

Assessing the Impact of Foreign Direct Investment on Human Capital Development in India: 1995-2014

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India is pursuing foreign direct investment in a big way to achieve higher economic growth and development. The basic motive of such growth is development of human capital. Given that FDI interacts with both economic growth and human capital development in the host country, it is essential to study the impact of FDI on human capital development for India. This study uses an econometric time series model for the period 1995-2014 to show that FDI offers a development potential and contributes to the host country's human capital development. The results indicate that FDI has a small but statistically significant positive impact on human capital development.

Keywords: *Foreign Direct Investment, Human Capital Development, Human Development Index, Time Series Analysis, Fully Modified Ordinary Least Squares*

1. INTRODUCTION

Post independence, India started out as a cautious and protected economy with myriad restrictions on foreign trade, investment and currency convertibility. However, the economic reforms undertaken in the early 1990s ushered in an era of economic growth and prosperity characterized by liberalization, privatization and globalization.

Gradually, over the years, Indian economy as a whole became dependent upon an assured supply of foreign capital in the form of foreign direct investment for tackling external commercial borrowings and plugging of the current account deficit. It is safe to assume that the Indian government is betting on FDI in a big way to tackle the above mentioned problems and also to be assured

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of a steady rate of economic growth. It is thought that FDI would help stabilize the external situation in two ways. First, because of its longer investment horizon, and second, because it could help reduce the country's dependence on imported manufactures.

The basic motive of economic growth is human capital development. Given that FDI interacts with both economic growth and human capital development in the host country, it is essential to study the impact of FDI on human capital development for India. This study aims to show empirically that FDI offers a development potential and contributes to the host country's human capital development.

The objectives of the study are as follows:

- To study the variables that impact human capital development in India
- To assess the role of FDI inflows in human capital development in India
- To determine impact of changes in FDI inflows on human development indicators in India

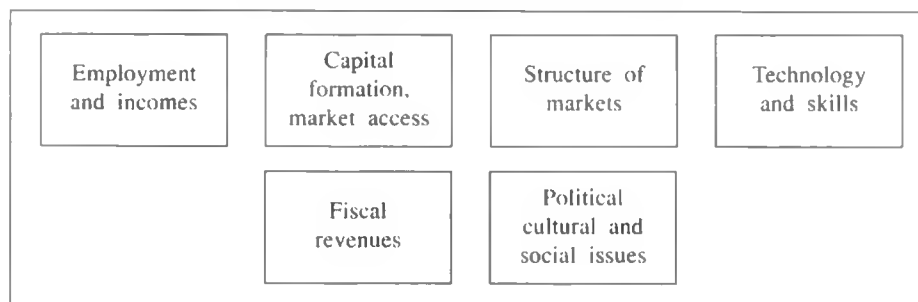
2. LITERATURE REVIEW

2.1 Foreign Direct Investment and its Impact

Foreign direct investment (FDI) occurs when a firm invests directly in facilities to produce and/or market a product in a foreign country. UNCTAD defines FDI as an investment involving a long-term relationship and reflecting a lasting interest in and control by a resident entity in one economy (foreign direct investor or parent enterprise) of an enterprise resident in a different

As per UNCTAD (1999), impact areas of FDI on development include:

Figure 1. Impact of FDI on Development



Source: UNCTAD (1999)

FDI affects economic growth through all of the above channels. The literature is rich with studies analyzing the causal relationship between FDI and economic growth, e.g., Alfaro (2003), Alfaro et al. (2004), Apergis et al. (2007), Carkovic and Levine (2005), Chowdhary and Mavrotas (2006), Hansen and Rand (2006), Lensink and Morrissey (2001), Nair-Reichert and Weinhold (2001), Balasubramanyam et al. (1999), Borenzstein et al. (1998), Li and Lieu (2005) etc. Broadly, research is supportive of the notion that FDI leads to aggregate economic growth, provided the host country has reached a certain threshold level of human capital, infrastructural and technological development. Lall and Narula (2004) argue that FDI by itself does not provide growth opportunities unless a domestic industrial capabilities base exists which has the technological capacity to profit from the externalities from multinational's activities. Borenzstein *et al.* (1998) suggest that the effectiveness of FDI depends on the stock of human capital in the host country. Only in countries where human capital is above a certain threshold does FDI positively contribute to growth. Xu (2000) estimates a growth equation for different samples of countries and finds a significant positive effect of FDI on growth in samples of countries with higher levels of human capital.

