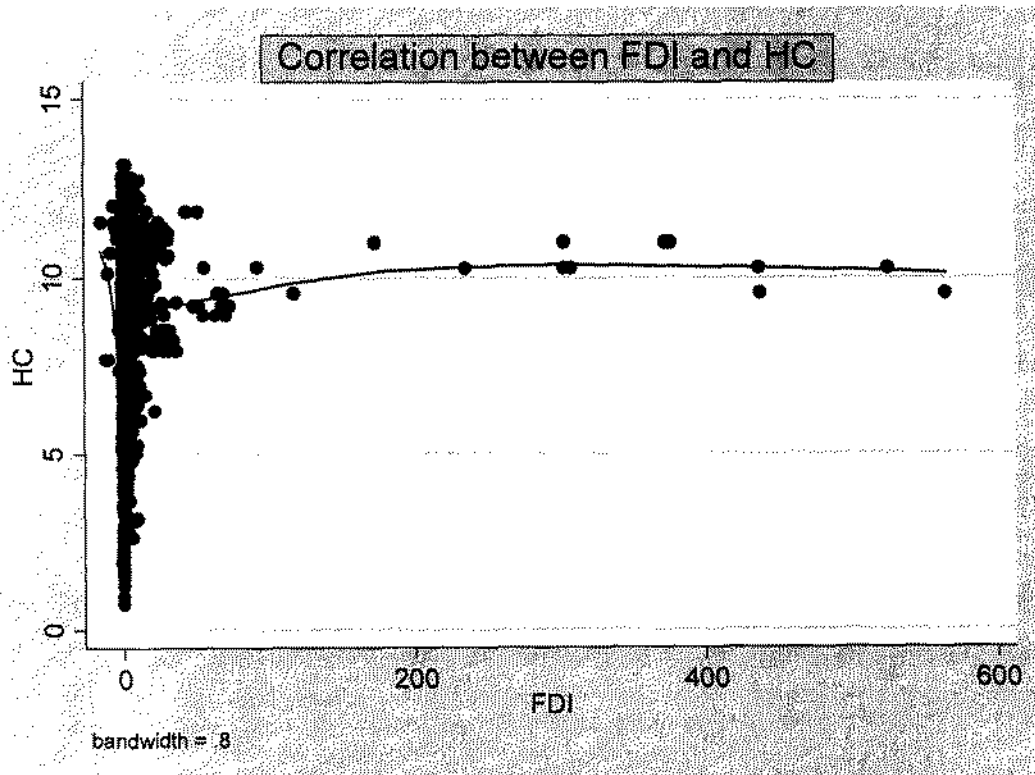
This diagram demonstrates the correlation between foreign direct investment (FDI) and human capital (HC). There is also a non-linear relationship between the two. It shows that as the level of foreign direct investment increases the level of human capital also enhances to a certain point and then it starts to decline. This positive relationship shows that as the overall level of foreign direct investment in our panel data grows, the level of human capital also grows in our analysis.

Figure 3.3   Correlation between FDI and INO

This plot shows the relationship between foreign direct investment (FDI) and innovation (INO).

Correlation between FDI and INO
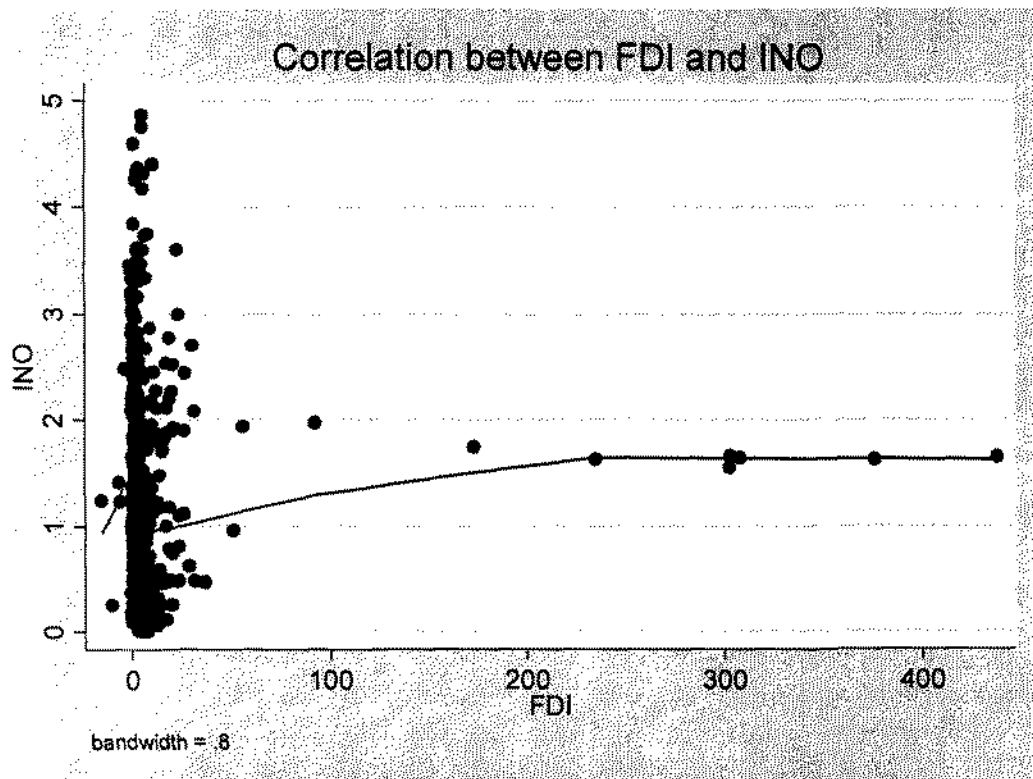
The above figure also the positive correlation between foreign direct investment (FDI) and innovation (INO). These two are also our core variables where we want to see the relationship between them. From the above diagram it is obvious that there is a none-linear relationship between foreign direct investment and innovation. It means that as the level of foreign investment gows the innovation level increases as well to a certain point and after that it starts to decline. We use R&D expenditures as proxy for innovation so, as the level of inward foreign investment increases there comes an increase in the domestic research and development activities as well.

23

Figure 3.4   Correlation between HC and EG

The following figure expresses the relationship between human capital (HC) and economic growth (EG).

Correltaion between HC and EG
bandwidth = .8
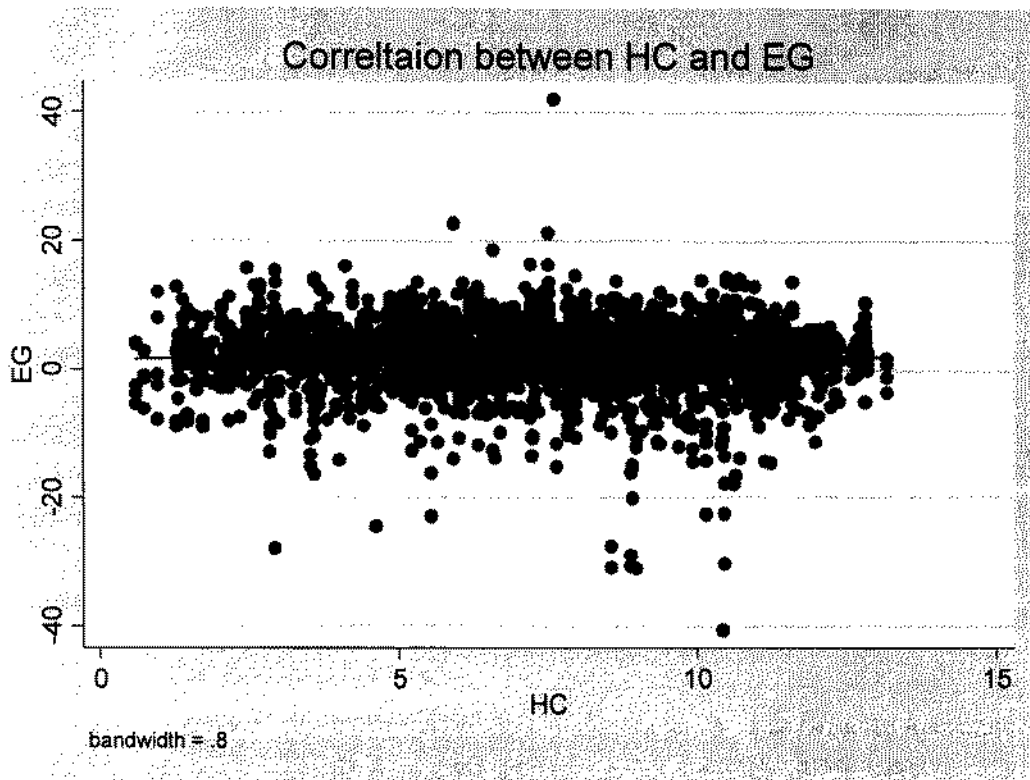
In this diagram we show the correlation between human capital (HC) and economic growth (EG). The plot demonstrates a none-linear relationship between the two. It means that as the level of human capital grows in our panel data set there is also an increase in the growth level to a certain level and after that it declines. We observe that this relationship is not that much strong but it is positive so, we can say that a good level of human capital can lead to enhance economic growth.

