

Exploring the Relation between Human Capital and Foreign Direct Investment -Indian Context

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Abstract

The paper examines whether human capital plays a vital role in the distribution of foreign direct investments (FDI) across Indian states and attracts FDI to India. The results from the national level study, undertaken for the period 1975-2013 show that the improvement in human capital does not cause growth in FDI inflows, and the growth in FDI inflows does not cause improvement in human capital. The results of panel regression, undertaken for period 2000-2010 show that the differences in the endowment of human capital do not explain the variations in the distribution of FDI across the states; rather, size of the market reflected in the State Gross Domestic Product, availability of cheap labor, and infrastructure for power supply are the crucial factors affecting the FDI distribution across the states. Therefore, the paper suggests that though the national and sub-national governments should invest on generating human capital, attention should be given to improve the labor market conditions, physical infrastructure, and scale of economic activities.

1. Introduction

1.1 India's current government after coming into power in May, 2014 launched the 'Make in India' campaign on 25th September of the same year. It is a major national initiative for boosting the manufacturing sector through facilitation of investment by attracting more foreign direct investments (FDI) in the sector. This campaign of the present Indian government has inspired the interest of researchers on issues related to the inflows of FDI to the country. India received \$40 billion FDI during the financial year 2015–2016 (Department of Industrial Policy and Promotion, 2016). Of the total FDI received during this period, the service sector attracted the highest share - 17.2% followed by the computer software and hardware sector – 14.7%. One of the common characteristics of these sectors is that they employ, especially the computer software and hardware sector, highly skilled labor. In other words, human capital is an important input for these sectors. Given this, it becomes worth investigating about the role of human capital in attracting FDI into India. Thus, the paper examines whether human capital is a significant determinant of FDI inflows into India. The paper answers the following two specific questions to satisfy the objective of the paper: (i) If improvement in India's human capital causes growth in FDI inflows to the country (ii) If the differences in the endowment of human capital across states can explain the variations in the distribution of FDI across the states. Given the dominance of human capital intensive sectors among the FDI receiving sectors in India, the study is expected to have significant relevance.

1.2 There are a lot of studies that study the determinants of FDI in India². Also, there is vast literature that talks about the importance of human capital in host countries to attract further FDI, but the empirical analysis remains largely inconclusive for the developing

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² Anitha (2012), Mukherjee (2011)

economies. There are countries like Singapore, which had formed policies to attract foreign capital in key sectors, which has facilitated human capital development in the country. What remains to be seen that is whether FDI growth is significantly causing human capital development and also, whether human capital development is causing FDI to grow in a developing country like India. There are a few studies that examine relation between FDI and human capital exclusively, in the Indian context. These studies, however, are not free from limitations. The following sections talk about these in detail. Given this backdrop, the present study examines whether human capital development and FDI growth cause each other. It is a national level analysis followed by state level study to examine if human capital can explain regional distribution of foreign direct investment.

1.3 The following section consists of a literature review; the third discusses the two-way causal relation between FDI growth and human capital development, the fourth section comprises panel study to understand if human capital has impact on regional distribution of FDI. The last section discusses the conclusion and policy implications.

2. Literature Review

2.1 Human Capital as a Determinant of FDI

2.1.1 If the workforce of a country is educated and skilled, (so that the country possesses plenteous human capital) it may work more efficiently and productively. If the workforce is skilled, it may be more capable of working on technology that may get transferred from the MNCs to the host countries. Moreover, if the workforce of a country is skilled, the MNCs may require incurring fewer costs on training the employees. These all may incentivize MNCs to invest in that particular country. Dutta et al (2010) cite Easterlin (1981) to proclaim that the presence of sufficient human capital in the host country may lead to minimization of transaction costs as multinationals need not spend too much on training the personnel. Another important component of human capital is health. Healthy workers are physically and mentally more able than workers who are unhealthy or prone to disease. If the workers are healthy, they will be less likely to fall ill and remain absent from work. Healthy workers might work more and be more productive. (Karimi et al, 2013). This might incentivize MNCs to invest in countries with relatively high proportion of healthy workers. Alsan (2006) found that “health has a positive and significant impact on capital inflows in low and middle income countries”.

2.1.2 Theoretically, the importance of human capital as a determinant of FDI inflow has been demonstrated by many scholars. Lucas (1990) presents a model to show that human capital is crucial in determining foreign capital flows to rich countries benefiting both the investing and the host country. Miyamoto (2003) demonstrates that enhanced human resource provides a benign climate for foreign investment which works through the direct effect of upgraded skill level of the workforce and the indirect effects of “socio-political stability and health”. Zhang and Markusen (1993) present a model to show that availability of skilled workforce in host countries is the “direct requirement” of multinational corporations. Human capital development is essential to reinforce the benefits of FDI on economy. Borensztein et al (1988) manifest that human capital is instrumental in determining the capacity of the host countries, to absorb technical diffusion that may be rendered due to foreign inflows. Empirically, however, the results are mixed. Root and Ahmed (1979) show that there is no significant relation between human capital and FDI for 58 developing