Similarly, Chowdhury and Mavrotas (2005) have reviewed a large number of empirical studies on the role of FDI in host countries which suggest that FDI is an important source of capital, complements domestic private investment, is usually associated with new job opportunities and enhancement of technology transfer and spillover, human capital (knowledge and skill) enhancement, and boosts overall economic growth in host countries. Zhao (1995) found that the inflow of technology through FDI stimulated indigenous technology development. Hermes and Lensink (2003), Durham (2004) and Alfaro et al. (2004) all find that countries with better financial systems and financial market regulations can exploit FDI more efficiently and achieve a higher growth rate.

Te Velde (2006) mentions many governments have begun to realize that inward and outward FDI can do more than just address balance of payments issues. For instance, FDI has contributed to changing whole production structures in South East Asian countries. FDI and foreign ownership in particular was also a source of access to new skills and techniques. FDI can help to increase productivity and thus growth, and thereby also reduce poverty.

Lehnert (2013) mentions that current literature has been divided by the positive and negative impacts of FDI on the host country. Some argue that FDI leads to economic growth, and productive increases in the economy as a whole, while others stress the risks associated with FDI. Researchers have posed concerns over the potential negative social effects of FDI. Due

to their relative size, MNEs were able to have control over the market, reducing overall competition and choice..

However, Te Velde (2006) states that a more nuanced view on FDI and development has emerged in the research community, viewing the impact of FDI on economic growth as not only positive or only negative, but that the effects depend on the type of FDI, firm characteristics, economic conditions and policies. The volume of FDI alone is not a sufficient measure of growth prospects. Sumner (2005) mentioned that the scale of benefits of FDI depends on the kind of FDI and its mode of entry, function, and financing, as well as the nature of the host economy.

This was evident in the growth performance of East Asian countries since 1960s, where an increase in efficiency seeking FDI in high value added manufacturing has been instrumental in transforming production structures. However, natural resource seeking FDI weakly governed oil rich developing countries such as Nigeria in the 1970s - 1990s or market seeking FDI that replaces local domestic capabilities by import substitution in countries in Latin America in the 1970s and early 1980s did not have the same growth enhancing impact.

A greenfield investment or a joint venture, for example, brings in new capital and would likely have strong local spillovers compared to FDI through a merger and acquisition. Raw-material-seeking FDI may create benefits of exports but little employment and few local spillovers. In contrast, market-access FDI might bring benefits of local content sourcing and employment. Chang (2003) conjectures that efficiency- or export-platform-seeking FDI is likely to contribute net exports and technology transfer but may have few local linkages. Countries at higher levels of economic development may benefit more, as they are able to provide local suppliers and/or a skilled labour force, while resource endowments and social, political, and cultural characteristics also mediate the relationship between FDI and the host economy.

2.2 Human Capital Development

Human capital is defined as the skills, knowledge, and experience possessed by an individual or population, viewed in terms of their value or cost to an organization or country. According to Becker (1993), human capital is an aggregation of knowledge, skills, abilities, and competencies, acquired by human beings over the course of their lives, developed through participation in various forms of formal and informal education and training, and utilized in productive activity for the benefit of individuals, organizations, and society. Lynham and Cunningham (2006) note that investment in people results in improved performance on the individual level, improved productivity

on the organizational level, and economic development and other benefits on the societal level. Michie (2001) notes that development of human capital can have a number of beneficial effects, both direct and indirect, for businesses and for the economy as a whole. Human capital development can be expected to lead to higher productivity and profitability as a direct result of the increased capacity of the employees to perform their tasks.

Human capital development contributes to economic growth and development of a country in a big way. Over the years, growth theories have evolved to include human capital as a significant determinant of economic growth.

Barro (1991) and Easterly, et al. (1994) argue that endogenous growth theory has re-awakened interest in the role of human capital, providing ample evidence that technology and human capital play an essential role in a country's development. Furthermore, Ranis, Stewart and Ramirez (2000) point out that there exists a strong connection between economic growth and human development. Economic growth provides the resources to permit sustained improvements in human development while improvements in the quality of the labor force are important contributors to economic growth.