24

Figure 3.5   Correlation between INO and EG

This plot represents the relationship between innovation (INO) and economic growth (EG).
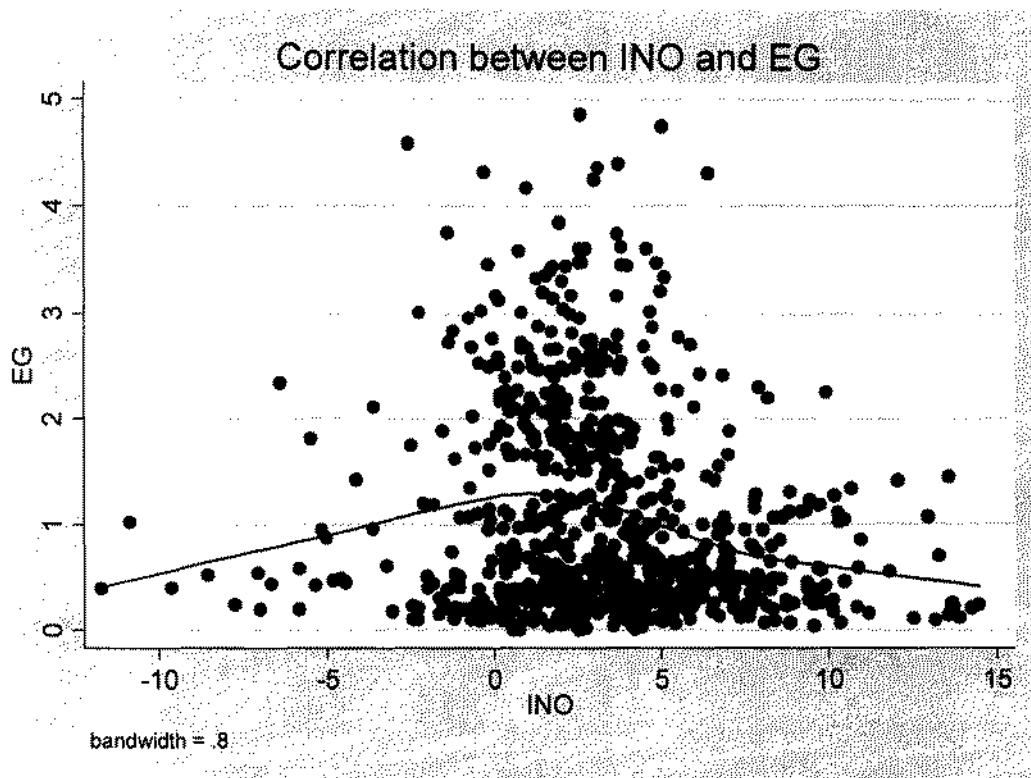
In this diagram we present the correlation between innovation (INO) and economic growth (EG). There is also a non-linear relationship between the two. This relationship shows that there is an increase in EG as INO increases, we can say that as the level of research and development increase the overall growth also enhances. But after a specific period EG starts to decline as there is a further increase in the level of innovation.

After discussing the descriptive analysis briefly, now we go to the second step of our analysis and that is the empirical analysis. Here we discuss the estimation methodology and that is comprises of schematic model, econometric model, equations to be estimated and the estimation technique.

3.3   Estimation Methodology

In this section we discuss the schematic model, econometric model, equations to be estimated for direct and indirect effects of FDI on Economic Growth. We also give a brief discussion about our estimation technique and that is seemingly unrelated regression technique (SUR).

3.3.1 Model

To investigate the relationship among our main variables which are economic growth, FDI, human capital and innovations, a relatively new method is applied, known as moderated mediation analysis suggested by (Muller et al. 2005) and (Preacher et al. 2007). This method identifies the intervening or mediating variables between any two variables. In our study the dependent variable is economic growth and explanatory variable is FDI while, human capital and innovation are the mediation variables. This study is basically being carried out to explore the indirect effect of foreign direct investment FDI on the economic growth. We can find out the effect of FDI on economic growth either directly or indirectly. By linking FDI with (EG) through

26

human capital, we say that when there is an inward flow of foreign investment, it will, at first stage affects human capital and this improved level of human capital will affect economic growth as forward effect. Similarly, when we link FDI with economic growth through innovation, it means that at first stage FDI will affect innovation activities (INO) in the economy and this will further lead to enhance economic growth in the economy.

In the estimation methodology, first we introduce our schematic model or flowchart of the study. It is clear from the schematic model that we are interested in direct as well as indirect effects of foreign direct investment (FDI) on economic growth (EG). One can see that we have constructed a model where FDI is linked directly and indirectly with economic growth. In the indirect link one can see that FDI affects HC at first stage and then this HC further affects economic growth. Similarly, FDI affects INO at first stage and the INO further affects economic growth.

Figure 3.6 Schematic Model

The theoretical model has been adapted/refined from the work of (Iqbal et al. 2012) and (Prajogo & Sohal, 2003). In the following figure we describe our schematic model. We see that FDI affects economic growth directly as well as indirectly. Indirect relationship between FDI and economic growth is explained by two channels of human capital and innovation.

27
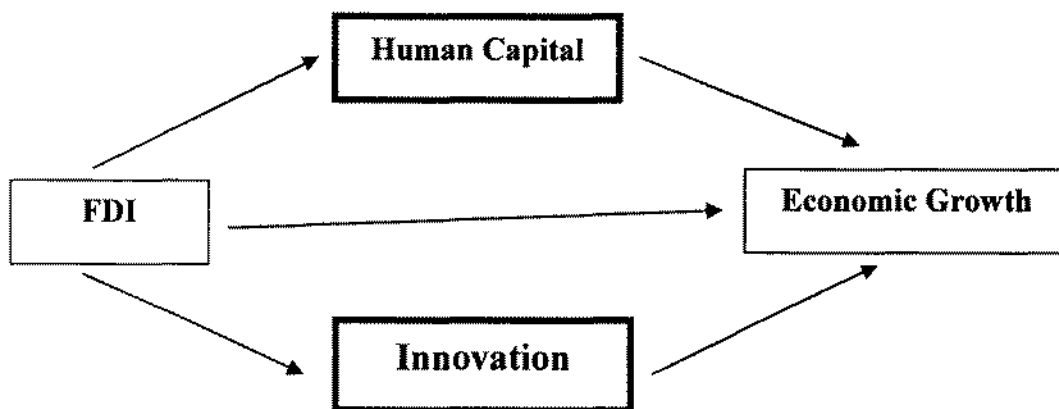
It is obvious from the schematic model that human capital (HC) and innovation (INO) play their important role of mediation between the dependent variable economic growth (EG) and explanatory variable foreign direct investment (FDI). So, it is clear now that FDI affects economic growth directly as well as indirectly through human capital and innovation and we are interested to capture these direct and indirect effects.

To estimate the direct as well as indirect effect of foreign direct investment on economic growth through the channels of human capital and innovation, we construct our econometric model as follows:

$$HC_{it} = \alpha_1 + \alpha_2 \, FDI_{it} + \alpha_3'X + u_{1it} \text{----------------------------- (3.1)}$$

Where, HC is human capital taken as average years of schooling of population aged fifteen and above. FDI is foreign direct investment (net inflows) taken as % of GDP. X is vector of control variables.

$$\text{INO}_{it} = \beta_1 + \beta_2 \text{FDI}_{it} + \beta_3'Y + u_{2it} \text{------------------------------ (3.2)}$$

Where, INO is innovation (R&D expenditures) taken as % of GDP. FDI is foreign direct investment and Y is vector of control variables.

$$\text{EG}_{it} = \gamma_1 + \gamma_2 \text{FDI}_{it} + \gamma_3 \text{HC}_{it} + \gamma_4 \text{INO}_{it} + \gamma_5 (\text{FDI*HC})_{it} + \gamma_6 (\text{FDI*INO})_{it} + \gamma_7'Z + u_{3it}$$

$$\text{--(3.3)}$$

Where, EG is economic growth of a country, FDI is the net inflow of foreign direct investment (% of GDP) in each country, HC is the level of human capital that each country is having. We use average years of schooling of population aged fifteen and above as proxy for human capital. INO is innovation in each country and we use (R&D expenditures as % of GDP) as proxy for innovation. (FDI*HC) is the interaction term of foreign direct investment and human capital, (FDI*INO) is the interaction term of foreign direct investment and innovation. Z is the vector of control variables for EG. These variables are initial real per capita GDP (Yo), government final consumption expenditures (GOV), inflation (INFL), credit provided by commercial banks to the private sector (PRIV), trade openness (OPEN) and domestic investment in education (INV).