countries. There is a possibility that in early period, say during 1960-70s, the motivation of MNCs was to seek market, resources rather than efficiency. The former are called the “Traditional factors” determining FDI and the latter as “Non-traditional factors”, by Nunnenkamp et al (2002), who point out that over time, the FDI is being increasingly driven by the “Non-Traditional factors” which might explain the significance of human capital in explaining FDI in more recent analysis. However, even the recent empirical studies do not fully corroborate the hypothesis. This is because there are recent studies that show a positive significant relation on one hand and insignificant relation on the other hand. Noorbaksh et al (2001) find positive impact of human capital on FDI for developing countries during the period 1980-1994. Sharma et al (2004) find the similar result for low income countries for period 1975-1999. Karimi et al (2013) confirm that human capital is a significant determinant of FDI flows to developing countries. A study by Dutta et al (2010) shows that education indicators have positive association with FDI inflows which is facilitated by good political and civil rights. Majeed et al (2008) study the period from 1970 to 2004 for 23 developing countries and find that effect of health indicators is positive and significant on FDI. On the other hand, Nunnenkamp et al (2002) show while human capital is positively correlated with foreign inflows in a sample of 28 developing countries, its impact as a determinant of FDI is at most modest. Checchi et al (2007) examine the role of human capital in attracting FDI using the dataset for 67 developing countries. However, the study shows that only population share with secondary school attainment that is seen as a component of human capital, is significantly correlated with FDI. Kar (2013) shows that in the Indian context, human capital development does not reinforce FDI growth. However, the study also shows that the number of primary, middle and higher secondary schools played a role in the distribution of FDI across 17 zones consisting of states and union territories. So, the empirical evidence concerning the role of human capital as a determinant of FDI is inconclusive. This calls for more research in the area.

2.2 FDI as a Determinant of Human Capital

2.2.1 FDI and human capital may reinforce each other and may lead an economy on path of development through a virtuous cycle (Checchi et al, 2007). Slaughter (2002) and Gittens (2006) suggest that the technological content of multinational corporations can explain the creation of human capital resulting from FDI. There are three channels that operate through demand side which may cause FDI to impact human capital development in host countries. First, the technology transfer from MNC to the host country affiliates spurs the demand for more skilled workers. Second, the technical knowledge transfer to the host country affiliates spills over to the other domestic firms which may improve productivity domestically and boost the demand for skilled personnel. Lastly, investment in physical capital may also spur investment in human capital. Increased investment in physical stock may lead to creation of new capital goods driving up the demand for skilled workforce.

2.2.2 One of the most important functions played by foreign capital in development of human capital in host countries is through provision of training to the workers. The employees of host country affiliate may receive direct and indirect training while working for these MNCs. If workers are appropriately trained, they may become more productive. Schultz (1961) considers training an important factor that may enhance human capability. There have been many instances wherein the MNEs have emerged as key providers of effective training to workers. Gershenberg (1987) examines the impact of MNC presence in

Kenya and concludes that MNCs offered better training to managers than the domestic private firms. Subbarao (2008) refers to another channel which may reinforce the role played by FDI in investment in human capital. He postulates that the returns from operations of MNCs in the host countries that go to the government may be further invested for accumulation of human capital.

2.2.3 The empirical evidence is inconclusive. Gittens (2006) tests the impact of FDI on human capital development but his results are largely inconclusive. Checchi et al (2007) conclude that FDI discourages secondary enrollment rates while it favours the tertiary enrollment rates. However the overall impact of FDI on human capital is estimated to be negative. Findings of Pradhan (2004) in context of Indian pharmaceutical sector show that the spillover effect of FDI is only realized when firms are already engaged in inventive activities. Sharma et al (2004) also find a positive impact of FDI on human capital for both low and middle income countries for period 1975-1999. Thus, evidence concerning the impact of FDI on human capital remains inconclusive.

2.2.4 What transpires from above discussion is that the evidence concerning the impact of human capital on FDI and vice-versa is yet not conclusive. This strengthens the motivation for the present study. There are a few empirical studies that examine the relation between human capital and FDI exclusively in the Indian context. Further, these studies suffer from various limitations. None of these studies³ consider the impact of health on FDI and only focus on effect of education on FDI. However, there are theoretical explanations for accounting health in human capital. As mentioned earlier; healthy workers are physically and mentally more able than workers who are unhealthy or prone to disease. If the workers are healthy, they will be less likely to fall ill and remain absent from work. This may enable them to work more, thus affecting their productivity. The second shortcoming is that a very few of them are limited to very short period of time⁴. In light of these shortcomings, the present analysis aims to overcome these drawbacks by considering health as a component of human capital and analyzing a relatively longer period of time, keeping in mind that human capital development is a process which requires long time.

3. Two Way Causal Relation between FDI Growth and Human Capital Development

3.1 Data

3.1.1 The analysis is based on use of secondary data which has been collected from various sources. The data used for Foreign Direct Investment is time series data on annual percentage change in FDI during 1975-2013. The data used for construction of human capital index is time series data on annual percentage change for period 1975-2013. For the current analysis, the human capital index comprises of education parameters which have been indicated by gross enrollment ratio in secondary and tertiary education. It also contains health parameter, which is indicated by life expectancy. The data on FDI stock have been collected from World Development Indicators provided by World Bank. The Human Capital index used for the second objective includes Gross Enrollment Ratio in secondary and tertiary education and Life Expectancy at Birth. The data on gross enrolment rate for secondary and tertiary education and life expectancy at birth for the national level analysis have been taken from the World Bank.