Given that more and more nations are trying to attract efficiency seeking and strategic asset seeking FDI in high value added areas, human development levels in country are likely to be an important determinant of inward FDI flows. Noorbakhsh et al. (2001) note that the presence of skilled personnel is a requirement for ensuring capital flows. To Dunning (1988), the skill and educational level of labour in a country can influence the volume and the extent to which FDI impacts on the recipient economy. Over the years, several empirical studies have proved that human development is a significant and positive determinant of FDI in a host country. These studies include Iyanda and Bello (1976), Nataranjan and Miang (1992), Dasgupta et al. (1996), Borensztein et al. (1998), Carkovic and Levine (2002), Alfaro et al. (2004), Xie and Wang (2009). However, studies by Root and Ahmed (1979), Schneider and Frey (1985), and Narula (1996) have found that human capital is not a significant determinant of FDI inflows to developing countries.

Ghosh and Mastromarcho (2013) conducted a stochastic frontier analysis of 24 OECD countries between the period 1993-2004 and found that the effects of international trade, FDI and migration on efficiency depend crucially on the level of accumulated human capital in a country. Blomstrom and Kokko (2003) and Miyamoto (2003) note that for multinational corporations operating in skill-intensive industries, the general level of human capital is very important. Similarly, in examining the impact of human capital on productivity gains arising from FDI flows, Borensztein et al. (1998) and Xu (2000) empirically

show that the impact of FDI on per capita growth depends upon the accumulated threshold level of human capital in the host economy.

There is clear indication in literature that human capital acts as the catalyst as well as a medium through which FDI inflows impact economic growth of a country. Now the question arises, whether FDI inflows impact human capital as well. Gohou (2009) mentions that FDI impacts human capital development through direct or indirect channels. The direct channel involves spillovers to the private sector through backward and forward linkages. FDI may also bring positive horizontal spillovers through augmented competition and implementation of new technologies. In addition to these positive spillovers to local firms, FDI can impact on human capital development directly through job creation. Such jobs will generate income for new workers. The indirect channel works at the macroeconomic level. If a country receives an overall net positive transfer, it is likely that FDI will increase investment. Investment is considered to increase economic growth, which in turn enhances human capital development.

Egger et al (2005) uses cross-sectional data of 79 countries and finds that net inflows of foreign direct investment raise participation in higher education. Zhuang (2008) investigated the effect of FDI on human capital accumulation in China using difference in difference strategy for the period 1978-99. He found that rising share of capital and technology intensive FDI in the 1990s lead to higher percentage of population with college and professional and technical education.

Finally, Majeed and Ahmad (2008) note that while human capital and FDI individually affect growth, they also reinforce each other through complementary effects. In general, enhanced human capital increases incoming FDI by making the investment climate attractive for foreign investors. This is done through a direct effect of upgraded skill level of the workforce, as well as via indirect effects such as improved socio-political stability and health. On the other hand, FDI contributes to human capital since multinational enterprises (MNEs) themselves can be active providers of education and training, bringing new skills, information and technology to host developing countries. Ultimately, this complementary effect leads to a virtuous circle of human capital and FDI where host countries experience continuous inflow of FDI over time by increasingly attracting higher value-added MNEs, while at the same time upgrading the skill contents of preexisting MNEs and domestic enterprises.

2.3 Using Human Development Index to measure impact of FDI on Human Capital

The ultimate objective of economic development is to improve human development. It is generally thought that economic growth improves overall wellbeing and so in majority of the studies on FDI-growth nexus, the researchers have assumed economic growth rate to be a good proxy for welfare or human development. However, this assumption has been questioned by Anand and Sen (2000). They say that when economic growth is not pro-poor then the effect may be worsening inequality instead of overall wellbeing.