α_1, β_1 and γ_1 are the intercepts of the regressions. α_2...... α_n, β_2....... β_n and γ_2...... γ_n are coefficients of variables. U_1, U_2 and U_3 are the error terms for all three equations.

3.3.2 Indirect Effects of FDI on Economic Growth using Channels of Human Capital and Innovation

Here we show that how the equation, for indirect effects are generated from the main equations

a) We calculate equation for the indirect effect of FDI on Economic Growth through the channel of Human Capital using equation (3.1) through (3.3)

$$\frac{\partial EG}{\partial FDI} = \frac{\partial EG}{\partial HC} \, X \, \frac{\partial HC}{\partial FDI} \quad\text{------------------------------}\ (3.4)$$

$$\frac{\partial EG}{\partial FDI} = \alpha 2 \, (\gamma 3 + \gamma 5F) \quad\text{----------------------------------}\ (3.5)$$

From equations (3.1 and 3.3) we calculate equation (3.4) where, one can see the partial indirect effect of FDI on EG. Here we see in the L.H.S of equation (3.4) that at first stage FDI affects HC and then HC affects EG. Now to calculate Equation (3.5) first we partially differentiate equation (3.1) with respect to FDI and get (α_2), second we differentiate equation (3.3) with respect to HC and get ($\gamma_3 + \gamma_5$FDI). Finally we multiply α_2 and ($\gamma_3 + \gamma_5$FDI) to get equation (3.5) representing the indirect effect of FDI on EG, and that is α_2 ($\gamma_3 + \gamma_5$FDI).

b) We Calculate the Equation for Indirect Effect of FDI on EG through the Channel of Innovation using equation (3.2) through (3.3)

$$\frac{\partial EG}{\partial FDI} = \frac{\partial EG}{\partial INO} \, X \, \frac{\partial INO}{\partial FDI} \quad\text{--------------------------------}\ (3.6)$$

30

$$\frac{\partial EG}{\partial FDI} = \beta 2 \; (\gamma 4 + \gamma 6 FDI) - - - - - - - - - - - - - - - - (3.7)$$

From equations (3.2 and 3.3) we calculate equation (3.6) where, one can see the partial indirect effect of FDI on EG. Here we see in the L.H.S of equation (3.6) that at first stage FDI affects INO and then INO affects EG. Now to calculate Equation (3.6) first we partially differentiate equation (3.2) with respect to FDI and get (β_2), second we differentiate equation (3.3) with respect to INO and get ($\gamma_4 + \gamma_6 FDI$). Finally we multiply β_2 and ($\gamma_4 + \gamma_6 FDI$) to get equation (3.7) to show the indirect effect of FDI on EG, and that is β_2 ($\gamma_4 + \gamma_6 FDI$).

Signs of coefficients of the above mentioned indirect effects depend upon the signs and magnitudes of $\alpha_2, \beta_2, \gamma_3, \gamma_4, \gamma_5$ and γ_6. Similarly; to test the significance of these indirect effects, we calculate their confidence intervals as presented in Chapter 4.

3.3.3 Seemingly Unrelated Regression (SUR) Model

Seemingly Unrelated Regression Model is proposed by Zellner (1962). It is basically generalization of a linear regression model. This model comprises of several regression equations and each of the equations has its own dependent variable. Each equation in this system can be estimated separately and it is a linear equation in itself.

SUR model can be seen as simple form of the general linear model where coefficients in [β] matrix are set to be equal to zero, or it can also be seen as general form of linear model in which explained variables might be different in each equation. This model can also be generalized into simultaneous equation model, where explanatory variables can be put as explained variables. However, we use this model for our panel data analysis. This technique has been used by researchers in prior literature where variables have been used as mediator or channelized to create an indirect link between variables. In our analysis, we use SUR method for unbalanced[1] panel data as suggested by Biorn (2004).

We use this technique (SUR) in the same way to channelize the relationship between foreign direct investment and economic growth through human capital on one side and innovation on the other side.

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[1] Unbalanced Panel data is, where the individual time series have unequal lengths

Chapter 4

Results and Discussions

This chapter consists upon estimation outcomes, results interpretations and discussions. Section 4.1 refers to empirical estimation and tabulated representation of the base-line, general and specific model. In section 4.2 we make general discussions about our empirical findings.

4.1   Estimation

We divide our empirical analysis into two subsections. Subsection 4.1.1 reveals our baseline model results of the direct and indirect effects of foreign direct investment (FDI) on economic growth (EG) through the channels of human capital (HC) and Innovation (INO).

Similarly, Subsection 4.1.2 explores our general model outcomes of the direct and indirect effects of foreign direct investment (FDI) on economic growth through the channels of human capital (HC) and innovation (INO). Some control variables like government final consumption expenditures (GOV), inflation (INFL), private credit provided by commercial banks to the private sector (PRIV), trade openness (OPEN), domestic investment in education (INV) and initial real per capita GDP (Yo) are included.

Subsection 4.1.3 describes our parsimonious or specific model showing the direct and indirect effects of foreign direct investment (FDI) on economic growth (EG) through

the channels of human capital (HC) and innovation (INO), where we confine our more general model to a specific general model. In this process we omit the control variables one by one and again run the regression to check the model for overall significance. We continue this process to that point where we get an overall significant model. In our study we are lift with a model where we have three control variables.

4.1.1   Base-Line Model

Model (1) of Table 4.1 represents our baseline model showing the effects of foreign direct investment (FDI) on economic growth (EG) through the channels of human capital (HC) and innovation (INO). We observe that economic growth (EG) equation (equation 3.3, Chapter 3) elaborates the effects of initial real per capita GDP (Yo), foreign direct investment (FDI), human capital (HC), innovation (INO), government final consumption expenditures (GOV) and inflation (INFL) on economic growth (EG) simultaneously. Initial real per capita GDP (Yo) has a negative and significant effect on economic growth (EG) at 1% significance level. It suggests that there exists an evidence of convergence in our panel study and it is also called pro-poor growth. This result supports the theory and prior studies like (Barro, 1996), (Bleaney and Nishiyama, 2000) and (Doppelhofer, 2000), but in our case the coefficient value is very small so, we can say that this relationship is quite weak.

In the same way we observe in our analysis that foreign direct investment (FDI) has a positive effect 0.134 on economic growth (EG) and it is significant at 1% level in

Model (1). It suggests that as the inflow of FDI increases it will directly affect EG positively.

Similarly, the equation of human capital (equation 3.1, Chapter 3) represents the effect of foreign direct investment (FDI) on human capital (HC). This effect is positive 0.492 and significant at 1% level of significance in Table 4.1 (Model 1). It suggests that there is a strong positive effect of foreign direct investment (FDI) on human capital (HC) and as the level of FDI inflow increases it will lead to improve the level of human capital either in physical amount or in terms of productivity. This result is consistent with the prior studies of (Lee, 2000) and (Rachel et al. 2001), where they suggest that foreign investment inflow leads to increase labor productivity.

Likewise, the equation of innovation (equation 3.2, Chapter 3) shows effect of foreign direct investment (FDI) on innovation (INO). This effect is also positive 0.658 and significant at 1% significance level in Table 4.1 (Model 1). It shows that there is also a strong positive effect of foreign direct investment (FDI) on innovation (INO) and as the FDI inflow enhances it will lead to grow innovation activities in the economy. this outcome also supports previous studies like (Damijan et al. 2001) and (Borensztein et al. 1997), where they conclude a strong effect of foreign investment and the R&D spillovers (Tamim, 1997).

Table 4.1: The Effects of Foreign Direct Investment on Economic Growth through the channels Human Capital and Innovation (Baseline Model)

VARIABLES	Model (1)			Model (2)		
	HC	INO	EG	HC	INO	EG
Yo			-0. 000*** (0.000)			-0.000*** (0.000)
FDI	0.018*** (0.000)	0.007*** (0.000)	0.134*** (0.000)	0.033*** (0.000)	0.001* (0.079)	0.052*** (0.000)
HC			0.492*** (0.000)			0.244*** (0.000)
INO			0.658*** (0.000)			0.644*** (0.000)
FDI*HC			-0.007*** (0.000)			-0.005*** (0.000)
FDI*INO			-0.030*** (0.000)			0.005*** (0.002)
GOV						-0.141*** (0.000)
INFL						-0.006*** (0.004)
Observations		763	763	754	754	754
No. of countries		74	74	74	74	74

Note: P-value of each coefficient is given in the parentheses. ***, ** and * show significance at 1%, 5% and 10% levels respectively. Our dependent variables are as follows: EG is growth rate of real per capita GDP. INO represents innovation, taken as research and development expenditure (R&D) as % of GDP. HC represents human capital, taken as average years of schooling (age 15years and above). Explanatory variables in our model are as follows: FDI is foreign direct investment, taken net inflows as % of GDP. Yo is initial real per capita GDP. HC and INO are as explained above. FDI*HC is the interaction of foreign direct investment and human capital. FDI*INO is the interaction term of foreign direct investment and innovation. GOV represents the general government final consumption expenditure as % of GDP. INFL is inflation (CPI).