³ Aggarwal (2005), Mukherjee (2011), Kar (2013)

⁴ For the zone level analysis, Kar (2013)

3.2 Model and Methodology

3.2.1 As described by Kar (2013), there could be a causal relation between FDI growth and human capital development. Towards this, a model has been specified to examine two-way causal relation between FDI growth and human capital development. Granger Causality approach has been used to test whether there is a two-way causal relation between FDI growth and human capital development.

The estimated equations for the FDI and human capital took the following forms:

$$F_t = \sum_{i=1}^n \alpha_i HC_{t-i} + \sum_{j=1}^n \beta_j F_{t-j} + u_{1t}$$

$$HC_t = \sum_{i=1}^m \eta_i HC_{t-i} + \sum_{j=1}^m \lambda_j F_{t-j} + u_{2t}$$

Here F_t is percentage change in FDI in time period t

HC_t is the percentage change in human capital in time period t.

α_i is coefficient on lag values of human capital in percentage change terms for FDI equation where i refers to number of lags taken

β_j is the coefficient on lag values of FDI in percentage terms for FDI equation where i refers to number of lags taken

u_{1t} is the error term for period t for FDI equation

Similarly, η_i is coefficient on lag values of human capital in percentage change terms for human capital equation where j refers to number of lags taken

λ_j is the coefficient on lag values of FDI in percentage terms for human capital equation where j refers to number of lags taken

u_{2t} is the error term for period t for human capital equation

3.2.2 The human capital index involving education and health has been constructed using Principal Component Analysis, which is a statistical procedure used on different variables to convert them into a single objective number. The weights in the computation of the index are determined by using Factor Loadings and Eigen Values from PCA. For the procedure, Eigen values above one are identified. Then the components corresponding to the selected Eigen values are extracted from the Rotational matrix. Each factor loading, for which Eigen value is more than one is then multiplied with the observations of corresponding variable. It is done for all the variables being considered. Adding all the weights give the total of weights. After multiplying each value with the respective weights for each variable, a weighted average is taken, where the denominator is the sum of weights. In other words, the following formula is applied for construction of index:

$$\frac{\sum_{i=1}^n X_i (\sum_{j=1}^n |L_{ij}| E_j)}{\sum_{i=1}^n (\sum_{j=1}^n |L_{ij}| E_j)}$$

where, X_i is the i th variable, L_{ij} is the factor loading value of the i th variable on the j th factor; E_j is the Eigen value of the j th factor.

3.2.3 It has often been suggested and used in social sciences for construction of indexes pertaining to education and health indicators (Education Development Index by National University of Educational Planning and Administration).

3.2.4 Granger- Causality test has been used to test the existence of two-way causal relation between FDI growth and human capital development. A Vector Auto-regressive (VAR) model has been specified for running the Granger-Causality test. The approach is based on significance of the lag values of the concerned variables in order to examine whether there exists a two-way causal relation between the variables being analysed or not. The significance of lag values point to a two-way causal relation and vice-versa. The direction of causality depends on the sign of coefficient on lag values. However, before applying the Granger approach, one needs to check whether the series for concerned variables are stationary in their levels form. Both Dickey Fuller and Augmented Dickey Fuller tests have been used to examine the stationarity of the concerned variables. The tests examine whether the respective series consist of unit root or not. Under the test null hypothesis, the series possess a unit root. If the series turns out to be non-stationary, it is differenced 'n' times where 'n' are the number of unit roots present in the series.

3.2.5 Dickey Fuller test followed by Augmented Dickey Fuller test has been used in the current analysis to test if the FDI growth and human capital development series are stationary. The results have been reported for Augmented Dickey Fuller Test in the table 3.1 in the appendix. The results show that FDI growth and human capital development are stationary series. After testing for stationarity, Granger causality test has been applied. The test uses F-statistic under the null hypothesis that there is no causal relation between FDI and human capital.

3.3 Results and Discussion

3.3.1 The Granger causality test results are given in appendix in table 3.2. They show that the F-statistic for FDI equation is insignificant which affirms the joint insignificance of lagged values of human capital index.⁵ This asserts that human capital development did not cause FDI growth in India over the period. The same holds true for equation of human capital development i.e. FDI growth do not seem to have caused human capital development over the period⁶. The results show that the lags for both FDI and human capital are jointly insignificant for both the equations concerning FDI growth and human capital development. Thus the test results show that both human capital development and FDI growth do not cause each other. Hence the hypothesis of existence of a two way causal relation between human capital development and FDI growth in Indian context has been invalidated empirically. The advantage of defining the variables in growth is that we can capture the impact of incremental change in one over the other. An attempt to test FDI and human capital in their level forms indicate no change in the results.

3.3.2 There have been few cases wherein the foreign presence has facilitated human capital development in India. According to Miyamoto (2003), Intel has invested in curriculum, educational equipment, infrastructure and technical support in developing countries like

⁵ Note that three lags for each of the FDI and human capital have been reported. Taking more number of lags did not change the results.