Kolstad and Tondel (2002) also mention that in the general development debate, economic development as measured by growth in GDP per capita is viewed as an important, but not sufficient, means of achieving improvements in human well-being, reduction in absolute poverty, wider choices and greater opportunities to realize human capabilities, and other development goals. Moreover, Sen (1998) notes that a country's level of development depends on various social and physical conditions, for example, the availability of health care, orderliness of living and access to modern medical knowledge. Hence, GNP per capita is too narrow a measure and development should be understood in a broader sense. As such, Human Development Index is considered to be a more important gauge of a country's development. Gohou (2009) conjectures that the Human Development Index (HDI) seems to be universally accepted as a consensual measure of human development.

Human Development Index (HDI) is a summary composite index that measures a country's average achievements in three basic aspects of human development: health, knowledge, and a decent standard of living. It originated in the annual development reports of United Nations Development Program (UNDP) in 1990. HDI was developed by a group of prominent development economists spearheaded by Mahbub-ul-Haq. They had the explicit purpose 'to shift the focus of development economics from national income accounting to people-centered policies'.

The HDI was compiled out of a belief that, while "income growth" is necessary to the development of society, it is not the important consideration, and UNDP therefore compiled the four indicators 'life expectancy at birth', 'adult literacy rate', 'gross enrolment ratio' and 'GDP per capita (PPP US\$)' as a single composite index more accurately reflecting each country's development achievements in the areas effort health, education, and the economy. The breakthrough for the HDI was the creation of a single statistic which was to serve as a frame of reference for both social and economic development. The HDI sets a minimum and a maximum for each dimension, called goalposts, and then shows where each country stands in relation to these goalposts, expressed as a value between 0 and 1.

Lehnert (2013) has studied the impact of foreign direct investment (FDI) and mediating effects of country national governance on the welfare and knowledge infrastructure of host countries. Based on a five-year anchored panel data of 175 countries producing over 9,000 observations, he finds that in general FDI has a positive influence on both host country welfare and knowledge infrastructure and the national governance positively mediates these relationships. In this study welfare has been measured by HDI.

Lehnert also notes that HDI addresses not only what Anand and Sen (1994) call the instrumental importance of wealth, but also other aspects of a living standard: health (measured by life expectancy at birth), overall knowledge level (measured by combining the adult literacy rate with the gross enrollment ratios), and standard of living (measured using the gross domestic product per capita in purchasing power parity terms in US dollars). These indices are weighted to produce a composite measure indicative of relative development: the HDI index.

Gohou (2009) has examined the relationship between FDI and poverty reduction in African nations using HDI as a key measure of welfare and finds a positive significant relationship between FDI and poverty reduction in Africa.

Sharma and Gani (2004) have conducted a seminal study on exploring the impact of FDI on human development by using the Human Development Index as a measure of human capital. They discovered that FDI has a positive effect on human development, although the effect is weak. The study also confirmed that the progress of human development exerts a significant positive effect on FDI in low-income countries. According to the authors, it appears that FDI contributes to the enhancement of human development through a positive effect on economic growth and infrastructure creations in host countries. Furthermore, the authors state that open economic policies are a necessary condition for human development through increasing efforts towards integration of national economies into the global marketplace and that FDI act as a conduit for promotion of openness of national economies.

3. PROBLEM IDENTIFICATION

Indian economy is highly dependent upon inflows of foreign funds. Easing out of norms for FDI, especially, external commercial borrowings (ECB), over the years has led to a dramatic rise in the inflow of foreign capital. As a result, corporate India's dependence on foreign capital has increased substantially. This is exacerbated by the fact that the government is betting on liberalizing the FDI regime in the wake of a deteriorating external account. As per The Hindu editorial dated 18th July, 2013, at about \$85 billion, or

4.5 per cent of GDP, India is running one of the highest current account deficits in the world. With the rupee coming under relentless pressure, from speculators and portfolio investment outflows, the government has made a strategic decision to push for stable capital flows in the form of FDI. The dependence on temporary capital inflows is high as approximately US\$ 25 billion worth of FII money is needed to plug the current account gap. This is an uncomfortable situation to be in. It is thought that FDI would help stabilize the external situation in two ways. First, because of its longer investment horizon, and second, because it could help reduce the country's dependence on imported manufactures. The government's recent liberalization of the FDI regime in telecom, defence and other critical sectors, where import dependence is high, will make a difference only if it leads to the infusion of critical technology and the augmentation of productive capacity. It is not wrong to say that India is pursuing the objective of using foreign capital to create a larger domestic manufacturing base.

