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Determinants of Inter-State Variations in FDI Inflows in India

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Abstract

The present paper makes an attempt to identify the factors that contribute to the wide-scale variations in FDI inflows across Indian States. Using a panel dataset consisting of 16 groups of Indian states over the period from 2001-02 to 2005-06, it is found that infrastructure does not have significant impact on inter-state variations in FDI inflows, which is contradictory to the general proposition that availability of infrastructure facilities largely determines the locations of investment projects. Instead, level and variability in profitability of the existing firms are found to have significant influence in deciding investment locations at the state level. While higher profitability of the existing enterprises brings in more FDI into a state, greater variability in it reduces the same.

Keywords: *FDI, Infrastructure, Profitability, Risks, States, Policy, India*

JEL Code Classification: *F23, H54, O2, R11*

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1. Introduction

The importance of foreign direct investment (FDI) in the development process of an economy is well recognized. Inflows of FDI bridges the gap between the desired and the actual level of capital stock, especially when domestic investment is not sufficient to push the actual capital stock up to the desired level (Noorbakhsh et al. 2001; Hayami, 2001). In addition, FDI also brings in better technology (in both disembodied and embodied forms) and management practices to the host country, which make the economy more competitive through spillover effects[1]. Besides, FDI can also substitute international trade and hedge the risks of exposure to foreign exchange. It is observed that inflows of foreign investment in natural gas sector and subsequent improvements in production efficiency and the terms of trade have made many of the Central Asian countries better off (Barry, 2009). Similarly, foreign investment appears to have significant positive impact on export performance of Turkey (Vural and Zortuk, 2011)[2].

The Indian economy has witnessed a number of liberal policy measures relating to FDI after initiation of the reform process in 1991[3]. The major policy changes include fixing the limits of foreign investment in high priority industries, liberalizing and streamlining the procedures and mechanisms, bringing in transparency in the decision making process, lessening of bureaucratic controls, expanding the list of industries/activities eligible for automatic route of FDI, encouraging investments by non-resident Indians (NRIs) and overseas corporate bodies (OCBs), etc. Hence, contrary to the government's involvement in creation and augmentation of domestic asset base in the pre-reform era, the new policy regime has recorded a marked shift by introducing a number of deregulatory measures to bring in greater competition and efficiency. Accordingly, the policy measures have provided greater flexibility in investment decisions to facilitate larger presence of the MNCs in the domestic market.

The policy changes of the 1990s have resulted in greater FDI inflows into Indian economy (Rao et al. 1997; Kumar, 1998; Nagraj, 2003; Sethi, et al. 2003; Rao and Murthy, 2006; Rozas and Vadlamannati, 2009). Inflows of both FDI and foreign portfolio investment (FPI) have shown increasing trends over the years during

[1]A number of studies (e.g., Caves, 1974; Globerman, 1979; Blomstorm and Perssion, 1983; Basant and Fikkert, 1996; Kathuria, 1998; Pradhan, 2006) find evidence of knowledge spillovers from foreign enterprises. Such spillovers can raise productivity of the local firms in a considerable way (Rodriguez-Clare, 1996).

[2] In general, it is expected that FDI has huge advantages with little or no downside (Bajpai and Sachs, 2000). This motivates the policy makers, especially of the developing nations to make efforts for more inward FDI.

[3]However, FDI is not a completely new source of finance for the Indian economy. A substantial presence of foreign capital was evident even in the pre-independence era when the British dominated over the mining, plantations, trade, and manufacturing base of the country (Athreye and Kapur, 2001).

1991-92 to 2008-09 (Chatterjee et al. 2009)[4]. However, while FPI inflows have declined sharply and became negative following the global slowdown in 2008-09, FDI inflows have continued increasing. Further, the inflows of FPI have fluctuated more as compared to that of FDI. Above all, increase in foreign investment has made India's growth strategy predominantly dependent on foreign capital[5].

The liberal policy measures have also enhanced competition amongst the state governments for bringing in more FDI into the respective states leading to locational tournaments for investment in recent years[6]. Many of the states today offer tax incentives, and provide land and public utilities at lower price to win the game. Since the state governments seek investment and the investors seek investment friendly locations, the outcomes depend on bargaining power of the players as well as on their ability or necessity to cooperate with each other to restrict competition. However, even though many of the states incur substantial administrative and promotional costs during the course of the tournament, only a few of them can have a potentially positive outcome from the tournament.

The locational tournaments seem to have significant implications for wide inter-state variations in FDI inflows that have made the distribution highly skewed towards a few states (Chatterjee et al. 2009). It is observed that the top five states attracting more than 65 percent of total FDI inflows during April 2000 to May 2009 are Maharashtra including, Dadra and Nagar Haveli, Delhi including Western Uttar Pradesh and Haryana, Karnataka, Gujarat, and Tamil Nadu including Pondicherry. On the contrary, the states like Bihar, Rajasthan and Uttar Pradesh have drawn a very small portion of total FDI inflows during this period.

Understanding the dynamics of such inter-state variations in FDI inflows is very important for balanced regional development in the country. This is so because - the skewed distribution of FDI inflows towards some specific states, hence increasing imbalance in regional development are likely to have serious consequences on socio-economic-political stability of the country[7]. The present paper is an attempt in this direction. The objective of the paper is to identify the

[4] According to the World Investment Prospects Survey 2009-2011 by the United Nations Conference on Trade and Development (UNCTAD), India was ranked at the third place in global FDIs in 2009, and was expected to remain amongst the top five attractive investment destinations during 2010-11. Similarly, a report of the Leeds University Business School commissioned by the UK Trade and Investment in 2010 ranked India amongst the top three countries in the world where the British companies can do better business during 2012-14.

[5] Although growth performance of many of the emerging economies like India is influenced by foreign capital, the possibility of a bi-directional causality cannot be ruled out. Better growth performance of an economy is also expected motivate foreign investors to invest therein. See Ilgun et al. (2010) for experience of Turkey in this regard.

[6] See Mytelka (1999) for details on locational tournaments.

[7] For example, Pal and Ghosh (2007) find that extremely skewed inter-state distribution of investment has caused increasing inter-regional disparities in India. Similarly, Nunnenkamp and Stracke (2007) point out that FDI is likely to widen regional income disparity in Indian economy.

factors that have caused inter-state variations in FDI inflows in India. The rest of the paper is divided into five sections. Section II reviews the literature on determinants of FDI inflows to indentify the critical issues. Section III specifies the functional model on the determinants of FDI and their possible impact. The estimation techniques applied and the data sources used are discussed in Section IV. Section V explains the regression results and their implications. Section VI concludes the paper with necessary policy directions.