⁶ Separate index on education and health were constructed to see if either of them have causal relation with FDI growth. However, the results remained the same.

India. However, it is not clear whether such investment has been significant or has led to any significant outcomes. Moreover, the instances of such an investment in human capital in India by foreign entities remain limited. Ramaiah and Acharyulu (2012) document that there has been a growing interest among the foreign players to invest in India's health care sector through capital investments, technology tie-ups and collaborative ventures across various segments that include diagnostics, medical equipment, and hospitals. It points to the possibility of this gradually getting translated into improved standards pertaining to health outcomes and make health care affordable and accessible to a wider spectrum. Though, theoretically, this might seem feasible, however, this might not be true in practice or take some more time to realize because such advantages in fact may benefit only a small proportion of population who can afford to spend high amount for health care facilities. Moreover, there are various challenges that the sector faces such as high initial costs of setting up hospitals that are in line with the international standards along with non-availability of a clear road map for this sector, which might limit the scope of external investment in the sector and so on.

3.3.3 According to the World Investment Report, 2013, India stands among the top five destinations for investors across the world. Major sectors that receive high FDI comprise of financial and non-financial services, computer hardware and software and so on. These sectors are the ones that require highly qualified labour force for their operations. One of the industries among these sectors, which have been successful in attracting large inflows of FDI, is the Indian IT industry. According to Indian Brand Equity Foundation (IBEF) 2014, Indian IT industry accounts for 52% of the US \$124-130 billion market. According to the report, it is cheap availability of qualified human resource that attracts FDI to IT sector in India. It states that, it is India's cost competitiveness in providing IT services, which is 3-4 times cheaper than the US, which is its Unique Selling Position in the global market. Kumar (2005) also suggest that it is the cheap availability of IT professionals in the sector that enables it to gross high FDI. The availability of cheap labour can itself be attributed to availability of massive pool of highly qualified manpower across the country. Interestingly, availability of sufficient educational infrastructure is the key source of steady supply of human resource. Arora et al (2010), identify the role of immense engineering baccalaureate capacity in regions like Maharashtra, Delhi, Bangalore and so on which acted as one of the initial conditions facilitating MNCs concerning IT sector to open up subsidiaries in India back in 1990s. So, one might infer that there were a number of factors at play, which facilitated the flow of FDI in India and not human capital per se.

3.3.4 To sum up, the time series analysis shows that human capital development and FDI growth do not cause each other in Indian context. It is not availability of human capital per se but the cheap availability of human capital that attracts FDI to such sectors in India. This seems to be true for IT sector which is one of the highest FDI grossing sectors (IBEF, 2014). One can substantiate the above argument by the figure 3.1 in the appendix. It clearly shows that among 43 countries comprising of developing and developed countries, the average annual salaries of the IT professionals is lowest in India.

3.3.5 Hence, the given figure demonstrates the argument that it is cheap availability of IT professionals that drives in FDI to the Indian IT sector. The average annual salaries of IT professionals are less even when compared with other South Asian countries like Pakistan, Sri Lanka. Hence, one might say that it is low cost of human capital that is driving in FDI to

IT sector in India.

3.3.6 The time series results do not support the existence of a two-way causal relation between human capital development and FDI growth in Indian context. A panel study has been proposed to see if human capital can explain regional distribution of FDI. A simple panel regression has been proposed to analyze such a hypothesis.

4. Human Capital as A Determinant of FDI-State Level Study

The study is based on 18 states and union territories which comprise of both high FDI and low FDI receiving states during 2000-2010. The high FDI receiving states (in per capita terms) used for the analysis are Andhra Pradesh, Maharashtra, Delhi, Karnataka, Chandigarh, Goa, Gujarat, Kerala, Puducherry while the low FDI states analyzed for the present study are Arunachal Pradesh, Assam, Dadra and Nagar Haveli, Daman and Diu, Lakshadweep, Tripura, Nagaland, Mizoram and Meghalaya.

4.1 Data

4.1.1 The data for actual FDI is not available state-wise. Rather, it is available for 17 RBI regional offices (zones). The zones or offices comprise of Mumbai, New Delhi, Chennai, Bangalore, Ahmedabad, Hyderabad, Kolkata, Chandigarh, Jaipur, Bhopal, Kochi, Panaji, Kanpur, Bhubaneswar, Guwahati, Patna, and Jammu. However, since the current analysis is proposed for selected state-wise study, therefore FDI approval data has been used rather than actual FDI statistics over the period 2000-2010. The FDI approval data has been taken from the Ministry of Commerce and Industry, Government of India. The empirical analysis is limited to period from 2000-2010 due to constraint on data availability for some of the independent variables. The human capital index includes education parameters which have been indicated using gross enrollment ratio in secondary and tertiary education for period 2000 to 2010. The index includes Infant Mortality Rate (IMR), Crude Birth Rate (CBR) and Crude Death Rates (CDR) as health indicators⁷. Other variables are average wages and salaries per capita, gross domestic state product (GSDP) at current prices, corruption cases received, GSDP growth rate in industry, capacity installed and state own tax revenue as a percent of GSDP for period 2000-10⁸.