In view of literature available on the subject, there remains no doubt that Indian government is pursuing FDI in big way to achieve higher economic growth and development. The basic motive of economic growth and development is human capital development. Given that FDI interacts with both economic growth and human capital development in the host country, it is essential to study the impact of FDI on human capital development for India.

4. RESEARCH HYPOTHESIS

For the present study the hypothesis is as follows:

- Null hypotheses (H_0): FDI is not a significant determinant of human development indicators or Beta coefficient ($\hat{\alpha}$) of FDI = 0 (where $\hat{\alpha}$ measures the sensitivity of HDI to changes in FDI)
- Alternative hypotheses (H_1): FDI is a significant determinant of human development indicators or Beta coefficient ($\hat{\alpha}$) of FDI \neq 0 (where $\hat{\alpha}$ measures the sensitivity of HDI to changes in FDI)

5. RESEARCH METHODOLOGY

Research methodology for the present study will follow the traditional econometric methodology as detailed in the following figure.

Figure 2. Research Methodology

<p>1. Statement of Theory or hypothesis</p>	<ul style="list-style-type: none"> • FDI plays a significant role in human capital development of a country. • $H_0: B=0$, and $H_1: B \neq 0$, where B measures the sensitivity of HDI to changes in FDI
<p>2. Variable identification and specification of the mathematical model</p>	<ul style="list-style-type: none"> • $Y=mX+c$ • $HDI = B_1V_1+B_2V_2+\dots+B_nV_n$
<p>3. Specification of the Econometric model</p>	<ul style="list-style-type: none"> • $HDI = B_1V_1+B_2V_2+\dots+B_nV_n + \epsilon$ • ϵ is the error term which accounts for all factors that affect the dependent variable but are not taken into account explicitly
<p>4. Obtaining Data</p>	<ul style="list-style-type: none"> • Data has been collected from publically available government and credible international agencies reports.
<p>5. Estimation of the Econometric model</p>	<ul style="list-style-type: none"> • Data is used to obtain the numerical estimates of the parameters which give empirical content to the model • Statistical technique of regression analysis is the main tool used to obtain the estimates.
<p>6. Hypothesis Testing</p>	<ul style="list-style-type: none"> • Hypothesis testing is done to test the statistical significance of the parameters • $H_0: B=0$, and $H_1: B \neq 0$, where B measures the sensitivity of HDI to changes in FDI
<p>7. Forecasting or Prediction/ Use of the Model for control or policy purposes</p>	<ul style="list-style-type: none"> • Model may be used to predict the future value(s) of the dependent, or variable on the basis of known or expected future value(s) of the explanatory variable X.

Source: Adapted from Basic econometrics by Gujarati, D. N. (2004)

5.1 Identification of relevant variables and data collection

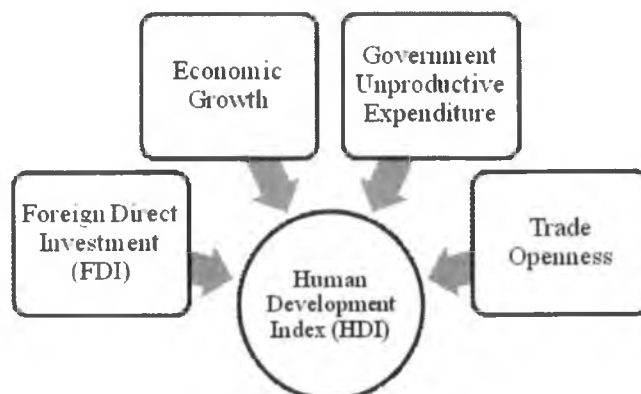
The key independent variable under scrutiny is FDI. The measure for FDI is FDI net inflows as a percentage of GDP. However, human development is a complex process, and it would be rash to say that FDI alone accounts for most of the variations in human development across countries of the world. A host of other variables also influence the process of human development. Identification of these variables forms the first objective of the research study. These variables have been selected on the basis of extensive literature review. Several other variables such as corruption, conflict, misery of the populace

as measured by mortality rates can also be included in the model. However, a line has to be drawn to select the optimal number of variables so as to optimize the forecasting potential of the model. As such, conflict, corruption and misery variables have not been included as independent variables.