2. Determinants of FDI Inflows: Review of Literature

Increasing importance and growing interest in the causes and consequences of FDI have led to the development of a number of theories. The major theories on FDI include the product life cycle hypothesis (Vernon, 1966), oligopolistic reactions hypothesis (Knickerbocker, 1973), industrial organization hypothesis (Kindleberger, 1969; Hymer, 1976; Caves, 1982; Dunning, 1988), and eclectic theory (Dunning, 1977, 1979, 1988). These theories manly explain the reasons for the multinational corporations' (MNCs) involvement in FDI, selecting one country in preference to another to locate investment, and choosing a particular mode of investment over others (Moosa, 2002).

The product life cycle hypothesis of Vernon (1966) is based on market imperfections across the nations, and relates FDI to international trade and innovation. The theory suggests that the firms resort to FDI at a particular stage of product life cycle for meeting local demand in foreign countries and seeking cost advantages. According to the oligopolistic reactions hypothesis, FDI is largely determined by oligopolistic reactions of the foreign firms to follow the leader (Knickerbocker, 1973; Flowers, 1976). The industrial organization models of Kindleberger (1969), Hymer (1976), Caves (1982) and Dunning (1988) point out that intangible assets (e.g., brand name, protection of patent, managerial skills, etc), lesser cost of capital, superior management, better advertising, promotion and distribution network, access to raw materials, economies of scale, efficient transportation infrastructure, substantial R&D investment in the home country, etc. motivate a firm in setting subsidiaries abroad. The eclectic theory of Dunning (1977, 1979 and 1988) explains the advantages of investing abroad in terms of ownership, location and internalization. While the nature of ownership explains the firm-specific advantages of going abroad, the locational factors influence the decision on where to investment. Internalization of firms, on the other hand, deals with the problem of how to go abroad.

Recent developments in the literature point out several other factors such as market size, labor cost, economic openness, political stability, risks of investment, governance, etc. to explain why the firms go abroad and how do they select the investment location. For example, Krugman (1996, 1998) highlights two sets of factors that can determine the location of investment. While the first group includes market size, external economies, knowledge spillovers, etc., the second

group comprises of market forces including input costs and non-market factors like pollution. On the other hand, Carstensen and Toubal (2003) are of the view that the traditional determinants like market potential, low labor costs, skilled workforce, corporate tax rates and relative endowments have significant impact on FDI decisions. In addition, transition-specific factors, such as the level and method of privatization, country specific risks (i.e., legal, political and economic environment), etc. also play important roles in determining FDI inflows. Other important determinants of inward FDI include distance from the markets, economic growth in host countries, etc. (Frenkel et al. 2004).

Given such diversities in the set of factors that influence regional strategies of the MNCs and their choice of investment location, it is necessary to have a deeper understanding of the factors that influence the spatial distribution of FDI (Chidlow and Stephen, 2008). International experiences suggest that infrastructure (both physical and social) may have significant impact on FDI decisions. Using a dataset of 18 Latin American countries over the period from 1995 to 2004, Quazi (2007) finds that better domestic investment climate, quality infrastructure, greater trade openness, and higher return on investment have significant influence on FDI inflows. Similarly, Kirkpatrick et al. (2006) identify infrastructure quality as one of the key determinants of FDI in the middle and low income countries during 1990-2002. The study by Hsiao and Shen (2003) identifies, along with infrastructure, economic growth, predictable behavior from government institutions, their trustworthiness and commitment, and tax rates as the important factors influencing FDI inflows. It is also observed that the regional characteristics such as potential for market share extension, labour cost differences, allocative efficiency, transportation infrastructure, and research and development have influence on the locational choice of FDI in mainland China (Chen, 1996). Studies by Globerman and Shapiro (2002), Noorbakhsh et al. (2001)[8], Abdul (2007), and Wheeler and Mody (1992) also find significant impact of infrastructure on FDI inflows[9].

There are studies in Indian context as well that explain FDI inflows with infrastructure as one of the key factors. For example, Kumar (2002) finds significant impact of physical infrastructure on FDI inflows in general and export oriented production of MNCs in particular. Similarly, Bajpai and Sachs (2000) point out that infrastructure of poor quality is one of the major constraints for India to become an attractive investment destination. On the other hand, Morris (2005) recognizes the importance of quality governance in FDI decisions, in addition to the necessity of

[8]According to Noorbakhsh et al. (2001), along with infrastructure, other location specific determinants like market size and its growth also have significant impact on FDI inflows.

[9]However, there are studies that do not find any significant relationship between infrastructure and FDI inflows. For example, Lheem and Guo (2004) do not find any significant impact of human capital on FDI distributions in China, rather geographical and historical conditions and economic growth in a region turn out to be the deciding factors. More interestingly, in many cases, the determinants of regional distribution of FDI are different from those at the national level.

infrastructure. Some of the existing studies in Indian context have attempted to explain inter-state differences in FDI inflows in terms of infrastructure. Using panel data regression models over the period 1991-2000, Archana (2006) finds that the variations in FDI across the states are caused by growth of market, gross capital formation, and physical and social infrastructure. Similarly, Nunnenkamp and Stracke (2007) observe that, along with various structural characteristics, inflows of FDI into a state are determined by availability of quality infrastructure. The foreign investors prefer investment locations that are relatively advanced in terms of per capita income and infrastructure. Some other studies that find significant influence of infrastructure on state-wise distribution of FDI in India include Majumdar (2005)[10], and Pal and Ghosh (2007).

Thus, majority of the studies find infrastructure as an important determinant of FDI inflows (Wheeler and Mody, 1992; Chen, 1996; Noorbakhsh et al. 2001; Kumar, 2002; Banga, 2003; Moosa and Cardak, 2006; Quazi, 2007; Rozas and Vadlamannati, 2009). It is observed that the countries or regions with better physical infrastructure have greater FDI inflows as compared to those lacking necessary infrastructure facilities (Wheeler and Mody, 1992; Loree and Guisinger, 1995; Chen, 1996; Mody and Srinivasan, 1998; Kumar, 2002; Abdul, 2007). Further, Banga (2003), Majumdar (2005), Archana (2006), Moosa and Cardak (2006), Siddharthan (2008), and Rozas and Vadlamannati (2009) find both physical and social infrastructure as important determinants of FDI inflows.

However, there are also studies that find only weak or contradictory relationship between FDI inflows and infrastructure in general and various components of it in particular. For instance, Chakravorty (2003) finds little significance of infrastructure in determining the location or quantity of industrial investment. Similarly, Nunnenkamp and Stracke (2007) do not find any significant influence of electricity and education on FDI inflows across Indian states. Likewise, Root and Ahmed (1979), Lheem and Guo (2004), Quazi (2007) do not find human capital as a significant determinant of inward FDI. Further, while education is found to have significant influence on FDI inflows (Hanson, 1996; Noorbakhsh et al. 2001; Archana, 2006), the role of health infrastructure is not adequately explored except in a few studies like Globerman and Shapiro (2002) and Chakravorty (2003)[11].