Furthermore, the interaction term of foreign direct investment and human capital (FDI*HC) is negative and significant at 1% level of significance in Table 4.1 (Model 1). It suggests that the positive effect of FDI on economic growth (EG), diminishes as the level of HC increases. In other way we can say that the positive effect of FDI on EG is less profound in countries having low level of HC and vice versa.

In the same way we see that the interaction term of foreign direct investment and innovation (FDI*INO) is also negative and significant at 1% significance level in Table 4.1 (Model 1). It also suggests that the positive effect of FDI on economic growth (EG), declines as the level of INO increases. In other words we can say that as the level of innovation grows in an economy with the inward FDI. The impact of FDI on economic growth diminishes as the level of innovation increases in an economy.

In Table 4.1 we study the marginal and conditional effects of foreign direct investment (FDI) on economic growth (EG), but the indirect effects of foreign direct investment on economic growth through the channels of human capital (HC) and innovation (INO) can be evaluated by calculating equations (3.4, 3.5, 3.6 and 3.7, Chapter 3).

Table 4.2 captures the indirect effects of foreign direct investment (FDI) on economic growth (EG) through the channels of human capital (HC) and innovation (INO) for Base-line Model. We categorize the indirect effects of FDI on EG through both HC and INO into low, average and higher level of FDI, while coefficients, p-values and 95% confidence interval values are given in their fronts.

Table 4.2:   The Indirect Effects of FDI on Economic Growth (Baseline Model)

Channels	Levels of FDI	Indirect Effects	95% Confidence Interval	
Human Capital	Low level of FDI	0.009*** (0.000)	0.008	0.010
	Average level of FDI	0.009*** (0.000)	0.008	0.010
	High level of FDI	0.008*** (0.000)	0.007	0.009
Innovation	Low level of FDI	0.004*** (0.000)	0.003	0.005
	Average level of FDI	0.004*** (0.000)	0.003	0.005
	High level of FDI	0.003*** (0.000)	0.002	0.004

Note: P-value of each coefficient is given in the parentheses. ***, ** and * represents the significance at 1%, 5% and 10% levels respectively. Low means 25th percentile, average level is 50th percentile and high level shows 75th percentile levels of FDI respectively.

We observe that the indirect effects of foreign direct investment (FDI) through the channel of human capital (HC) at low level of FDI is 0.009, at average level of FDI is 0.009 and at high level of FDI is 0.008. These effects at all three levels of FDI are positive and significant at 1% level of significance. This result suggests that whatever the level of inward FDI is, it affects economic growth (EG) positively regardless of the magnitude of effect.

Similarly; the indirect effects of foreign direct investment (FDI) through the channel of Innovation (INO) at low level of FDI is 0.004, at average level of FDI is 0.004 and

at high level of FDI is 0.004. These effects at all three levels of FDI are also positive and significant at 1% significance level. This outcome also reveals that at any level of inward FDI it affects innovation in the economy positively regardless of the magnitude of this effect.

After discussing our Base-Line Model in details, now we introduce our general model. In general model we incorporate some control variables to test their effects on economic growth.

4.1.2 General Model

In the General Model, five control variables government final consumption expenditures (GOV) and inflation (INFL), trade openness (OPEN), private credit provided by commercial banks to the private sector (PRIV) and domestic investment in education (INV) are incorporated along with the variables already exist in the Base-line model which are initial real per capita GDP (Yo), foreign direct investment (FDI), human capital (HC) and innovation (INO). We are using panel data set to capture robustness of different variables on economic growth for the sampled set of countries. All the outcomes of our analysis are expressed in Table 4.3 Model (2).

Model (2) in Table 4.3 explains the direct marginal effects of foreign direct investment (FDI) on economic growth (EG), however the indirect effects can be obtained by calculating equations (3.1, 3.2 and 3.3) of Chapter 3.

Table 4.3: **The Effects of Foreign Direct Investment (FDI) on Economic Growth (EG) through the channels of Human Capital and Innovation (General Model)**

VARIABLES	Model (1)			Model (2)		
	HC	INO	EG	HC	INO	EG
Yo			-0.000*** (0.000)			-0.000*** (0.000)
FDI	0.018*** (0.000)	0.007*** (0.000)	0.134*** (0.000)	0.475*** (0.000)	0.053*** (0.000)	3.563*** (0.000)
HC			0.492*** (0.000)			11.245*** (0.000)
INO			0.658*** (0.000)			9.062*** (0.000)
FDI*HC			-0.007*** (0.000)			-0.248*** (0.000)
FDI*INO			-0.030*** (0.000)			-0.590*** (0.000)
GOV						-7.500*** (0.000)
INFL						-0.446*** (0.000)
OPEN						-0.210*** (0.000)
PRIV						-0.184*** (0.000)
INV						5.495*** (0.000)
Observations	763	763	763	472	472	472
Countries	74	74	74	74	74	74

Note: P-value of each coefficient is given in the parentheses. ***, ** and * show significance at 1%, 5% and 10% levels respectively. Our dependent variables are as follows: EG is growth rate of real per capita GDP. INO represents innovation, taken as research and development expenditure (R&D) as % of GDP. HC represents human capital, taken as average years of schooling (age 15years and above). Explanatory variables in our model are as follows: FDI is foreign direct investment, taken net inflows as % of GDP. Yo is initial real per capita GDP. HC and INO are as explained above. FDI*HC is the interaction of foreign direct investment and human capital. FDI*INO is the interaction term of foreign direct investment and innovation. GOV represents the general government final consumption expenditure as % of GDP. INFL is inflation (CPI). OPEN is trade openness as % of GDP. PRIV is private credit provided by commercial banks to the private sector as % of GDP. INV is the domestic investment in education as % of GDP.

Initial real per capita GDP (Yo) has a negative and significant effect on economic growth (EG) at 1% significance level. It suggests that there is an evidence of convergence in our panel data set. This result supports the theory and prior studies like (Barro, 1996), (Bleaney and Nishiyama, 2000) and (Doppelhofer, 2000), where they come with the evidence of convergence and in our case there is such evidence as well.

In the same way, we observe in our analysis that foreign direct investment (FDI) has a positive effect 3.563 on economic growth (EG) and it is significant at 1% level in Model (2). It suggests that as the inflow of FDI increases it will directly affect EG positively.

Similarly, the equation of human capital (equation 3.1, Chapter 3) represents the effect of foreign direct investment (FDI) on human capital (HC). This effect is positive 11.245 and significant at 1% level of significance in Table 4.3 (Model 2). It suggests that there is a strong positive effect of foreign direct investment (FDI) on human capital (HC) and as the level of FDI inflow increases it will lead to improve the level of human capital either in physical amount or in terms of productivity. This result is consistent with the prior studies of (Lee, 2000) and (Rachel et al. 2001), where they conclude that foreign investment inflow leads to increase labor productivity.

Likewise, the equation of innovation (equation 3.2, Chapter 3) shows effect of foreign direct investment (FDI) on innovation (INO). This effect is also positive 9.062 and significant at 1% significance level in Table 4.3 (Model 2). It shows that there is also a strong positive effect of foreign direct investment (FDI) on innovation (INO) and as the FDI inflow enhances in the economy it will lead to grow innovation activities in

41

the economy. This outcome also supports previous studies like (Damijan et al. 2001) and (Borensztein et al. 1997), where they conclude a strong effect of foreign investment and the R&D spillovers (Tamim, 1997).

Furthermore, the interaction term of foreign direct investment and human capital (FDI*HC) is negative -0.248, and significant at 1% level of significance in Table 4.3 (Model 2). It suggests that the positive effect of FDI on economic growth (EG) declines as the level of HC increases in the economy. In other way we can say that the positive effect of FDI on EG is less profound in countries having low level of HC and vice versa.

In the same way we see that the interaction term of foreign direct investment and innovation (FDI*INO) is also negative -0.590 and significant at 1% significance level in Table 4.3 (Model 2). It suggests that as positive effect of FDI on economic growth (EG) declines as the level of (INO) increases in the economy. In other way we can say that the positive effect of FDI on EG is less profound in countries having low level of INO and vice versa.