4.1.2 The data on Gross Enrollment Ratio for secondary and tertiary education across states for various years have been compiled from different reports, such as State Profiles, Table of Statistics of School Education Report, Statistics of Technical and Higher Education Report, All India Survey on Higher Education (AISHE) Report, which have all been collected from the Ministry of Human Resource and Development, Government of India. The data on IMR, CBR and CDR have been taken from the website of Planning Commission, Government of India. The data on Gross State Domestic Product (GSDP) has been obtained from the Directorate of Economics and Statistics of the respective state governments and from Central Statistics Office (CSO). The data on wages and salaries and capacity installed has been taken from Center for Monitoring Indian Economy Pvt. Ltd. (CMIE) database. The data for state own tax revenue as a percent of GSDP and its growth rate in industry have

⁷ Life expectancy is a better indicator when compared with IMR, CBR and CDR, which are too basic. However, data non-availability for state level study constraints the use for such an indicator.

⁸ The variables – FDI approval, gross domestic state product (GSDP), average wages and salaries have been taken in per capita terms by dividing the absolute values by population size.

been obtained from Planning Commission, Government of India. The data for population has been taken from the Report of the Technical Group on Population Projections developed by the National Commission on Population (May 2006), which is available from the office of the Registrar General and Census Commissioner, India. The data for corruption cases has been obtained from the National Crime Records Bureau.

4.2 Model and Methodology

4.2.1 A Panel Regression Model has been used to test the hypothesis if human capital has an impact on FDI inflows or not, where human capital index has been constructed using principal component analysis. Panel regression model has two specifications-Fixed Effects and Random Effects. The Fixed Effects model assumes that the time variant and invariant factors are correlated. However, the Random Effects model assumes that there is zero correlation between time variant and invariant factors. Thus, before proceeding with the regression exercise, one needs to test whether Fixed Effects or Random Effects model is better suited for the regression exercise. Hausman test is applied to see if Random effects model or Fixed effects model is more relevant for the current analysis under the null that Random Effects Model is appropriate for the analysis. The test results are indicated in appendix in table 4.1. The test results invalidate the null hypothesis. Hence Fixed effects model has been estimated to test if human capital lays an impact on distribution of FDI across different regions as follows:

$$FDI_{it} = \beta_0 + \beta_1 HC_{it} + \beta_2 GSDP_{it} + \beta_3 W_{it} + \beta_4 C_{it} + \beta_5 GI_{it} + \beta_6 CI_{it} + \beta_7 ST_{it} + u_{it}$$

Here, FDI_{it} refers to FDI per capita for state i in time period t

HC_{it} is the human capital index for state i in time period t

$GSDP_{it}$ is the Gross domestic state product per capita for state i in time period t

W_{it} is average wage and salary per capita for state i in time period t

C_{it} refers to the corruption cases received by state i in time period t and

GI_{it} refers to the growth of GSDP in industry in state i in time period t

CI_{it} refers to capacity installed in state i in time period t

ST_{it} refers to state's own tax revenue as a percent of GSDP in state i in time period t

u_{it} is the error term for state i in time period t

4.3 Discussion of explanatory variables other than human capital:

4.3.1 Market Size may be an important determinant of FDI. Large market size may act as an incentive for MNCs to invest in those areas. Chew Ging Lee (2009) has pointed out that domestic product has a positive effect on FDI inflows in the long run. Hence, GSDP per capita has been used to proxy for market size, as has been done in other studies (Aggarwal, 2005; Mukherjee, 2011). States with large markets may attract more FDI. Hence, the expected sign on this coefficient is positive.

4.3.2 Labour wage might be another important determinant of FDI to a region. Availability of relatively cheap labour may act as one of important factors that may determine the distribution of FDI (Aggarwal, 2005). One may expect high labour cost to have a negative impact on foreign inflows. According to Mukherjee (2011), the efficiency seeking foreign

firms are expected to prefer lower wage locations to minimise their cost of production. However, there may be an alternate hypothesis concerning the relation of labour with FDI. Labour cost itself might be indicative of human capital as high labour wage might reflect high productivity and hence high level of human capital. Hence, high wages paid in a region might have a positive impact on FDI (Anitha, 2012). Thus, the coefficient might be positive. Average wages and salaries per capita have been taken as proxy for this variable.

4.3.3 Corruption may be an important determinant of FDI. Higher corruption in some regions may deter FDI inflows in that region (Anitha, 2012). MNCs might be reluctant to invest in regions with relatively high rates of corruption. Hence, one might expect a negative sign of corruption coefficient. However, there might be an alternate hypothesis concerning the impact of corruption on FDI inflows. ‘‘High corruption might grease the wheels of FDI inflow’’ (Egger and Winner, 2005; Dutta et al, 2010). This might be true as high corruption might facilitate the rent seeking behaviour of foreign entities as corrupt government officials might be bribed against certain activities that turn out to be advantageous for foreign investors. Hence more MNC investment could be driven in areas where such a possibility may be well realized. For example, Maharashtra is the state that topped the list in terms of both corruption and receiver of FDI inflow during the period. Thus, one might not affirm the sign of corruption coefficient. Corruption cases received by the states during the period have been taken as proxy for the concerned variable.