Hence, majority of the existing studies consider infrastructure an important determinant of FDI inflows, but there is no consensus on this issue. This is possibly due to the differences in types of data used, methods of analysis applied, and selection of components in defining infrastructure, and choice and definition of other variables, choice of timeframe, etc. For example, many of these studies (e.g.,

[10]According to Majumder (2005), the investors generally prefer those areas which are successful in expanding and augmenting basic infrastructure facilities.

[11] Chakravorty (2003) considers infant mortality rate as a measure of social infrastructure, but does not distinctly specify it as a measure of health infrastructure.

Noorbakhsh, et al. 2001; Majumdar, 2005; Archana, 2006; Nunnenkamp and Stracke, 2007; Siddharthan, 2008) have used data on proposed/approved FDI, and not data on actual FDI inflows. Since there is a considerable gap between the proposed/approved amount and actual investment inflows, the conclusions are likely to differ. What is even more important is that the indicators of infrastructure used vary widely across these studies. While the study by Siddharthan (2008) measures physical infrastructure in terms of teledensity and electricity consumption, Noorbakhsh, et al. (2001) have used energy availability as the proxy for infrastructure. On the other hand, Archana (2006) has used a wide range of variables to measure infrastructure. The infrastructure in the study is represented by the telecom and energy index, and the transport and media index. The telecom and energy index includes teledensity, electricity consumption and literacy rate, whereas the transport and media index covers road density, railway density, motor vehicle density and newspaper density. Such differences in components in the measures of infrastructure are likely to have significant bearing on observed infrastructure-FDI relationships.

Further, the relationship between infrastructure and FDI depends largely on the nature of investment. For example, mergers and acquisition (M&As) have become a predominant channel of FDI inflows into India in the post-reform era. Nearly 39 per cent of FDI inflows into the country during 1997-1999 has taken the form of M&As, whereas inward FDI in the pre-reform era was invariably Greenfield investments in nature (Kumar, 2000). The trend continued in the recent past as well. Acquisition of shares by the foreign investors constituted around two-fifths of the total FDI equity inflows during 2005-07 (Rao and Dhar, 2011). When such a significant portion of FDI inflows are in the form of M&As, infrastructure may not necessarily be a per-condition for investment decisions, though the requirement of the minimum level of infrastructure for a region to attract FDI cannot be ignored[12]. Further, FDI through acquisition forces the investors to invest in a state where the target firm is located, and such a state may not necessarily be a favourable destination for investment, when availability of infrastructure is concerned. In other words, FDI through acquisition is likely to be influenced by compulsion not by choice of locational advantage.

Nature and extent of infrastructure requirement is also largely industry specific. It is observed that that the top three sectors attracting major portion of FDI inflows during 2000-05 include computer software and hardware, services, and telecommunication[13]. These sectors do not require road or railway related infrastructure to attract FDI. Instead, foreign investment in telecommunication results in expansion and development of communication infrastructure. Therefore,

[12] There is also a need for the developing countries to reach a certain level of educational, technological and physical infrastructure to reap the benefits from the presence of foreign enterprises (OECD, 2002).
[13] The details on sector-wise FDI inflows are available in SIA Newsletter, Department of Industrial Policy and Promotion, Government of India (www.dipp.nic.in).

infrastructure-FDI relationship is likely to be influenced largely by industry wise distribution of investment inflows. The key sectors attracting FDI into Maharashtra include energy, transportation, services, telecommunication and electrical equipment. This means that FDI inflows into Maharashtra are mostly in service providing sectors or for development of infrastructure. The same can be said in case of Delhi as well. It has attracted FDI inflows primarily in sectors like telecommunications, transportation, electrical equipment (including software), and services. Hence, availability of physical infrastructure may not be a precondition for FDI in Maharashtra and Delhi, though these two states have attracted significant portion of inward FDI during 2000-09 (Chatterjee et al. 2009).

Besides, on many occasions, the foreign investors may create the necessary infrastructure facilities on their own instead of depending on public stock. It is also observed that in a developing country like India a large portion of FDI is directed towards developing such facilities, especially when domestic investment is not sufficient to meet requirements. In such cases, the state of infrastructure is not a cause but an effect of FDI inflows. Similarly, the mobility of human resources may nullify the impact of education and health infrastructure on FDI inflows. All these possibilities restrict generalization of infrastructure-FDI relationship and create the necessity of reexamining the same in Indian context.

Further, FDI is generally considered as 'stock' and the stream of returns in the long-run largely influences decisions on investment (Moosa, 2002). Hence, performance of the existing enterprises may play a crucial role in choosing investment locations as this signals the stream of returns from the proposed project. The investors usually prefer the locations where they expect greater returns. In addition, when the investors are risk-averse, the choice of investment location may also be influenced by risks of investment (Moosa, 2002). The rationale of this proposition can be seen in the portfolio diversification hypothesis of Tobin (1958) and Markowitz (1959). According to this hypothesis, investment decisions are guided not only by the expected rate of return but also by the risks[14]. Further, on many occasions, the decisions on FDI may be irreversible due to huge sunk cost, and, therefore, careful planning and evaluation of expected returns from alternative investment locations are carried out by the prospective foreign investors before making investment decisions. But, the existing studies do not adequately explore the influence of risks of and returns from investment on locational decisions.

There are a number of studies that examine the influence of inflows of FDI on domestic investment, though the nature of impact is inconclusive in the literature. For example, while Fry (1992), De Mello (1999), Lipsey (2000), Agosin and Mayer (2000), Kim and Seo (2003) and Titarenko (2006) find FDI as a substitute of domestic investment, Borensztein et al. (1998), De Mello (1999), Agosin and Mayer

[14] These risks may be linked to the legal, political and economic environment, and can turn out to be significant deterrent to FDI inflows (Cartstensen and Toubal, 2003).

(2000), Krkoska (2001) and Changyuan (2007) observe complementarities between the two. However, the influence of domestic investment on inflows of FDI is not well explored in the literature. According to Apergis et al. (2006), there are two channels through which domestic investment can influence FDI. Domestic investment may be directed towards building physical and social infrastructure to attract FDI. Besides, greater domestic investment may also signal better business environment at the local level and this may attract foreign investment. This is particularly so when there is incomplete information and the foreign investors perceive that domestic investors have more accurate information relating to the local business climate. The studies that find domestic investment as an important determinant of FDI include Hecht et al. (2004), Apergis et al. (2006) and Quazi (2007). However, when the market size is given, larger domestic investment may reduce the scope for FDI. For example, Harrison and Revenga (1995) do not observe any significant impact of domestic investment on FDI. Hence, it is necessary to examine the impact of domestic investment on FDI inflows in Indian context. But, such an attempt is largely absent in the existing studies.

The review of literature on different theories and the determinants of FDI, therefore, show that the decisions on investment location may not necessarily be influenced by availability of adequate quality infrastructure facilities. Even when infrastructure influences location of FDI, performance of the existing enterprises, technology frontier at the local level and domestic investment may also play crucial role in attracting investment into a region. In other words, along with infrastructure, regional variation in FDI inflows should be analyzed from the investors' perspective by incorporating these issues and the next section of the paper is an attempt in this direction.