In addition to this, we further see that government expenditure (GOV) and inflation (INFL) both have negative and significant effect on economic growth (EG) at 1% significance level consistent with study of (Fischer, 1993). This outcome reveals an inverse relationship between government size (GOV) and economic growth (EG) suggesting that as the government expenditures or government size becomes larger it will lead to affect economic growth (EG) adversely. Similarly, the inverse relationship

between inflation and economic growth means that as there is a price hike in the economy it will also affect economic growth adversely.

Talking about trade openness (OPEN) and private credit (PRIV) we see that both of these also have negative and significant effect on economic growth (EG) at 1 % level. This result also reveals that in our study both openness and private credit affects economic growth (EG) adversely. The reason behind the negative impact of trade openness in our study might be due to the trade deficit or more imports of consumables than the technological instruments and other necessary tools of development like manufacturer imports etc as these things are considered a vehicle for growth and development. Such conclusion is also drawn by (Bayoumi et al. 1999) in a study for USA, (Wachtel, P., & Rousseau, P. L. 2007) also obtained such negative outcomes. Similarly, the negative impact of private credit in our analysis might be due to the greater contribution of advanced countries in the panel data and in most of the advanced economies this effect is negative. Such negative results are also found by (Bhatti, A. A. 2014) and (Wachtel, P., & Rousseau, P. L. 2011). Where they conclude that the positive and significant effect of financial development on growth is valid for old data set only (before 1990s) and it disappears in the recent data. This disappearance may be due to the repeated financial crises after 1990s. While domestic investment in education (INV) has a positive 5.495 and significant effect on economic growth (EG) at 1% significance level, suggesting that as the domestic investment on education increases it will affect economic growth positively.

We summarize our general model results as there are two variables which are although having significant effect but their signs are against the theory. For instance trade openness should affect economic growth positively and private credit should affect economic growth positively as well. Therefore in our parsimonious model we will omit these control variables one by one and run the regression again and again to the point where we get a model showing the overall significance and the signs of coefficients also support theory.

Now, in order to capture the indirect effects of foreign direct investment (FDI) on economic growth (EG) through the channels of human capital (HC) and innovation (INO), we construct Table 4.4. This Table explains the indirect effects of FDI on EG for Specified General Model.

We categorize the indirect effects of FDI on EG through both HC and INO into low, average and higher level of FDI, while coefficients, p-values and 95% confidence interval values are given in fronts to them.

We observe that the indirect effects of foreign direct investment (FDI) through the channel of human capital (HC) at low level of FDI is 5.289, at average level of FDI is 5.179, and at high level of FDI is 4.926.

4.1.3 Parsimonious or Specific Model

In the Final Model, we omit all those variables of general model which are either insignificant or their signs of coefficients are against theory. Only two control variables government final consumption expenditures (GOV) and inflation (INFL), are incorporated along with the variables already exist in the Base-line model which are initial real per capita GDP (Yo), foreign direct investment (FDI), human capital (HC) and innovation (INO). We are using panel data set to capture robustness of different variables on economic growth for the sampled set of countries. All the outcomes of our analysis are expressed in Table 4.5 Model (2).

Model (2) in Table 4.5 explains the direct and conditional effects of foreign direct investment (FDI) on economic growth (EG), however the indirect effects can be obtained by calculating equations (3.1, 3.2 and 3.3) of Chapter 3.

Initial real per capita GDP (Yo) has an inverse and significant effect on economic growth (EG) at 1% significance level. It suggests that there exists an evidence of convergence in our panel study and it is also called pro-poor growth. This result supports the theory and prior studies like (Barro, 1996), (Bleaney and Nishiyama, 2000) and (Doppelhofer, 2000), but in our case the coefficient value is very small so, we can say that this relationship is quite weak.

In the same way we observe in our analysis that foreign direct investment (FDI) has a positive effect 0.052, on economic growth (EG) and it is significant at 1% level in

Model (2). It suggests that as the inflow of FDI increases it will directly affect economic growth (EG) positively.

Table 4.5:   The Effect of Foreign Direct Investment (FDI) on Economic Growth (EG) through the channels of Human Capital and Innovation (Parsimonious or Specific Model)

VARIABLES	Model (1)			Model (2)		
	HC	INO	EG	HC	INO	EG
Yo			-0.000*** (0.000)			-0.000*** (0.000)
FDI	0.018*** (0.000)	0.007*** (0.000)	0.134*** (0.000)	0.033*** (0.000)	0.001* (0.079)	0.052*** (0.000)
HC			0.492*** (0.000)			0.244*** (0.000)
INO			0.658*** (0.000)			0.644*** (0.000)
FDI*HC			-0.007*** (0.000)			-0.005*** (0.000)
FDI*INO			-0.030*** (0.000)			-0.005*** (0.002)
GOV						-0.141*** (0.000)
INFL						-0.006*** (0.004)
Observations	763	763	763	754	754	754
No. of Countries	74	74	74	74	74	74

Note: P-value of each coefficient is given in the parentheses. ***, ** and * show significance at 1%, 5% and 10% levels respectively. Our dependent variables are as follows: EG is growth rate of real per capita GDP. INO represents innovation, taken as research and development expenditure (R&D) as % of GDP. HC represents human capital, taken as average years of schooling (age 15years and above). Explanatory variables in our model are as follows: FDI is foreign direct investment, taken net inflows as % of GDP. Yo is initial real per capita GDP. HC and INO are as explained above. FDI*HC is the interaction of foreign direct investment and human capital. FDI*INO is the interaction term of foreign direct investment and innovation. GOV represents the general government final consumption expenditure as % of GDP. INFL is inflation (CPI).

Similarly, the equation of human capital (equation 3.1, Chapter 3) represents the effect of foreign direct investment (FDI) on human capital (HC). This effect is positive 0.244, and significant at 1% level of significance in Table 4.5 (Model 2). It suggests that there is a strong positive effect of foreign direct investment (FDI) on human capital (HC) and as the level of FDI inflow increases it will lead to improve the level of human capital either in physical amount or in terms of productivity. This result is consistent with the prior studies of (Lee, 2000) and (Rachel et al. 2001), where they conclude that foreign investment inflow leads to increase labor productivity.

Likewise, the equation of innovation (equation 3.2, Chapter 3) shows effect of foreign direct investment (FDI) on innovation (INO). This effect is also positive 0.644 and significant at 1% significance level in Table 4.5 (Model 2). It shows that there is also a strong positive effect of foreign direct investment (FDI) on innovation (INO) and as the FDI inflow enhances in the economy it will lead to grow innovation activities in the economy. This outcome also supports previous studies like (Damijan et al. 2001) and (Borensztein et al. 1997), where they conclude a strong effect of foreign investment and the R&D spillovers (Tamim, 1997).

Furthermore, the interaction term of foreign direct investment and human capital (FDI*HC) is negative and significant at 1% level of significance in Table 4.5 (Model 2). It suggests that the positive effect of FDI on economic growth (EG) declines as the level of HC increases in the economy. In other way we can say that the positive effect of FDI on economic growth is less profound in countries having low level of HC and vice versa.

48

In the same way we see that the interaction term of foreign direct investment and innovation (FDI*INO) is positive and significant at 1% significance level in Table 4.5 (Model 2). It suggests that as positive effect of FDI on economic growth (EG) diminishes as the level of (INO) increases in our panel data analysis and vice versa. In other words we can say that as the level of FDI grows in an economy the positive effect of innovation on growth decreases.

In addition to this, we further see that government expenditure (GOV) and inflation (INFL) both have negative and significant effect on economic growth (EG) at 1% significance level supporting (Fischer, 1993). This outcome reveals an inverse relationship between government size (GOV) and economic growth (EG) suggesting that as the government expenditures or government size becomes larger it will lead to affect economic growth (EG) adversely. Similarly, the inverse relationship between inflation and economic growth means that as there is a price hike in the economy it will also affect economic growth adversely.

Now, in order to capture the indirect effects of foreign direct investment (FDI) on economic growth (EG) through the channels of human capital (HC) and innovation (INO), we construct Table 4.6. This Table explains the indirect effects of FDI on economic growth (EG) for our Parsimonious Model.

We categorize the indirect effects of FDI on EG through both HC and INO into low, average and higher level of FDI, while coefficients, p-values and 95% confidence interval values are given in fronts to them.

We observe that the indirect effects of foreign direct investment (FDI) through the channel of human capital (HC) at low level of FDI is 0.008, at average level of FDI is 0.008, and at high level of FDI is 0.007. These effects at all three levels of FDI are positive and significant at 1% level of significance. This result suggests that whatever the level of inward FDI is, it affects economic growth (EG) positively regardless of the magnitude of effect.