4.3.4 Industrial orientation might be another factor determining the regional distribution of FDI. If investors perceive that a region is subject to a large industrial base, they may invest in that region (Mukherjee, 2011). Growth rate of GSDP in industry has been used as a proxy for industrial orientation. High rates of GSDP growth in industry may be indicative of better industrial orientation in such states. Hence, the expected sign on this coefficient is positive.

4.3.5 Infrastructure might also play an important role as a determinant of FDI. Better power supply and so on may act as important factor determining intake of FDI (Siddharthan, 2006). Capacity installed (in MW) has been taken as proxy variable for infrastructure. Better infrastructure in form of availability of power may act as a factor which may have positive influence on FDI flowing to a region. Hence, the expected sign for the coefficient is positive.

4.3.6 Policy environment might also define the share of inward FDI. High tax might be indicative of high tax burden which may deter FDI flows to regions with high tax burden. Mukherjee (2011) cites various studies to document the empirical evidence from European Union which reveals that while making their location decisions, MNCs focus on overall tax burden than that of any individual corporate. Based on this argument, State own tax revenue as a share of GSDP⁹ has been taken as proxy for policy environment. This proxy has been most widely used in the literature¹⁰. One might expect a negative sign on its coefficient. However, there might be an alternate hypothesis concerning this proxy. State’s own tax revenue as a percent of GSDP does not give a sense of tax incidence faced by a foreign entity. In fact, the foreign entities might see it as an indicator of government capacity. A more efficient government or administration might be more successful in collecting high tax

⁹ Some incidence of tax burden faced by foreign companies might be better proxy to indicate tax burden. However, non-availability of data is major constraint.

¹⁰ Like in studies such as Mukherjee (2011)

revenue as compared to an inefficient government. The high tax revenue might translate (depending on other considerations like extent of implementation and so on) into high expenditure incurred by the state on development projects and so on. According to Mukherjee (2011), a strong government has a positive influence on FDI which may get reflected in high state tax revenue. Thus, coefficient on this variable might be positive.

4.4 Results and Discussion

4.4.1 The panel results are given in appendix in table 4.2¹¹. The results show that the coefficient on human capital index is negative and insignificant¹². Thus, one might say that human capital index does not play an important role in determining the inflow of FDI to different regions. Hence, inter-state differences in endowment of human capital might not play as a significant factor in determining distribution of FDI. The insignificance of human capital index can be attributed to the mobility of labor across states. Since, labor is mobile across Indian states, irrespective of skilled or unskilled, a state's own endowment of human capital may not be a decisive factor in attracting FDI. However, even the results of national level study, which do not encounter such mobility issue, do not invalidate the results of state level study.

4.4.2 The results from the panel exercise show that coefficient of capacity installed which has been taken as a proxy for availability of electricity in a region, indicating the role played by physical infrastructure in determining FDI inflows to a particular region is found to be positive and significant. This shows that FDI inflows within India are driven by availability of better infrastructure.

4.4.3 Maharashtra is among the highest receivers of FDI in IT sector. One of the key conditions that facilitate the functioning of the IT parks within the state is the availability of 100 percent power supply in the region (IBEF, 2014). Hence, infrastructure plays an important role in determining FDI inflows to different states.

4.4.4 The coefficient of wage is negative and significant at one percent level of significance. Now there are two hypotheses relating to the impact of wage on FDI as explained earlier. Firstly, wage can be purely seen as an indicator of cheap labour. Availability of cheap labour might reduce cost of production and hence lead to differences in regional distribution of FDI. So FDI may be driven to regions in India wherein cheap labour is available. According to Arora (2010), it was cost competitiveness of regions such as Maharashtra, Karnataka and so on which laid conditions leading to clustering of IT firms in these regions. Hence, the argument seems to be justified. This has been validated by the facts provided in the time series analysis. The alternate hypothesis pertaining to relation of wage with FDI states that higher wage levels might be indicative of higher labour productivity and hence high level of human capital. Hence, a firm looking out for highly qualified workers might get attracted with higher wage prevailing in a region. However, one might argue that such hypothesis might not hold and wage in a region might simply be high due to historical factors or stronger trade union in one region as compared to another. There are innumerable

¹¹ Multicollinearity and heteroskedasticity tests have been done to ensure that they do not hinder the results.

¹² Separate index on education and health were constructed to see if either of them have impact on with FDI. However, the results remained the same.

studies that have been reviewed by the World Bank report (2003) which show that collective bargaining and unions have an impact on wage setting (Aggarwal, 2005). They showed that workers who belonged to trade unions earned higher wages than their counter parts who were not a part of trade union. Yet, an attempt was made to analyse if human capital has an effect on FDI if wages are not taken into consideration. The results showed that the coefficient on human capital index remained insignificant. Hence, one might argue that human capital might be seen independent of wage prevailing in a region in the sense that wages might not indicate the level of worker productivity. It might hold in theory, but in practice, the international entities who wish to invest in India might look at parameters other than wage to examine productivity of labour force. This comes out more clearly by facts stated in the time series analysis which show that it is availability of cheap qualified labour in sectors like Information Technology that drives in FDI. If cheap labour were indicative of low level of productivity, then FDI would not have come into that sector or that region in first place.