3. Theoretical Model of FDI

As discussed above, the choice of location for investment depends on the stream of returns in the long-run which is largely determined by location specific potential to convert the investment into returns. This means that, in order to derive the theoretical model on the determinants of FDI inflows, it is important to define an appropriate functional form of conversion of investment into returns. Following Griffith and Webster (2004), let us define the expected return from investment (Ri) as,

$$R_i = \pi_i [\alpha_i \ln (FDI_i) + \beta] \quad (1)$$

Here, FDI_i is the amount of FDI inflows into state i, π_i is the return per unit of realized output from FDI in the state[15], and α_i represents the state specific potential

[15]The paper uses profitability measured as the percentage share of profit in total industrial output in a state as an indicator of the level of business performance (π_i). It is assumed that greater profitability of the existing enterprises enhances both ability and willingness of the existing MNCs to expand their

to convert FDI into output, given β as the threshold output which is constant across the states. Therefore, the present value of expected return from investment (PVRi) will be,

$$PVR_i = \frac{\pi_i [\alpha_i \ln (FDI_i) + \beta]}{(x_i + r)} \quad (2)$$

Here, xi stands for the risks of investing in state i and r for the rate of discount constant for all the states. Similarly, the present value of the recurring expenses of investment will be

$$C_i = \frac{\gamma FDI_i}{(x_i + r)} \quad (3)$$

Here, γ stands for the proportional factor and it is assumed to be constant across the states.

If the investors decide to make investment to the maximum amount of FDI_0 in India, investment in a particular state FDIi will be either less than or equal to FDI_0, i.e., $FDI_o \geq FDI_i$ or $FDI_o - FDI_i \geq 0$

Therefore, objective of the investors is to decide FDI_i so that the net expected return,

$NER_i = \frac{\pi_i [\alpha_i \ln (FDI_i) + \beta]}{(x_i + r)} - \frac{\gamma FDI_i}{(x_i + r)}$ is maximum subject to $FDI_o - FDI_i \geq 0$

Hence, the problem of the potential investors can be written in Lagrange expression as follows:

$$L = \frac{\pi_i [\alpha_i \ln (FDI_i) + \beta]}{(x_i + r)} - \frac{\gamma FDI_i}{(x_i + r)} + \lambda (FDI_0 - FDI_i) \quad (4)$$

By applying Kuhn-Tucker conditions of constrained optimization,

$$FDI_i = \frac{\pi_i \alpha_i}{[\gamma + \lambda (x_i + r)]} \quad (5)$$

Assuming that the rate of discount 'r' is uniform across the states, (5) can be expressed as the following functional relationship,

$$FDI_i = f(\alpha_i, \pi_i, x_i) \quad (6)$$

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business in a state. Greater profitability of the existing enterprises also attracts new foreign investors to invest therein. In either way, a state with higher profitability of the existing business enterprises is likely to attracted greater FDI inflows.

Here, $\frac{\partial FDI_i}{\partial \alpha_i} > 0$; $\frac{\partial FDI_i}{\partial \pi_i} > 0$; and $\frac{\partial FDI_i}{\partial x_i} < 0$.

This means that the optimum investment in state i varies directly with the state-specific potential to convert FDI into output, return per unit of realized output, but inversely with the risks of investment in the state. But, the potential of a state to convert FDI into return is likely to depend on availability of physical and social infrastructure, the scope for investment therein and the technology frontier. Therefore,

$$\alpha_i = \phi\left(RDI_i, DI_i, TCI_i, PWR_i, EDUI_i, HI_i\right) \quad (7)$$

Here, RDI stands for research and development intensity in state i to represent its technology frontier[16], DI for implemented domestic investment in the state, TCI for transportation and communication infrastructure, PWR for power supply, EDUI for educational infrastructure, and HI for health infrastructure. While RDI acts a proxy for technology frontier of the state i and DI captures the scope for FDI therein, TCI and PWR proxy for physical infrastructure. On the other hand, EDUI and HI control for social infrastructure facilities in the state[17]. Substituting (7) in (6),

$$FDI_i = f\left[\phi\left(RDI_i, DI_i, TCI_i, PWR_i, EDUI_i, HI_i\right), \pi_i, x_i\right] \quad (8)$$

As the influence of the factors on FDI inflows may not be instantaneous and many of the independent variables may be influenced by FDI inflows as well, the present study introduces a lag of two years for the infrastructural components and a lag of one year for rest of the variables (except DI) to capture the dynamics of adjustments as well as to control for the problem of endogeneity[18]. However, due to the non-availability of data, the study has taken a lag of 3 months for DI. The functional relationship (8) is, therefore, reduced to

[16] Here, extramural research in a state supported by various departments/agencies of the Central Government is used as a measure of its technology frontier. Such extramural research aims at building up general research capability and also at promoting research.

[17] It should be mentioned that, in the present paper, education infrastructure refers to availability of education related facilities like number of educational institutions, number of teachers in proportion of students, etc., and not the supply of educated manpower as the latter may be influenced by migration. Further, the paper does not include graduate workforce in measuring education infrastructure. It is assumed that mobility of the workforce with better education is very high and it is relatively less for the semi-skilled or unskilled workforce. The potential investors may in general look at availability of semi-skilled workforce at the local level while making decisions on investment location.

[18] The issue of endogeneity is unlikely to be serious in the in the present context. This is so because the dataset used in the present paper have time-series components of only five years and implementation of the Greenfield FDI projects in manufacturing in particular has long gestation lag. It is very unlikely that the FDI in any particular year will have immediate impact on profitability of the existing firms, domestic investment or infrastructure. However, introduction of lags in independent variables also reduces such possibility further.

$$FDI_{it} = f\left(RDI_{i,t-1}, DI_{i,t-1}, TCI_{i,t-2}, PWR_{i,t-2}, EDUI_{i,t-2}, HI_{i,t-2}, PROF_{i,t-1}, RI_{i,t-1}\right)$$

Assuming that there exists linearity in the relationships, the above functional relationship can be rewritten as

$$FDI_{it} = \beta_1 + \beta_2 RDI_{i,t-1} + \beta_3 DI_{i,t-1} + \beta_4 TCI_{i,t-2} + \beta_5 PWR_{i,t-2} + \beta_6 EDUI_{i,t-2} + \beta_7 HI_{i,t-2} + \beta_8 PROF_{i,t-1} + \beta_9 RI_{i,t-1} + u_{it} \quad (9)$$

Here, u_{it} stands for the random disturbance term. From (9) it appears that the amount of FDI inflows into a state is determined by its technology frontier, physical and social infrastructure facilities, scope for investment in the state, and performance of the existing enterprises[19].