Table 4.6:   The Indirect Effects of FDI on Economic Growth (Parsimonious Model)

Channels	Levels of FDI	Indirect Effects	95% confidence interval	
Human Capital	Low level of FDI	0.008*** 0.000	0.007	0.009
	Average level of FDI	0.008*** 0.000	0.007	0.009
	High level of FDI	0.007*** 0.000	0.006	0.008
Innovation	Low level of FDI	0.000* 0.079	-0.000	0.002
	Average level of FDI	0.000* 0.079	-0.000	0.002
	High level of FDI	0.000* 0.079	-0.000	0.002

Note: P-value of each coefficient is given in the parentheses. ***, ** and * represents the significance at 1%, 5% and 10% levels respectively. Low means 25th percentile, average level is 50th percentile and high level shows 75th percentile levels of FDI respectively.

Similarly; the indirect effects of foreign direct investment (FDI) through the channel of Innovation (INO) at low level of FDI is 0.000, at average level of FDI is 0.000 and at high level of FDI is 0.000. These effects at all three levels of FDI are also positive and significant at 10% significance level. This outcome also reveals that at any level of inward FDI it affects innovation in the economy positively regardless of the magnitude of this effect.

4.2   Summary

Our estimation results regarding direct effects of our different explanatory variables on economic growth (EG) like convergence variable (Yo), foreign direct investment (FDI), human capital (HC) and innovation (INO) in Tables (4.1, 4.3 and 4.5) are all supporting our research objective and fully consistent with the prior studies. For instance (Yo) is consistently negative and significant for all models in Tables (4.1, 4.3 and 4.3). This outcome strongly supports the evidence of convergence in the prior literature on growth and convergence like (Barro, 1996), (Bleaney and Nishiyama, 2000) and (Doppelhofer, 2000).

In the same way we observe that FDI, HC and INO are also positive and significant in all our models of Tables (4.1, 4.3 and 4.5) and provide a strong support to our research objectives. Similarly, the control variables like government size (GOV) and inflation (INFL) in Tables (4.1, 4.3 and 4.5) are also up to the mark and provide clear evidence of theoretical background where all of these two variables affect economic growth adversely. This is also proved by (Fischer, 1993) and (Barro, 1996). Another control

variable domestic investment in education (INV) is also positive and significant suggesting that investment in education leads to enhance growth. Two variables trade openness (OPEN) and private credit provided by commercial banks to the private sector (PRIV) are although significant but are negative and will affect economic growth adversely that's why have omitted these variables from our Parsimonious or specific Model.

While determining the significance of the indirect effects of foreign direct investment (FDI) at its different levels on economic growth (EG) through the channels of human capital and innovation, we construct confidence intervals at low, average and high levels of FDI as presented in Tables (4.2, 4.4 and 4.6). The indirect effects of FDI on EG through the channels of HC and INO are positive and significant at all levels of FDI. These results are supporting our research objectives.

We note that, the indirect effects of FDI on economic growth (EG) are more profound as compare to the direct effects. This conclusion is based on the coefficients values of the interaction terms of (FDI*HC) and (FDI*INO).

Chapter 5

Conclusions and Policy Recommendations

5.1 Conclusions

We use a panel data set of 74 countries in this research to explore the relationship between foreign direct investment and economic growth through the channels of human capital and innovation. We use Seemingly Unrelated Regression (SUR) technique for panel data to obtain the direct as well as the indirect empirical results as suggested by (Biorn, 2004). We examine the indirect linkages between foreign direct investment and economic growth to achieve our main objectives of this study. The channels we are using to explore the indirect effect of foreign direct investment (FDI) on economic growth (EG), are human capital (HC), and innovation (INO). In other words, this study exploits the direct (marginal), conditional (interaction terms and real per capita GDP) and indirect effects of foreign direct investment on economic growth.

It is obvious from our empirical results that, foreign direct investment (FDI) has a positive and significant effect on economic growth in all our three models. It suggests that as the FDI inflow increases, as a result there will growth enhancement in the economy. Similarly; Human capital (HC) and Innovation (INO) both have also positive and significant effect on economic growth in all the three models. It means that as in an economy the level of human capital and innovation activities improves, it will directly enhance growth. In the same way government size (GOV) and inflation

(INFL) both have negative relationship with economic growth and affects it adversely in models 4.1, 4.3 and 4.5. The negative sign of initial real per capita gdp (Yo) coefficient clearly shows a convergence in both the models (4.1, 4.3 and 4.5), and it is consistent with the prior literature like (Barro, 1996), (Bleaney and Nishiyama, 2000) and (Doppelhofer, 2000).

Coefficients of all the interaction term of foreign direct investment with human capital (FDI*HC) are negative and significant in all the Tables (4.1, 4.3 and 4.5) suggesting that the positive effect of FDI on EG diminishes as the level of HC increases in the economy. In other way we can say that the positive effect of FDI on EG is less profound in countries having low level of HC and vice versa.

Similarly, coefficients of all the interaction terms of foreign direct investment and innovation (FDI*INO) are also negative and significant in the Tables (4.1, 4.3 and 4.5), also suggesting that the positive effect of FDI on economic growth (EG) declines as the level of INO increases in the economy. In other words we can say that as the level of innovation grows in an economy with the inward FDI, the positive effect declines over time.

We conclude here that there is a direct and positive relationship between foreign direct investment and economic growth in our panel set of data which means that, if the amount of foreign direct investment (inflow) increases it will lead to enhance economic growth in the home economy. Likewise, as the levels of human capital and innovation within an economy increase, their impact on the economic growth declines over time as the level of inward FDI grows.

54

Talking about the indirect effect of foreign direct investment on economic growth is a matter of our concern, because it is our main objective to explore the indirect effect of foreign direct investment on economic growth. It is obvious from our results that foreign direct investment has a positive and significant indirect effect on economic growth through both the channels of human capital and innovation. We come with the conclusion that foreign direct investment affects human capital positively which further leads to affect economic growth in a positive way. Similarly, foreign direct investment affects innovation positively which further leads to affect economic growth in a positive way. We also conclude the direct effect of foreign direct investment on economic growth is also positive.

We note that, the indirect effects of FDI on economic growth (EG) are more profound as compare to the direct effects. This conclusion is based on the coefficients values of the interaction terms of (FDI*HC) and (FDI*INO).

5.2   Policy Recommendations

From the discussion it is clear that our findings reflect the direct effect of foreign direct investment on economic growth as positive. Foreign direct investment is found as one of the major contributors to the domestic growth. Therefore, Governments need to focus and initiate policies which are attractive for foreign investment. Foreign investors should be given initiatives and facilities. To maintain Law and order situation in the country to provide safe and secure environment so that foreign investors can be attracted to invest in the domestic economy. It will lead to strengthen

55

domestic economy and will also contribute to enhance employment opportunities in the local market.

Similarly, human capital being one of our core variables and contributing to domestic economic growth, governments also should focus on educational policies and need to develop a well educated and skilled labor force in the form of human capital so that maximum benefits can be achieved from foreign investment. Foreign investors also initiate trainings and skill development programs for their employees. So, contribution from both sides of governments and foreign investors will make possible to achieve the ultimate goal of economic growth.

In the same way as we conclude that innovation in an economy is one of the major contributors to growth in the modern economies. Government officials and policy makers should also initiate research and development programs in the country to make domestic technological progress on one hand and on the other hand to make the economy able to absorb the technology transfer in the form of foreign investment.

Likewise, Government size has been one of the hurdles in the way of economic growth in the modern economies so far. Therefore, government size leads to increase non-developmental expenditures and expansion of ministries and departments further leads to enhance possibilities of corruption and other administrative complications. Therefore government size should be contracted so that, lesser the government expenditures will lead to spend more on developmental projects to enhance domestic growth which is the ultimate goal of any economy.

Inflation has also been one of the main obstacles in the way of economic growth around the world. Inflation should be controlled and kept as minimum as possible so that persistent growth can be achieved in the economy.

5.3   Directions for Future Research

The current research, no doubt captures the impact of FDI on economic growth in a very comprehensive way but at the same time it also opens new ways to researchers regarding studying the indirect effects of FDI on economic growth. In the current study we analyze panel data set for 74 countries including developing and developed.

1) Same studies might be conducted for developing and developed economies separately.

2) Obtaining data for greater number of countries

3) Different time span can be used for future research in such studies

4) Incorporating more variables in the study to capture their impact on economic growth.

   ❖ Government investment

   ❖ Private investment

   ❖ Population growth

   ❖ level of physical capital

5) Exploring other channels of economic growth to capture their impact

References

Aghion, P., Blundell, R., Griffith, R., Howitt, P., & Prantl, S. (2004). Entry and productivity growth: Evidence from micro-level panel data. Journal of the European Economic Association, 2(2-3), 265-276.