Following additional variables have been identified through review of literature:

Economic Growth: The impact of economic growth on human capital has already been explored in the above review of literature. Ranis et. al. (2000) note that economic growth provides the resources to permit sustained improvements in human development. Economic development translates into better education, health and higher income for the people. Bhanumurthy and Mitra (2004) have proved that India has seen significant falls in poverty since the 1980s, reduction rates for poverty have further accelerated into the 1990s. This has been strongly related to India's impressive growth record over this period. In words of Rodrik (2008), 'Historically nothing has worked better than economic growth in enabling societies to improve the life chances of their members, including those at the very bottom.' Moreover, Human Development Report, UNDP (1996), notes that there is a positive two-way relationship between human development and economic growth. Therefore, economic growth has been taken as an explanatory variable.

Figure 3. Variables Influencing Human Capital Development



Source: Literature Review

Government unproductive expenditure: Government development priorities can be inferred by looking at the diversion of resources from productive activities to nonproductive ones such as arms import, purchase of weapons and recruitment of productive members of the society for military and defense

services. Increasing expenditure on this front indicates that lesser amount of resources are available for expenditure on health and education facilities, which could enhance human capital. Therefore, defense expenditure a percentage of central government expenditure is taken as another explanatory variable.

Trade Openness: Trade openness is an important engine of human development as liberalized trade regimes provide an environment conducive to growth. Glick & Moreno (1996) mention that the relative success of India, China, Vietnam, and East Asian countries in the past few decades appears to highlight the benefits of adopting trade openness strategies in terms of growth and human development. Trade Openness is measured by the ratio of exports plus imports to GDP.

Table 1: Data Collection and Measurement

Variable	Type of variable	Measurement	Data Source
Human Development Index (proxy for Human Capital Development)	Dependent Variable	Index; $1 > HDI > 0$	United Nations Human Development Report
Foreign Direct Investment	Explanatory Variable	Foreign direct investment, net inflows as a percentage of GDP	World Development Indicators, World Bank
Economic Growth	Explanatory Variable	Annual Percentage	World Development Indicators, World Bank
Government Unproductive Expenditure	Explanatory Variable	Military expenditure as a percentage of government expenditure	World Development Indicators, World Bank
Trade Openness	Explanatory Variable	Trade as a percentage of GDP	World Development Indicators, World Bank

5.2 Specification of Mathematical and Econometric model

The mathematical model for the study is:

$$\bullet \text{ HDI} = \beta_0 + \beta_1 V_1 + \beta_2 V_2 + \beta_3 V_3 + \beta_4 V_4$$

The econometric model for the study is:

$$\bullet \text{ HDI} = \beta_0 + \beta_1 V_1 + \beta_2 V_2 + \beta_3 V_3 + \beta_4 V_4 + \varepsilon$$

Where,

- β_0 = Intercept
- β_n = Slope parameters of the respective variables, where n ranges from 1 to 4.
- V_1 = Foreign Direct Investment
- V_2 = Economic Growth
- V_3 = Government unproductive expenditure
- V_4 = Trade Openness
- ϵ = Error Term

5.3 Estimation and Testing of Econometric model

At this stage, data is used to obtain the numerical estimates of the parameters which give empirical content to the model. Eviews 9 software has been used for all econometric analysis for this research paper.

Figure 4. Steps for Estimation and Testing of Econometric Model

Test for stationary	<ul style="list-style-type: none"> • Augmented Dickey Fuller Test • The Phillips–Perron (PP) Unit Root Test
Determining order of Integration	<ul style="list-style-type: none"> • Transforming nonstationary time series into stationary time series in order to carry out meaningful analysis • If a timeseries is a difference stationary Process (DSP); it has a unit root, the first differences of such time series are usually stationary.
Test for cointegration	<ul style="list-style-type: none"> • Determine optimal lag length through VAR estimation • Examine cointegrating relationships between variables in the model • Johansen Cointegration Tests
Fully Modified Ordinary Least Squares (FMOLS)	<ul style="list-style-type: none"> • In the presence of atleast one cointegrating relationship, we will use a regression model which compensates for potential endogeneity, serial correlation and heterogeneity in the variables

Source: Author’s own research and study

Time Series Data

A time series is a sequence of data points, typically consisting of successive measurements made over a time interval. Time series data represents a random or stochastic process, which is nothing but a collection of random variables ordered in time. Such variables may be continuous (for example, an electrocardiogram) or discrete (for example, gross domestic product or GDP).