3.1. Possible impact of explanatory variables

Research and Development Intensity (RDI): The relationship between R&D efforts and FDI inflows is complex. On the one hand, R&D is expected to raise the quality of human capital and its productivity by improving existing technologies and developing new techniques. In other words, higher R&D is likely to improve technological capabilities, which in turn may result in greater FDI inflows. Besides, when the FDI is in the forms of mergers or acquisitions, the local firms require minimum level of human and technological strength to absorb spillovers from the foreign firm. Therefore, the states with greater R&D efforts are likely to attract more FDI[20]. However, greater R&D efforts in a state may also create entry barriers and thereby restrict FDI inflows. Further, when imitation potential is high, greater R&D may not raise FDI inflows. Hence, the impact of R&D on FDI inflows depends on how these diverse forces operate.

Implemented Domestic Investment (DI): Both domestic and foreign investment can add impulse in creation of asset base[21.] In an underdeveloped state, domestic investment may create infrastructure and market opportunities to encourage foreign investors for investing therein. Greater domestic investment into a state may also signal better business environment and thereby attract greater FDI inflows. Hence, one may expect complementarities between domestic investment and FDI. However, domestic investment may also serve as a substitute of FDI reducing the scope for the later. Further, at the aggregate level domestic

[19] The sector specific distribution of FDI is also likely to be one of the reasons behind the skewed distribution of FDI across the Indian states (Rao and Murthy, 2006). Similarly, the share of a state in total FDI inflows may also depend on the nature of investment. However, lack of systematic data restricts from modeling FDI by capturing these aspects.

[20] It is observed that FDI leads to positive growth effects in regions that are closer to the technology frontier (Aghion et al. 2006; Nunnenkamp and Stracke, 2007).

[21] In general, in the initial stages of development, an economy may rely on domestic investment. But, a stage may come when the optimum capital stock may exceed actual capital stock .i.e. domestic investment becomes incapable in meeting the burgeoning needs both financially and technologically. Under such circumstances, FDI may play a crucial role in bridging the financial and technological gap.

investment and foreign investment may not have a significant relationship, especially when substitutability neutralizes the complementarities. Thus, the relationship between domestic investment and FDI is largely an empirical issue.

Transportation and Communication Infrastructure (TCI): Better transport and communication facilities are expected to provide easy and quick access to input and output markets making the environment largely business conducive. Therefore, the states with better TCI are likely to attract greater FDI inflows (Kumar, 2002; Archana, 2006; Nunnenkamp and Stracke, 2007). However, such positive association may not necessarily hold, especially when foreign investment is directed towards developing infrastructure or the foreign investors develop the required infrastructure or FDI comes in through mergers and acquisitions instead of Greenfield investments. In addition, the requirement of TCI for FDI is largely industry-specific. There are studies (e.g., Chakravorty, 2003) that find no significant influence of infrastructure in determining the location of FDI. The influence of TCI on FDI, therefore, depends on how these diverse forces empirically dominate each other.

Power Supply (PWR): Availability of electricity along with other infrastructural parameters is instrumental for bringing in private investment (Ghosh and De, 2005; Archana, 2006), whereas shortage of it is likely to restrict investment inflows. The states with more power shortage are likely to receive less FDI inflows. However, when the foreign investors develop their own source of power, it may not become a significant determinant of FDI inflows. For example, Nunnenkamp and Stracke (2007) do not find power supply as a significant determinant of FDI in Indian states. The impact of power supply on FDI inflows, therefore, depends on the relative strength of these diverse forces.

Educational Infrastructure (EDUI): Investment requires availability of qualified human capital (Moosa, 2005) and, therefore, promoting education is considered as crucial for overall development of an economy (Sen and Pal, 2005). A number of studies (e.g., Noorbakhsh et al. 2001; Quazi, 2007; Nunnenkamp and Stracke, 2007) observe significant influence of human capital on FDI inflows. The states with good educational infrastructure can attract greater FDI inflows. However, since human resources are highly mobile, availability of quality manpower at the local level may not necessarily be a pre-condition for choice of investment locations[22]. Instead, the potential investors may look at availability of semi-skilled/unskilled workforce at the local level while making investment decisions. Further, there are sectors that engage large number of unskilled/semi-skilled workforce and investment in these sectors may be directed towards the states even with poor educational infrastructure to source necessary workforce at lower wage rate. Hence, the impact

[22] For example, Quazi (2007) finds no significant influence of human capital on FDI inflows.

of educational infrastructure on FDI inflows depends largely on the nature of industry.

Health infrastructure (HI): Good health facilities have positive impact on labour productivity (Sen and Pal, 2005). Therefore, one may expect a positive relationship between health infrastructure and FDI inflows. However, considering that human capital is highly mobile, such a positive relationship may not necessarily hold. Hence, the impact of health infrastructure on FDI inflows is largely an empirical issue.

Profitability (PROF): Higher profitability of the existing enterprises in a state indicates better business environment and hence encourages potential investors to invest therein. It also raises the ability and willingness of the existing enterprises to expand their business. Profitability also represents factors like size of the existing firms (Hall and Weiss, 1967; Samuels and Smith, 1968), their market share (Gale, 1972), market concentration (Bain, 1951; Schwartzman, 1959; Mishra, 2008), and past profitability and growth (Singh and Whittington, 1968; Barthwal, 1977). Therefore, the states with higher profitability of the existing enterprises may be expected to attract greater FDI inflows. However, entry of new firms and expansion of existing ones may reduce profitability and hence FDI inflows in the long-run.

Risks of Investment (RI): As many of the potential investors are risk-averse, market risks[23] are likely to play crucial role in selecting investment location (Moosa, 2002). From a firm's perspective, risks and returns are considered as the important performance characteristics that are likely to influence entry decisions. Generally, higher risks reduce the likelihood of entry unless the potential entrant is risk prone (Basant and Saha, 2005). Greater risks also restrict expansion of the existing firms. Hence, one may expect less FDI inflows into the states where the existing enterprises suffer from the problem of greater variability in profitability. However, if the investors are risks lovers for greater returns, investment may go up.

4. Estimation Techniques and Data

Equation (9) is estimated with a panel dataset of 16 groups of Indian states[24] over the period from 2001-02 to 2005-06[25.] This helps in raising the number of

[23]Here, by risks we refer to variability in profitability or rates of return. While understanding their implications for investment decisions, the risks are generally considered in a long-term perspective. However, the short run fluctuations in business performance are also likely to be very important in this regard, particularly due to increasing market competition and integration of markets during the post-reform period.