Akinlo, A. E. (2004). Foreign direct investment and growth in Nigeria an empirical investigation. Journal of Policy Modeling, (26) 627-639.

Ambler, T., & Barrow, S. (1996). The employer brand. Journal of brand management, 4(3), 185-206.

Artadi, E. V., & Sala-i-Martin, X. (2003). The economic tragedy of the XXth century: growth in Africa (No. w9865). National Bureau of Economic Research.

Asteriou, D., & Agiomirgianakis, G. M. (2001). Human capital and economic growth: time series evidence from Greece. Journal of Policy Modeling, 23(5), 481-489.

Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. Journal of personality and social psychology, 51(6), 1173.

Barrell, R., & Pain, N. (1997). Foreign Direct Investment, Technological Change, And Economic Growth Within Europe*.The Economic Journal, 107(445), 1770-1786.

Barro, R. J. (1996). Determinants of economic growth: a cross-country empirical study (No. w5698). National Bureau of Economic Research.

Barro, R. J. LEE. (1993),'International Comparisons of Educational Attainment. NBER Working Paper, (w4349).

Barro, R. J., & Lee, J. W. (1993). International comparisons of educational attainment. Journal of monetary economics, 32(3), 363-394.

Barro, R. J., & Lee, J. W. (1996). International measures of schooling years and schooling quality. The American Economic Review, 218-223.

Barro, R. J., Sala-i-Martin, X., Blanchard, O. J., & Hall, R. E. (1991). Convergence across states and regions. Brookings papers on economic activity, 107-182.

Bayoumi, T., & Masson, P. R. (1995). Fiscal flows in the United States and Canada: lessons for monetary union in Europe. European Economic Review,39(2), 253-274.

Bayoumi, T., Coe, D. T., & Helpman, E. (1999). R&D spillovers and global growth. Journal of International Economics, 47(2), 399-428.

Ben-David, D. (1996). Trade and Governance among countries." Journal of International Economics (40), 279-298.

Ben-David, D. (1996). Trade and convergence among countries. Journal of international Economics, 40(3), 279-298.

Bengoa, M., & Sanchez-Robles, B. (2003). Foreign direct investment, economic freedom and growth: new evidence from Latin America. European journal of political economy, 19(3), 529-545.

Benhabib, J., & Spiegel, M. M. (1992). The role of human capital and political instability in economic development. New York University.

Benhabib, J., & Spiegel, M. M. (1994). The role of human capital in economic development evidence from aggregate cross-country data. Journal of Monetary economics, 34(2), 143-173.

Benhabib, J., & Spiegel, M. M. (1997). Growth and investment across countries: are primitives all that matter?. Federal Reserve Bank of San Francisco.

Benhabib, J., & Spiegel, M. M. (2005). Human capital and technology diffusion.Handbook of economic growth, (1), 935-966.

Beugelsdijk, S. (2008). Strategic human resource practices and product innovation. Organization Studies, 29(6), 821-847.

Beugelsdijk, S., Smeets, R., & Zwinkels, R. (2008). The impact of horizontal and vertical FDI on host's country economic growth. International Business Review, 17(4), 452-472.

Bhatti, A. A. (2014). A Robust Sensitivity Analysis of Cross-Country Finance-Growth Regressions. Available at SSRN 2432519.

Bils, M. (2004). Measuring the growth from better and better goods (No. w10606). National Bureau of Economic Research.

Bils, M., & Klenow, P. J. (1998). Does schooling cause growth or the other way around? (No. w6393). National Bureau of Economic Research.

Bils, M., & Klenow, P. J. (2000). Does schooling cause growth?. American economic review, 1160-1183.

Biørn, E. (2004). Regression systems for unbalanced panel data: a stepwise maximum likelihood procedure. Journal of Econometrics, 122(2), 281-291.

Bitzer, J., & Kerekes, M. (2008). Does foreign direct investment transfer technology across borders? New evidence. Economics Letters, 100(3), 355-358.

Bleaney, M., & Nishiyama, A. (2002). Explaining growth: a contest between models. Journal of Economic Growth, 7(1), 43-56.

Bleaney, M., & Nishiyama, A. (2003). Convergence in income inequality: differences between advanced and developing countries. Economics Bulletin,4(22), 1-10.

Bleaney, M., & Nishiyama, A. (2004). Income inequality and growth—does the relationship vary with the income level?. Economics Letters, 84(3), 349-355.

Blomström, M., & Kokko, A. (1997). How Foreign Investment Affects Hose Countries (No. 1745). World Bank Publications.

Blomstrom, M., & Kokko, A. (1997). Regional integration and foreign direct investment (No. w6019). National Bureau of Economic Research.

Borensztein, E., De Gregorio, J., & Lee, J. W. (1998). How does foreign direct investment affect economic growth?. Journal of international Economics, 45(1), 115-135.

61

Branstetter, L. (2000). Foreign Direct Investment and R&D Spillovers Is There a Connection. University of Chicago Press (9), 113 - 146.

Branstetter, L., Fisman, R., & Foley, C. F. (2005). Do stronger intellectual property rights increase international technology transfer? Empirical evidence from US firm-level data (No. w11516). National Bureau of Economic Research.

Bruno, M., & Easterly, W. (1998). Inflation crises and long-run growth. Journal of Monetary Economics, 41(1), 3-26.

Büthe, T., & Milner, H. V. (2008). The politics of foreign direct investment into developing countries: increasing FDI through international trade agreements?.American Journal of Political Science, 52(4), 741-762.

Cao, L. G., & Wang, Y. L. (1990). Mechanism of the formation of contractile ring in dividing cultured animal cells. II. Cortical movement of microinjected actin filaments. The Journal of cell biology, 111(5), 1905-1911.

Chowdhury, A., & Mavrotas, G. (2005). FDI and growth: a causal relationship(No. 2005/25). Research Paper, UNU-WIDER, United Nations University (UNU).

Coe, D. T., & Helpman, E. (1995). International r&d spillovers. European economic review, 39(5), 859-887.

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

Crespo, N., & Fontoura, M. P. (2007). Determinant factors of FDI spillovers–what do we really know?. World development, 35(3), 410-425.

Cuaresma, J. C., & Doppelhofer, G. (2007). Nonlinearities in cross-country growth regressions: A Bayesian averaging of thresholds (BAT) approach.Journal of Macroeconomics, 29(3), 541-554.

D. Asterioua, G.M. Agiomirgianakisb (2001). Human capital and economic growth Time series evidence from Greece. Journal of Policy Modeling (23), 481-489.

Damijan, J. P., Knell, M. S., Majcen, B., & Rojec, M. (2003). Technology transfer through FDI in top-10 transition countries: How important are direct effects, horizontal and vertical spillovers?.

Damijan, J. P., Knell, M., Majcen, B., & Rojec, M. (2003). The role of FDI, R&D accumulation and trade in transferring technology to transition countries: evidence from firm panel data for eight transition countries. Economic systems,27(2), 189-204.

De La Potterie, B. V. P., & Lichtenberg, F. (2001). Does foreign direct investment transfer technology across borders?. Review of Economics and Statistics, 83(3), 490-497.

Doppelhofer, G., Miller, R. I., & Sala-i-Martin, X. (2000). Determinants of long-term growth: A Bayesian averaging of classical estimates (BACE) approach(No. w7750). National bureau of economic research.

E. Borenszteina , J. De Gregoriob, J-W. Leec (1998). "How does foreign direct investment affect economic growth." Journal of International Economics (45), 115–135.

Eaton, J., & Kortum, S. (1996). Trade in ideas Patenting and productivity in the OECD. Journal of international Economics, 40(3), 251-278.

Engelbrecht, H. J. (2003). Human Capital and Economic Growth: Cross-Section Evidence for OECD Countries. Economic Record, 79(SpecialIssue), S40-S51.

Findlay, R. (1978). Relative backwardness, direct foreign investment, and the transfer of technology: a simple dynamic model. The Quarterly Journal of Economics, 1-16.

Fischer, S. (1993). The role of macroeconomic factors in growth. Journal of monetary economics, 32(3), 485-512.

Girma, S., Gong, Y., & Görg, H. (2008). Foreign direct investment, access to finance, and innovation activity in Chinese enterprises. The World Bank Economic Review, 22(2), 367-382.

Griffith, R., Redding, S., & Van Reenen, J. (2004). Mapping the two faces of R&D: Productivity growth in a panel of OECD industries. Review of Economics and Statistics, 86(4), 883-895.

Gürsoy, F., & Kalyoncu, H. (2012). Foreign direct investment and growth relationship in Georgia. International Journal of Economics and Financial Issues, 2(3), 267-271.

Gursoy, F., Sekreter, A., & Kalyoncu, H. (2013). FDI and economic growth relationship based on cross-country comparison. International Journal of Economics and Financial Issues, 3(2), 519-524.