4.4.5 The results obtained from panel exercise show that the coefficient on GSDP which has been used as a proxy for market size in the current analysis is significant and positive. States with large markets may attract more FDI which may be measured in terms of state domestic product. Next, the coefficient on corruption cases received is positive though insignificant. Hence, one might conclude that corruption does not help explain the inter-state differences in distribution of FDI inflows. The coefficient of growth of GSDP in industries as an indicator of industrial orientation is negative though insignificant. The insignificance shows that high growth of GSDP in industry is not a significant factor in determining FDI flows to a particular region as FDI inflows to a certain region might not be coming to industries wherein the output growth is high. The coefficient of state's own tax revenue as a percent of GSDP is found to be positive though insignificant. Hence, state's own tax revenue as a percent of GSDP does not have either positive or negative impact on regional distribution of FDI.

4.4.6 Sensing the market, infrastructure and wages have an impact in explaining regional distribution of FDI, it was felt that it might be of interest to see if these factors can cause FDI growth in India. Granger Causality test results were applied to test if there is a two-way causal relation between FDI growth and GDP growth, in fashion similar to that in section 3.

4.4.7 The Augmented Dickey Fuller test results for GDP growth series show that the series is stationary (test results are provided in appendix in table 3.1.). The results of Granger Causality show that there is a two-way causal relation between FDI growth and GDP growth during 1975-2013. After incorporating 5 lags for each of FDI growth and GDP growth series, they cause each other. The test results are given in appendix in table 3.3.

4.4.8 The data for Capacity Installed, as a proxy for infrastructure and Wages and Salaries is available only for much later dates. Therefore, it was not feasible to do a time series analysis for either of them.

5. Conclusions and Policy Implications

5.1 The current analysis attempts to examine relation between FDI and human capital in the Indian context. The motivation for undertaking such an analysis comes from the fact that there is no consensus regarding the relation between FDI and human capital in the

literature. Moreover, the studies that analyse this relation in the Indian context extensively have certain limitations that the current analysis attempts to overcome. The current analysis is based on a time series analysis to examine whether there is a two-way causal relation between FDI growth and human capital development for India as a whole followed by a selected state level study to test if human capital can explain inter-state distribution of FDI. The results show that there is no causal relation between FDI growth and human capital development in either direction for India as a whole. The facts stated in the national level analysis show that though FDI in India comes in the sectors requiring highly qualified workers such as Information Technology, it is cheap availability of human capital (white collar professionals) rather than human capital per se that might drive in FDI. The results for state level study show that human capital has no impact in determining the regional distribution of FDI. In fact, factors such as physical infrastructure, market and cheap labour seem to be important in explaining the inter-state differences pertaining to FDI. These factors might also have a two-way causal relation with FDI, such as GDP growth (as shown in the analysis). The state level analysis seems to be consistent with the facts stated in the time series analysis that cheap availability of workforce may drive in FDI to India. Though FDI might be flowing in sectors that require high human capital, it might be cheap availability of human capital, rather than human capital per se that drives in FDI in sectors like Information Technology. The empirical results seem to be consistent with the findings of related studies in the Indian context. The time series findings for India as a whole are consistent with that of Kar (2013), which show non-existence of any causal relation between FDI growth and human capital development for India as a whole. The state level findings of non-existence of any impact of human capital on FDI seem to be in conformity with the empirical findings of Mukherjee (2011) and Aggarwal (2005).

5.2 Given the findings of the study, it may be suggested that while governments (both national and sub-national) should invest on generating human capital, the attention should be given towards improving the labor market conditions, physical infrastructure, and scale of economic activities. In fact, all these factors are inter-connected. Better labor market conditions and improved infrastructure should improve the scale of economic activities. Policies like 'Make in India' would deliver its potential benefits in terms of attracting FDI and generating jobs and income, only if governments provide better labor market environment and sufficient infrastructure. With the passing of the Goods and Services Tax bill by the Indian parliament, India will become an integrated and one market, the hassle of multiple taxes will go away and improve the ease of doing business. This, in turn, is expected to increase the scale of economic activities and attract more FDI.

5.3 Future Research

5.3.1 There are other factors that might explain the regional distribution of FDI like proxies for tax incidence faced by a foreign entity, state geography, ethnic tensions, political instability, population density, better proxies for corruption and so on. However, lack of consistent time and cross section data limits the scope of scrutinizing effect of such variables. There is scope of future research in the area. One might do a sector specific study to see if human capital can explain distribution of FDI. One might construct Index of Human Capital so as to cover other aspects such as migration, training, R&D activities and so on (as documented by Schultz, 1961).

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Appendix**Table: 3.1: Results of Augmented Dickey Fuller Test for Unit Root**

Variable	Calculated Test Value	5% critical value	Stationarity
Annual Percentage Change in FDI	-7.001	-2.966	Stationary in levels
Annual Percentage Change in Human Capital Index	-5.662	-2.975	Stationary in levels
Annual Percentage Change in GDP	-5.990	-2.964	Stationary in levels

Note: The reported results exclude time trend or drift term in model specification, however the results do not change if either time trend or drift term is included in the model.