[24] Here, the states are combined into 16 groups as per the data on FDI inflows provided by the regional offices of the Reserve Bank of India. Accordingly, Maharashtra includes Dadar Nagar and Daman & Diu, Tamil Nadu includes Pondicherry, Kerala includes Lakshadweep, Uttar Pradesh includes Uttaranchal, Bihar includes Jharkhand, Madhya Pradesh includes Chattisgarh, North-Eastern Region includes Assam, Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland and Tripura, West Bengal includes Sikkim, Andaman & Nicobar Islands, Chandigarh includes Punjab, Haryana and Himachal Pradesh, and Delhi

observations and hence in enhancing the degrees of freedom and efficiency of the estimators considerably. It also incorporates the dynamics of FDI inflows into the states. First, the pooled regression model is estimated assuming that there is no significant state specific or temporal effect. In regression with panel data, the random effects models (REM) and the fixed effects models (FEM) are estimated to control individual specific and temporal effects, and the choice between the two is a critical issue. However, the present paper prefers the REM to the FEM. This is so because, the states are grouped mainly on the basis of their geographical location and, hence, they are likely to be heterogeneous within a group in terms of their socio-economic-political structure. Similarly, different groups of states also seem to be heterogeneous in nature and the group specific effects are unlikely to be systematic. Further, since there are only 80 observations, the FEM will suffer from the problem of considerably low degrees of freedom as it requires estimating state specific parameters to capture individual effects. On the other hand the REM does not suffer from such problem as it does not require estimating separate parameters to characterize the individual states. Besides, the REM also retains the observed characteristics that remain constant for each individual, but they are dropped in the FEM. Despite its limitations in the present context, the FEM is estimated and the relevant tests, viz., the restricted F-test and the Hausman (1978) test are carried out to examine statistically if the FEM is suitable[26].

Equation (9) is estimated as the REM by applying the method of feasible generalized least squares (FGLS)[27]. In order to make a choice between the pooled regression model and the REM (i.e., to confirm the assumption of randomness), the Breusch-Pagan Lagrange Multiplier Test (1980) is applied. In addition, since the cross-sectional observations are larger as compared to the time-series components, the t-statistics of the individual coefficients in the pooled regression model and the z-statistics of the coefficients in the REM are computed by using robust standard errors to control for the problem of heteroscedasticity. The severity of the problem of multicollinearity across the independent variables is also examined by using the variance inflation factors (VIF).

As mentioned above, the Reserve Bank of India (RBI) combines the data on inflows of FDI into the states under the jurisdiction of its regional offices and, in the present paper, the states are grouped accordingly. The components used in different measures of infrastructure are averaged for the respective group with

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includes part of Uttar Pradesh and Haryana. However, state specific data are available for Gujarat, Karnataka, Goa, Andhra Pradesh, Orissa and Rajasthan, and these states are considered separately.

[25] As we have systematic data on FDI inflows only for six years, a time-series analysis will not be appropriate. Further, since the data on FDI are available only across 16 groups of Indian states, a simple cross-sectional analysis also turns to be inappropriate. Hence, we apply panel data analysis to estimate the regression equation.

[26] While the restricted F-test makes a choice between the pooled regression model and the FEM, the Hausman (1978) test is applied to select between the FEM and the REM.

[27] For the details see, Gujarati and Sangeetha (2007).

appropriate weights to the best possible extent while combining the states. Grouping of the states in this way may bring in omitted variable bias by ignoring other state specific variables that cannot be averaged. However, since the states in a group are largely heterogeneous in terms of their socio-economic-political characteristics and the paper finally chooses the random effects model, such bias is likely to be largely controlled. Of course, such a grouping is still a limitation of the present paper, and non-availability of data on actual inflows of FDI at state level restricts from carrying out analysis at the state level.

Further, there are many aspects of infrastructure, such as road and railway network, ports, airports, telecommunication network, information infrastructure, energy availability, education and health facilities, etc. Many of these aspects of infrastructure are likely to be correlated with each other (Canning, 1998) resulting in the problem of multicollinearity. When it is so, the regression results in respect of the individual coefficients may be misleading. On the other hand, a particular or a few of the components may not capture overall infrastructure adequately across the states. For example, a state may have a very good network of roads but the telecommunication network may not be well developed. Hence, capturing the role of different aspects of infrastructure requires comprehensive measures.

In the present paper, different components of infrastructure are combined and three measures of infrastructure, namely transport and communication infrastructure (TCI), education infrastructure (EDUI) and health infrastructure (HI) are constructed. While TCI includes road density (RD), railway density (RWD), vehicle density (VD), and telecom-density (TD), EDUI includes educational institutions-students ratio (ISR) and teachers-students ratio (TSR). On the other hand, HI comprises of birth rate (BR), death rate (DR) and infant mortality rate (IMR). Although either factor analysis (FA) or principal component analysis (PCA) can be applied to construct a composite measure, there are debates regarding their choices. While Bentler and Kano (1990), Floyd and Widaman (1995), Ford et al. (1986), Gorsuch (1990), Loehlin (1990), MacCallum and Tucker (1991), Mulaik, (1990), Costello and Osborne (2005), and Snook and Gorsuch (1989) consider factor analysis more appropriate, Arrindell and Van der Ende (1985), Guadagnoli and Velicer (1988), Schoenmann (1990), Steiger (1990), Velicer and Jackson (1990) either find that there is no difference between the two methods or prefer the principal component analysis.

The present paper applies factor analysis to construct the measures of infrastructure. This is so because the PCA is simply a data reduction method where the computations are carried out ignoring the underlying structure caused by the latent variables. The components are estimated on the basis of the variance of the manifest variables and the variances are found in the solution itself (Ford et al. 1986). On the other hand, the FA aims not only to reveal the latent variables that cause the manifest variables to covary, but also can discriminate between shared and unique variances (Costello and Osborne, 2005; Garson, 2010). In other words,

during factor extraction the shared variance of a variable is partitioned from its unique variance and error variance in the FA. Further, the FA is based on correlation and it is possible to add variables to the model without affecting factor loadings, whereas the PCA is based on variance and adding variables to the model change the factor loadings (Garson, 2010). Hence, the FA is more flexible vis-à-vis the PCA. The measures computed in this way can help in having a more comprehensive measure of infrastructure.

The results of factor analysis can be used either in the form of factor scores or in the form of summated scales based on the factor structure. The choice depends on the presence of errors in the original data as the results of factor analysis can largely be influenced by these errors. Since the present paper uses secondary data, original data are likely to be well-constructed, valid, and reliable. Hence, the present study uses factor scores as measures of different types of infrastructure. The factor score is a linear combination of all of the original variables that are relevant in making the new factors. While carrying out the FA only those factors are retained that have eigenvalue greater than or equal to zero. Accordingly, in the present paper, for the measures of transport and communication infrastructure and health infrastructure only the first factors are considered. However, in case of education infrastructure, there are two factors with eigenvalue of none being greater than or equal to zero. But, since the eigenvalue of the second factor is negative, the first factor is used to compute the measure of education infrastructure. The predicted factor scores for each of the three different measures of infrastructure are obtained by using regression method after orthogonal rotation.