Hakro, A. N., & Ghumro, I. A. (2011). Determinants of foreign direct investment flows to Pakistan. The Journal of Developing Areas, 44(2), 217-242.

Harrison, A. E. (1994). Productivity, imperfect competition and trade reform: Theory and evidence. Journal of International Economics, 36(1), 53-73.

Hoekman, B. M., Maskus, K. E., & Saggi, K. (2005). Transfer of technology to developing countries: unilateral and multilateral policy options. World Development, 33(10), 1587-1602.

Hu, A. G., Jefferson, G. H., & Jinchang, Q. (2005). R&D and technology transfer: firm-level evidence from Chinese industry. Review of Economics and Statistics, 87(4), 780-786.

Iqbal, T., Khan, B. A., Nadeem Talib, D., & Khan, N. (2012). TQM and organization performance: the mediation and moderation fit. *Life Science Journal, 9*(4).

Jess Benhabib, M. M. S. (1992). The Role Human capital and political instability in economic development. C. V. Starr Centre for Applied Economics 92(24).

Jess Benhabib, M. M. S. (1994). The role of human capital in economic development Evidence from aggregate cross-country data. Journal of Monetary Economics (34), 143-173.

Jonathan Templea, b., Hans-Joachim Voth" (1998). Human capital, equipment investment, and industrialization. European Economic Review (42), 1343- 1362.

Khan, M. A., & Khan, S. A. (2011). Foreign direct investment and economic growth in

Pakistan: A Sectoral Analysis. Working Papers & Research Reports,2011.

Krueger, A. M indahl (2000):; Education for Growth: Why and For Whom. Journal of Economic Literature (39), 1101–1136.

Liu, Z. (2008). Foreign direct investment and technology spillovers: Theory and evidence. Journal of Development Economics 85(1-2): 176-193.

Lucas, R. E. (1998). On the mechanics of economic development.Econometric Society Monographs, (29), 61-70.

Mankiw, N. G., Romer, D., & Weil, D. N. (1990). A contribution to the empirics of economic growth (No. w3541). National Bureau of Economic Research.

Markusen, J. R. (1989). Trade in producer services and in other specialized intermediate inputs. The American Economic Review, 85-95.

Muller, D., Judd, C. M., & Yzerbyt, V. Y. (2005). When moderation is mediated and mediation is moderated. Journal of personality and social psychology, 89(6), 852.

Mutascu, M., & Fleischer, A. M. (2011). Economic growth and globalization in Romania. World Applied Sciences Journal, 1691-1697.

Nelson, R. R., & Phelps, E. S. (1966). Investment in humans, technological diffusion, and economic growth. The American Economic Review, 69-75.

Ozturk, I., & Kalyoncu, H. (2007). Foreign direct investment and growth: An empirical investigation based on cross-country comparison.

Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and re-sampling strategies for assessing and comparing indirect effects in multiple mediator models. Behavior research methods, 40(3), 879-891.

Preacher, K. J., Rucker, D. D., & Hayes, A. F. (2007). Addressing moderated mediation hypotheses: Theory, methods, and prescriptions. Multivariate behavioral research, 42(1), 185-227.

Pritchett, L. (1996). Where has all the education gone?. World Bank Policy Research Working Paper, (1581).

Pritchett, L. (2001). Where has all the education gone?. The World Bank Economic Review, 15(3), 367-391.

Razin, A., Sadka, E., & Tong, H. (2008). Bilateral FDI flows: Threshold barriers and productivity shocks. CESIFO Economic Studies, 54(3), 451-470.

Rodrik, D. (1996). Coordination failures and government policy: A model with applications to East Asia and Eastern Europe. Journal of international economics, 40(1), 1-22.

Romer, P. M. (1986). Increasing returns and long-run growth. The journal of political economy, 1002-1037.

Romer, P. M. (1990). Human capital and growth: theory and evidence. In Carnegie-Rochester Conference Series on Public Policy (32), 251-286. North-Holland.

Rousseau, P. L., & Wachtel, P. (2011). What is happening to the impact of financial deepening on economic growth?. Economic Inquiry, 49(1), 276-288.

Sala-i-Martin, X., & V Artadi, E. (2003). Economic growth and investment in the Arab world.

Sinani, E., & Meyer, K. E. (2004). Spillovers of technology transfer from FDI: the case of Estonia. Journal of comparative economics, 32(3), 445-466.

Spingler, W. (1964). U.S. Patent No. 3,117,769. Washington, DC: U.S. Patent and Trademark Office.

Stansel, R. M., de Lange, T., & Griffith, J. D. (2001). T-loop assembly in vitro involves binding of TRF2 near the 3' telomeric overhang. The EMBO journal,20(19), 5532-5540.

Temiz, D., & Gökmen, A. (2014). FDI inflow as an international business operation by MNCs and economic growth: An empirical study on Turkey.International Business Review, 23(1), 145-154.

Temple, J. (1999). A positive effect of human capital on growth. Economics Letters, 65(1), 131-134.

Temple, J. (1999). The new growth evidence. Journal of economic Literature, 112-156.

Temple, J., & Voth, H. J. (1998). Human capital, equipment investment, and industrialization. European Economic Review, 42(7), 1343-1362.

Tiwari, A. K., & Mutascu, M. (2011). Economic growth and FDI in Asia: A panel-data approach. Economic Analysis and Policy, 41(2), 173-187.

Wang, M. (2009). Manufacturing FDI and economic growth: evidence from Asian economies. Applied Economics, 41(8), 991-1002.

Xin, X., & Whalley, J. (2006). China's FDI and Non-FDI Economies and the Sustainability of Future High Chinese Growth. National Bureau of Economic Research.

Xu, B. (2000). Multinational enterprises, technology diffusion, and host country productivity growth. Journal of Development Economics, 62(2), 477-493.

Xu, B., & Wang, J. 2000), Trade, FDI and international technology diffusion. InJournal of Economic Integration.

Zellner, A. (1962). An efficient method of estimating seemingly unrelated regressions and tests for aggregation bias. Journal of the American statistical Association, 57(298), 348-368.

Zhao, X., Lynch, J. G., & Chen, Q. (2010). Reconsidering Baron and Kenny: Myths and truths about mediation analysis. Journal of consumer research,37(2), 197-206.

Appendix A-1

Table of variables and their sources:

S No.	Variables	Variable Symbol	Variable Description	Source
1	Economic Growth (annual %)	EG	Economic Growth (log difference of real per capita GDP growth, constant 2005 US$)	WDI (2011)
2	Foreign Direct Investment	FDI	Foreign direct investment as % of GDP (X+M)	WDI (2011)
3	Human Capital	HC	Human capital (average years of schooling (of population with age 15 years and above) as proxy for human capital)	Barro-Lee (2012)
4	Innovation	INO	Innovation: R&D as % of GDP,	WDI (2011)
5	Government Size	GOV	Government size (government final consumption expenditure % of GDP)	WDI (2011)
6	Inflation	INF	Annual % Inflation rate (consumer price index)	WDI (2011)
7	Initial GDP	Y_0	Initial real per capita income (we use first lag of real per capita income per annum at 2005 US$)	WDI (2011)
8	Openness	OPEN	Trade openness of country, (X+M) % of GDP	WDI (2011)
9	Private Credit by Commercial banks	PRIV	Private credit (domestic credit provided by commercial banks to private sector) as % of GDP	WDI (2011)
10	Domestic investment in education	INV	Domestic Investment in education sector as % of GDP	WDI (2011)

Appendix A-2

Table of Summary Statistics:

Variables	Obs	Mean	Minimum	Median	Maximum	SD
EG	3383	2.387	-40.747	2.698	42.016	4.714
FDI	2395	4.860	-15.049	1.396	564.97	26.639
HC	3700	7.527	0.59	7.785	13.18	2.745
INO	771	1.086	0.006	0.705	4.864	0.979
GOV	3025	15.712	1.401	15.173	76.222	5.432
INFL	2879	33.798	-21.675	5.879	11749	318.897
OPEN	3018	70.195	0.309	58.272	438.092	50.621
Yo	3284	12952.7	83.400	5907.9	86127.2	14232.6

Appendix A-3

Correlation Matrix:

	EG	FDI	INO	HC	GOV	INFL	OPEN	Yo
EG	1.000							
FDI	0.029	1.000						
INO	-0.179	0.049	1.000					
HC	0.060	0.069	0.497	1.000				
GOV	-0.226	-0.028	0.568	0.362	1.000			
INFL	-0.077	-0.019	-0.096	-0.050	-0.086	1.000		
OPEN	0.113	0.396	-0.007	0.229	-0.082	-0.024	1.000	
Yo	-0.257	0.335	0.679	0.457	0.499	-0.122	0.185	1.000