GDP is stochastic process in the sense that a particular figure that we draw at an instance can be any number depending on the economic and political situation prevailing at such time. The figure is a particular 'realization' of all such possibilities. Therefore, we can say that GDP is a stochastic process and the actual values we observe for a period are a particular realization of that process.

Stationary Stochastic Process

Broadly speaking, a stochastic process is said to be stationary if its mean and variance are constant over time and the value of the covariance between the two time periods depends only on the distance or gap or lag between the two time periods and not the actual time at which the covariance is computed. In short, if a time series is stationary, its mean, variance, and auto covariance (at various lags) remain the same no matter at what point we measure them; that is, they are time invariant.

Why are we interested in stationarity?

A nonstationary time series will have a time- varying mean or a time-varying variance or both. If a time series is nonstationary, we can study its behavior only for the time period under consideration. Each set of time series data will therefore be for a particular episode. As a consequence, it is not possible to generalize it to other time periods. Therefore, for the purpose of forecasting, such (nonstationary) time series may be of little practical value.

Moreover, regression of a nonstationary time series on another nonstationary time series may produce spurious or nonsense regression. Hallmarks of such situations include, apparently significant relationships between non-related variables and high coefficient of determination or R^2 , signifying high explanatory power of the regression model.

Augmented Dickey-Fuller (ADF) Test and Philips-Perron (PP) tests are the most commonly used tests for checking whether the time series are stationary. ADF test is a modification of Dickey-Fuller test of Dickey and Fuller (1979) which includes lagged changes of the variable as regressors. An important assumption of the DF test is that the error terms are independently and identically distributed. The ADF test adjusts the DF test to take care of possible serial correlation in the error terms by adding the lagged difference terms of the regressand. The Philips-Perron (PP) test, formulated by Philips and Perron (1988), uses nonparametric statistical methods to take care of the serial correlation in the error terms without adding lagged difference terms.

Augmented Dickey-Fuller (ADF) test and Philips-Perron (PP) test show that all variables are non-stationary at levels, but they are stationary at their

first differences at a 5% level of significance, and hence the time series are integrated of order one, I(1). However, economic growth (EG) variable is non-stationary at level and stationary at first difference at a 1% level of significance.

Table 2. Testing for Stationarity

Variable	ADF test		PP test	
	Level	First Difference	Level	First Difference
HDI	1.732473	-6.042346*	1.499691	-6.018783*
Economic Growth	-3.631707	-5.665084**	-3.605818	-12.50962**
FDI	-1.812197	-4.912649*	-1.773875	-4.912649*
Trade Openness	-0.898254	-4.293133*	-0.898254	-4.291037*
Govt. Unproductive Expn.	-1.996389	-4.195115*	-1.961412	-5.318879*

MacKinnon et al. (1999) one-sided critical values are -3.886751, -3.052169 and -2.666593 for 1, 5 and 10%, respectively

**Indicates that variables are stationary at their first differences at a 5% level of significance.*

***Indicates that variables are stationary at their first differences at a 1% level of significance.*

Source: Eviews 9 Analysis

Cointegration

As mentioned earlier, regression of one time series variable on one or more time series variables often can give nonsensical or spurious results. One way to guard against it is to find out if the time series are cointegrated. Economically speaking, two variables will be cointegrated if they have a long term or equilibrium relationship between them. Cointegration means that despite being individually non stationary, a linear combination of two or more time series can be stationary. When we try to regress a non stationary time series on another, the equation becomes cointegrating regression model and the slope parameters are known as cointegrating parameters.

To conduct the co-integration test, the Engel and Granger (1987) or the Johansen and Juselius (1990) or the Johansen (1991) approach can be used. Agbola and Damoense (2005) note that the Johansen cointegration procedure is superior to the Engle and Granger approach because it does not assume the existence of at most one single cointegrating vector. Furthermore, unlike the Engle-Granger cointegration test, the Johansen cointegration approach

is not sensitive to the choice of dependent variable and assumes all variables to be endogenous.