It should be mentioned that while the trends and variations in FDI inflows are examined for the period from 2001-02 to 2005-06, the measures of infrastructure are computed for the period from 1999-00 to 2003-04. Introduction of such time lag controls for non-instantaneous relationship between infrastructure and FDI inflows and hence reduces the possibility of simultaneity in the envisaged relationship. In should be mentioned that since the groups of states are the unit of analysis, the components of infrastructure for a group are measured by averaging them across the states in the group with appropriate weights. For example, in order to compute road density for a particular group, first the density is computed for each of the individual states within the group. Next, the densities are averaged with share of a particular state in total road length of all the states in the group as the weight. In order to measure other variables, aggregative method is applied. For instance, in order to measure profitability, profits of all the firms located in a group are added and are normalized by total gross state domestic product of the states in the group.

The necessary data are collected from a variety of sources. Data on FDI inflows across the groups of states are collected from www.indiastat.com[28]. The data on different components of infrastructure such as railway density, road density, number of telephone lines, and vehicle density, and also on population are sourced from the Economic Intelligence Service of the Centre for Monitoring Indian Economy (CMIE), Mumbai. On the other hand, data on birth rate, death rate, infant mortality rate, number of teachers, enrollment of students, and educational institutions, and inflows of FDI are collected from www.indiastat.com. This database also provides information on industrial disputes and crimes. Data on approved Industrial Entrepreneurs Memorandum (IEM) and Letter of Intent (LOI) are sourced from www.dipp.nic.in. The data on profits and output are compiled from www.mospi.gov.in, whereas that on state gross domestic product is collected from www.rbi.org.in.

5. Results and Discussions

The summary statistics of the variables used in regression are given in Table 1. The regression results of the pooled regression model, the FEM and the REM are presented in Table 2. It is observed that the F-statistic of the pooled regression model is statistically significant and value of adjusted R^2 is very high. This means that the estimated model is statistically significant with high explanatory power. Since the value of the variance inflation factor (VIF) for all the explanatory variables are very low, the estimated model does not suffer from the problem of multicollinearity. The t-statistics based on robust standard errors show that the coefficient of RDI, PROF, RI and HI are statistically significant. Further, the coefficients of RDI and PROF are positive and that of RI and HI is negative. On the other hand, the coefficient of DI, TCI, PWR and EDUI are not statistically significant.

Table 1: Summary Statistics of the Variables

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
FDI	80	0.56	1.27	Neg.	8.46
RDI	80	0.06	0.09	Neg.	0.53
PROF	80	6.13	4.75	-3.27	27.38
RI	80	2.07	2.25	0.13	9.72
DI	80	8.37	15.54	-6.64	94.55
TCI	80	Neg.	0.89	-0.75	3.61
PWR	80	-7.29	5.69	-27.72	Neg.
EDUI	80	Neg.	0.30	-0.51	0.88
HI	80	Neg.	0.76	-1.75	1.28

Note: Neg. = Negligible (<0.005)

[28] Here, a group of states is also treated as an individual state for analytical convenience.

However, the pooled regression model does not take care of temporal effects. In order to overcome this limitation, the REM is estimated. It is observed that the Wald-χ^2 of the REM is statistically significant and the R^2 is quite high (Table 2). This means that the estimated REM is statistically significant with - high explanatory power. Further, the Breusch and Pagan Lagrange Multiplier Test (1980) yields the χ^2 statistic which is statistically significant (Table 3). In other words, the Breusch and Pagan Lagrange Multiplier Test (1980) suggests for selection of the REM over the pooled regression model.

As mentioned earlier, the present paper also estimates the FEM and the regression results are presented in Table 2. It is observed that the estimated model is not statistically significant. Further, although the restricted F-test suggests for preferring the FEM to the pooled regression model (Table 3), the Hausman (1978) test concludes that the REM is a better specification as compared to the FEM in the present context. Hence, regression results of the REM are used for statistical inference and analysis of the individual coefficients.

Table 2: Regression Results

Ordinary Least Squares Model				Fixed Effects Model			Random Effects Model		
Variable	Coefficient	t-Stat	VIF	Variable	Coefficient	t-Stat	Variable	Coefficient	z-Stat
Intercept	0.145	0.6		Intercept	0.501	0.87	Intercept	0.325	1.06
RDI	4.650	2.01**	3.63	RDI	-0.561	-0.07	RDI	3.040	1.12
PROF	0.031	2.03**	1.56	PROF	0.030	1.67*	PROF	0.024	2.02**
RI	-0.076	-2.46**	1.30	RI	0.061	1.08	RI	-0.053	-1.76*
DI	0.003	0.66	1.20	DI	0.001	0.23	DI	0.005	1.59
TCI	0.720	1.52	3.93	TCI	0.515	1.17	TCI	0.834	1.28
PWR	-0.010	-0.85	1.23	PWR	0.031	1.44	PWR	0.004	0.34
EDUI	0.116	0.43	1.44	EDUI	-1.007	-1.26	EDUI	-0.050	-0.15
HI	-0.195	-2.12**	1.29	HI	1.414	1.14	HI	-0.188	-1.5
F-Stat (8, 71)		28.51***		F-Stat (8,56)	0.57		Wald-χ^2	64.17***	
R^2		0.70		R^2-Within	0.16		R^2-Within	0.03	
Adj-R^2		0.67		R^2-Between	0.0005		R^2-Between	0.83	
				R^2-Overall	0.0001		R^2-Overall	0.69	
Number of Observation		80		Number of Observation	80		Number of Observation	80	

Note: The z-statistics and t-statistics are computed by using robust standard error.
*** Statistically significant at 1 percent;
** Statistically significant at 5 percent;
* Statistically significant at 10 percent

The Z-statistics of the individual coefficients, computed on the basis of robust standard errors, show that the coefficient of PROF and RI are statistically significant. While the coefficient of PROF is positive, that of RI is negative. This means that the level of and variations in profitability of the existing enterprises have significant influence on variations in FDI inflows across the groups of states. Higher profitability brings in more FDI into a state, whereas greater variations in it reduce the inflows of FDI. However, the coefficient of RDI, DI, TCI, EDUI and HI are not statistically significant. In other words, research and development related

efforts of the existing enterprises, implemented domestic investment, and availability of infrastructure facilities do not have any significant impact on variations in FDI inflows across the groups of Indian states.

From the regression results it is evident that higher the profitability of the existing enterprises in a state, greater is the FDI inflows therein as higher profitability signals better business environment and possibility of greater return in future. Higher profitability also raises the ability and willingness of the existing firms to grow and encourage new firms to enter the market (Mishra and Behera, 2007). On the other hand, greater risks, i.e., larger variations in profitability, discourage new investors, particularly who are risks averse, and restrict the existing enterprises from expanding their business.