Table: 3.2: Results for Granger –Causality Test for FDI and Human Capital

Equation	F statistic	Number of Lags	Prob > F	Joint significance of lag values at 5% level
FDI growth	0.81096	3	0.4998	Insignificant
Human Capital Index Development	1.6849	3	0.1957	Insignificant

Table: 3.3: Results for Granger – Causality Test for FDI and GDP

Equation	F statistic	Number of Lags	Prob > F	Joint significance of lag values at 5% level
FDI growth	18.684	5	0.002	Significant
GDP growth	12.615	5	0.027	Significant

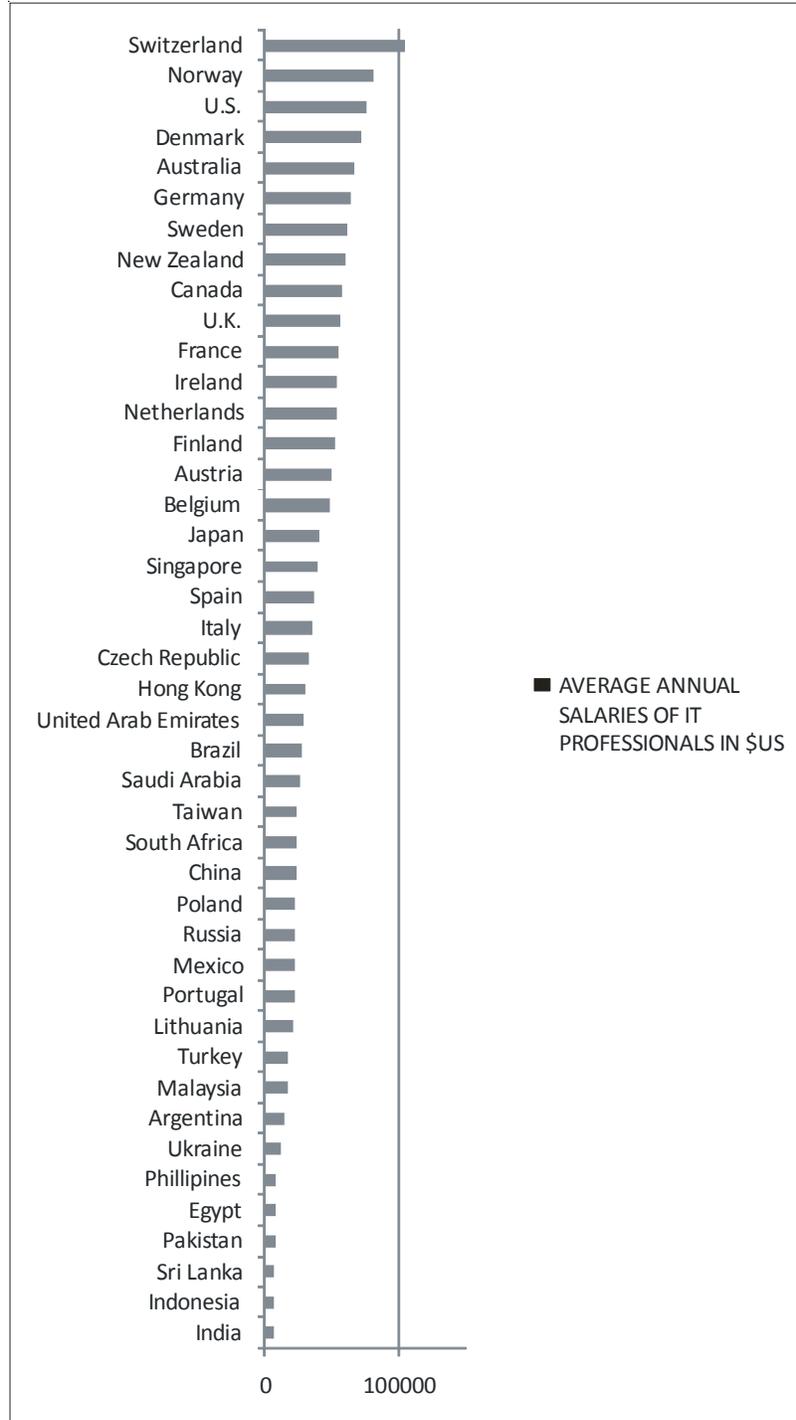
Table: 4.1: Results of Hausman Test

Value of Chi statistic	Prob>chi	Significance
20.18	0.0026	Significant at 1%

Note: The test results show that the null hypothesis has been rejected as that there is significant difference between results of fixed effects and random effects model. This means that random effects model cannot be estimated for current analysis.

Table: 4.2. Results of State Fixed Effects

Variables	Coefficients/values
Human Capital Index	-16.07 (19.38)
GSDP per capita	0.03* (0.016)
Wage per capita	-2.20*** (0.52)
Corruption cases received	1.53 (1.63)
Growth rate of GSDP in industries	-24.40 (14.41)
Capacity Installed	0.50*** (0.12)
State's own tax revenue as a percent of GSDP	127.72 (108.15)
Constant	-1151.65 (984.16)
F statistic: 9.45***	
R sq-0.20	
Observations-160	
<p>Figures in parenthesis are standard errors. ***, ** and * denote significance at 1%, 5% and at 10% respectively.</p>	

Figure 3.1: Average annual salaries of IT professionals in different countries 2014-2015 (in US \$)Source: (www.bloomberg.com, 2015)