Now that we have established that our time series are I(1), we can test for cointegration. We have used Johansen cointegration tests (along with the VAR estimation to determine the optimal lag length) to test for cointegration. The table below reports the VAR lag order selection criteria, and it indicates that the optimal lag length based on AIC and SC is 1 lag.

Table 3. VAR Lag Order Selection

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-99.50159	NA	0.041224	11.00017	11.24870	11.04223
1	-39.05167	82.72095*	0.001104*	7.268597*	8.759816*	7.520970*

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

Source : Eviews 9 Analysis

Johansen Cointegration Test indicates presence of atleast 1 cointegrating equation. We can, therefore, reject the null hypothesis of no cointegration.

Table 4. Johansen Cointegration Test

Hypothesized No.of CE(s)	Trace Statistic	0.05 Critical Value	Probability**	Max-Eigen Statistic	0.05 Critical Value	Probability**
None *	95.96136	69.81889	0.0001	47.85993	33.87687	0.0006
At most 1 *	48.10143	47.85613	0.0474	26.25048	27.58434	0.0733
At most 2	21.85095	29.79707	0.3068	17.02086	21.13162	0.1710
At most 3	4.830088	15.49471	0.8266	4.172007	14.26460	0.8408
At most 4	0.658081	3.841466	0.4172	0.658081	3.841466	0.4172

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level.

Max-eigenvalue test also indicates 1 cointegrating eqn(s) at the 0.05 level.

* denotes rejection of the hypothesis at the 0.05 level.

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

Source: Eviews 9 Analysis

Fully Modified Ordinary Least Squares (FMOLS)

Now that Johansen cointegration test has confirmed the existence of cointegration among the variables in question, we can either develop a VECM model or fit a cointegrating regression (FMOLS) to the variables.

Fully modified least squares (FMOLS) regression was originally designed by Phillips and Hansen (1990) to provide optimal estimates of cointegrating regressions. The method modifies least squares to account for serial correlation effects and for the endogeneity in the regressors that results from the existence of a cointegrating relationship. Fully Modified Ordinary Least Squares (FMOLS) regression indicates that coefficients of foreign direct investment and trade openness are statistically significant as we fail to accept the null hypothesis ($\beta=0$). Furthermore, it is seen that the two variables have a positive impact on human capital development. High r^2 value of 84.27% indicates that the model is a good fit to the data.

However, it must also be noted that economic growth and government unproductive expenditure have not been found to be statistically significant determinants of human capital development.

Table 5. Fully Modified Ordinary Least Squares Regression Results

Variable	Coefficient	Std. Error	t-Statistic	Probability
FDI	0.019640	0.007452	2.635658	0.0196
Economic Growth	0.000339	0.001829	0.185402	0.8556
Trade Openness	0.005018	0.000499	10.05004	0.0000
Govt. Unproductive Expn.	0.002171	0.004133	0.525414	0.6075
R-Square	0.877690	Adjusted R-square		0.842744

Source: Eviews 9 Analysis

6. CONCLUSION

Results are largely in line with the expectations. The model indicates that the key variable under study; foreign direct investment, is a statistically significant determinant of human capital development. It has a small but positive impact on human capital development. FDI contributes to development of human capital in host countries through positive effect on economic growth and infrastructure creation. This implies that increasing globalization and cross border capital flows are an encouraging factor for human capital development. Indian policymakers have rightly portrayed a pro-FDI stance since past few

decades. On the one hand public policy has provided for fiscal incentives to multinationals for bringing in inward FDI flows, on the other hand, investment in education and skill development has been undertaken so as to develop a threshold level of human capital. Currently the policy challenge is to channel FDI into sectors prioritized for economic and social development. Government policy may include measures that directly encourage multinational enterprises to undertake training of their workforce. This can complement the general policy of education and training to attract inward investment, and policies to ensure that such training continues once employees enter employment with multinational enterprises. Additionally, policies to encourage technological diffusion are vital as it would lead to enhancement of human capital of the country. That being said, policymakers need to be vigilant about efficacy of FDI from the point of view of national economic priorities and be selective about the sectoral composition of FDI.

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