Table 3: Tests for Selection of Appropriate Model

Purpose	Null Hypothesis	Test Statistic
Selection between Pooled Regression Model and the Fixed Effects Model (Restricted F Test)	All $u_i = 0$	$F_{(15,56)} = 3.81^{***}$
Selection between Pooled Regression Model and the Random Effects Model (Breusch-Pagan Lagrange Multiplier Test)	$\sigma_u^2 = 0$	$\chi^2_{(1)} = 6.95^{***}$
Selection between the Fixed Effects Model and the Random Effects Model (Hausman Test)	Difference in coefficients is not systematic	$\chi^2_{(8)} = 5.11$

Note: *** Statistically significant at 1 percent

However, the observation of no significant relationship between RDI and FDI inflows is contradictory to the proposition that the state/regions closer to technology frontier attract more investment (Aghion et al. 2006 and Nunnenkamp and Stracke, 2007). This may be due to reliance of the foreign firms more on their own R&D base than on sourcing the same in the host country. Further, no significant relationship between DI and FDI inflows implies that DI is neither a substitute nor a complementary of FDI. This is possibly due to neutralizing effects of diverse forces in the envisaged relationship between DI and FDI. In some sectors, FDI may be a substitute of DI, whereas, in others it may act as complementary. Since the impact is examined at the state level, such a finding is not surprising.

It is found that physical and social infrastructures do not have significant impact on FDI inflows. This contradicts with the notion that availability of better physical and social infrastructure is necessary for attracting more FDI (Bajpai and Sachs, 2000; Kumar, 2002). This is very important as lack of necessary infrastructure, especially physical infrastructure facilities, is cited as the prime cause for less FDI inflows into many of the Indian states. There may be a number of possible reasons for such a finding. First, a large portion of FDI has come in through the route of mergers and acquisitions during the post-reform period. In such cases, physical infrastructure may not be a crucial factor to influence the investment decisions as compared to the Greenfield investment projects. Second, on many occasions, the foreign

investors may create their own infrastructure facilities according to the needs instead of depending on public stock. When it is so, availability of physical infrastructure facilities is not a pre-condition for making investment decision in a state. Third, in a developing country like India, FDI may be directed towards developing physical infrastructure, as domestic investment in these countries is not sufficient enough to meet the physical infrastructure requirements. In such cases, infrastructure is not a cause but an effect of FDI inflows. Finally, requirement of physical infrastructure is largely industry specific. Depending on the nature of industry, a state with even poor physical infrastructure can record greater FDI inflows.

The regression result in respect of educational infrastructure is also contradictory to the notion that better educational infrastructure can help in drawing more investment (Moosa, 2005; Sen and Pal, 2005). While educational infrastructure is necessary for improving the quality of human resources at the local level, the nature and extent of requirement of the same are largely industry specific. It is observed that Kerala ranks at the top in literacy rates, but the state fails to attract FDI inflows proportionately as compared to Maharashtra, Tamil Nadu and Gujarat. However, whether mobility of human resources nullifies the impact of education infrastructure on FDI inflows requires further scrutiny[29]. The same can be said in respect of HI as well.

6. Concluding Remarks

The present paper attempts to identify the determinants of inter-state variations in FDI inflows in India. It is observed that infrastructure, be it physical or social, does not have any significant influence on variations in FDI inflows across the Indian states. Instead, inter-state variations in inward FDI are caused by the level and variations in profitability of the existing enterprises. While higher profitability attracts more FDI, greater variability in it reduces the same. Like infrastructure, R&D intensity, and domestic investment also do not have any significant impact on variations in FDI inflows across Indian states.

The findings of the present paper raise some important policy issues. The paper finds that higher profitability of the existing firms results in greater FDI inflows into a state. It is, therefore, necessary to design appropriate policies that can ensure the potential investors' high rate of returns on investment in future. However, higher returns should be realized not by exercising market power but through greater efficiency. The competition laws and policies have significant role to play in this regard. Strict competition laws can potentially reduce market power and hence profitability of the existing firms, But, such laws can also enhance market

[29] This is so because in the present paper does not include graduate workforce in measuring education infrastructure and therefore the extent of mobility is likely to be less.

competition and hence efficiency that can result in higher profitability. Hence, the competition laws and policies should aim not merely at reducing market power, but also at raising market competition by encouraging entry of new firms. This may require removal of legal and structural entry barriers in input and output markets, greater flexibility in the labor laws, easy access to public utility services, simplification of the tax structure, widening the market size, etc. Designing policy resolution in this regard requires detailed scrutiny on the issues.

Since risks in business deter investment inflows, role of the government in regulating market operations to control fluctuations in business performance seems to be crucial. It is therefore necessary to examine if stability in functioning of the capital market and regulation of monopolistic and restrictive business practices by the incumbents can make business performance steadier. Stability in business performance may also require the smaller firms in particular to have easy and regular access to the input and output markets and lessening of information asymmetry and better information dissemination mechanisms. Hence, a better understanding of the determinants of FDI inflows requires exploring the role of institutions and future studies should be devoted in this line.

However, due to non availability of systematic data the present paper covers only the period from 2001-02 to 2005-06 and fails to capture the changing dynamics of FDI following the global economic slowdown. Besides, consideration of groups of states as the unit of analysis explores the envisaged relationships in a limited way. More importantly, the paper indentifies the determinants of total FDI inflows, but, a deeper understanding of the determinants also requires analysis across different types of FDI inflows as well as their industry specific concentration. Hence, future studies can be undertaken in this direction to have better understanding of the determinants of inter-state variations in FDI inflows in India. .

Appendix

Research and Development Intensity (RDI): We measure RDI of group i in year t as the percentage share of total research and development expenditure (RDE) by the group in total value of its industrial output (IO) in the same year, i.e., $RDI_{it} = \frac{RDE_{it}}{IO_{it}} * 100$

Implemented Domestic Investment (DI): Here, DI for group i in year t is measured as the percentage share of implemented industrial entrepreneur memoranda (IEM) in the total industrial investment proposals (TI) for that group, .i.e. $DI_{it} = \frac{IEM_{it}}{TI_{it}} * 100$

Transportation and Communication Infrastructure (TCI): The TCI index for group i in year t is constructed by using principal factor analysis. This index comprises of road density (RD), railway density (RWD), vehicle density (VD) and telephone density (TD).**Power Supply (PWR):** The PWR for group i in year t is estimated as the percentage share of power supply shortage (PWS) to its availability (PWR), .i.e., $PWR_{it} = \frac{PWS_{it}}{PWA_{it}} * 100$

Educational Infrastructure (EDUI): The EDUI index for group i in year t is constructed by using principal factor analysis. This index comprises of educational institutions-students ratio (*ISR*) and teachers-students ratio (*TSR*).

Health Infrastructure (HI): The HI index for group i in year is also constructed by using principal factor analysis. This index comprises of birth rate (BR), death rate (DR) and infant mortality rate (IR).

Profitability (PROF): Here PROF for group i in year t is measured as the percentage share of profits (Π_{it}) in value of industrial output (O), i.e., $PROF_{it} = \frac{\pi_{it}}{O_{it}} * 100$

Risk of Investment (RI): The RI for group i in year t is measured as the standard deviation of profitability during previous three years, .i.e. $RI_{it} = \sigma(PROF_{it}, PROF_{it-1}, PROF_{it-2})$

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