Chapter 5
Determinants of Outward FDI from India: An Empirical Study of Host Country Factors
CHAPTER 5
DETERMINANTS OF OUTWARD FDI FROM INDIA: AN EMPIRICAL STUDY OF HOST COUNTRY FACTORS

5.1. INTRODUCTION

In the previous chapters, we have studied the relevant literature w.r.t OFDI from developing countries, while examining the firm level and macro-economic level factors deriving OFDI. Now, we proceed to realize the drivers of OFDI at the macro level host of factors may account for the increasing importance of Indian OFDI. These factors can be studied in two ways – one at the level of economy by considering a set of macroeconomic variables and second at the level of firm, by looking at firm specific variables. The present study would identify determinants of OFDI using both these approaches. This section would focus on the macro-economic analysis of the determinants.

At the macro economy level both ‘pull’ and ‘push’ factors work together to drive Outward FDI from India. The pull factors are also known as the host country factors. The host country factors look at the location specific variables like market variables, natural resources and comparative advantages that pull OFDI from the home country towards the host country. Amongst the macro determinants of Outward FDI, another set of variable are known as the push factors. These factors originate from the home country and drive Outward FDI from these countries to other host countries. Various home country determinants of Outward FDI may include variables like GDP, GDP per capita, exchange rate, interest rate, technology, human capital, home country formal and informal institutions, Government policies, state of domestic market, competition etc. The main stream perspective on OFDI is developed by Dunning outlining, the three important variables namely Ownership, Locational factors and Internalization that catapult OFDI from a country. OLI advantages motivate a firm to undergo additional risks and costs as it can be offset by higher returns associated with shifting production facilities abroad.
Chapter 5 Determinants of Outward FDI from India: An Empirical Study of Host Country Factors

The sub-theme of the current study deals with those locational factors of the host country that have influenced the pattern of Indian OFDI. These factors situated at the host country are also known as ‘pull’ factors, as they attract investments in domestic territory from overseas markets.

5.2. EXPLANATORY VARIABLES

After a careful review of the literature, some of the important pull factors identified as such are market size, market demand, population, infrastructure, technology, number of bilateral investment treaties by host country, trade openness, FDI openness and physical distance between the host and home country. It should be noted that apart from the above mentioned variables, some other variables and the host country socio cultural factors may also be important. Besides Government current policies, the business history of the host country makes the decision easy for foreign MNEs to make investments in that host country. (Lall, 1996)

Now, we proceed to throw light on the importance and influence of those variables which have attracted Indian OFDI. There are large numbers of variables affecting Outward FDI as is evident from the existing literature. These variables can broadly be classified into two categories namely, ‘push and pull’ factors. The push factors are largely the home country factors or indigenous factors that facilitate outbound investment by local firms abroad. The pull factors refer to those factors operating in the host countries (like availability of cheap labor, presence of strategic assets) that attract Outward FDI from the home countries. The present study focuses on the pull factors emanating from various host countries drawing FDI for their economy. Hence, we would look at a number of macroeconomic variables of these countries to understand their captivating power in pulling investment from home country, i.e. India.

The extant theories have originally looked at the home country factors and more specifically at the FSAs that catapult domestic companies to invest overseas. The existing vast literature also offers explanations to host country factors that have traditionally influenced MNEs to choose one location over the other. These variables can be broadly classified in two categories namely, traditional factors (also known as Gravity model factors) like distance between the home and the host country, GDP, GDP
Chapter 5 Determinants of Outward FDI from India: An Empirical Study of Host Country Factors

per capita etc. and country specific factors like political stability, corruption, technology, human capital, robust infrastructure, Government support and investment regime etc. For the sake of our analysis, we incorporate variables from both the categories to build an empirical model. The present study attempts to analyze and later empirically test the various host country factors attracting outward Investment from Indian firms. Based on the extant theory, the following factors are proposed to affect the locational choice of Indian firms.

5.2.1. Market Index

To incorporate the effects of three variables i.e. namely, GDP, GDP per capita and population, we will be using composite index. The variable for composite index will be known as market index. Before we discuss the relationship between market index and OFDI from India, we discuss the economic implication for the three constituents of market index, i.e. GDP, GDP per capita and population in the following paragraphs:

5.2.1.1. Market Size

Host country feature such as market size are generally considered to be influential determinant of FDI outflows. The larger the market size, larger will be the demand and bigger would be the sale of the product. Number of studies has found out the positive relationship between the market size and the FDI outflows (Chakrabarti, 2001; Buckley et al., 2006; Deng, 2004; Taylor, 2002; Zhang, 2003). The bigger market not only offers substantial sale of the product and/or services but also the efficient utilization of the resources due to economies of scale. The growing market size also offers increasing opportunities to firms to experience enhanced profit as opposed to economies with slower growth rate. Various studies have taken real GDP and real GDP per capita as the proxy for market size showing positive relationship between Outward FDI and GDP and GDP per capita. UNCTAD (1998), has pointed out that the decision of MNEs to enter or expand their operations is based on expectations and over these locations where most of their production would be sold out. Further, MNEs prefer setting up their operations in those countries where the markets are large providing greater opportunities to utilize the internal resources better and hence, produce products at low costs. (Kravis and Lipsey, 1982).
5.2.1.2. Population

One more proxy for markets can be the population of the host country. Large population of the host country provides access to bigger consumer base to the home country firms. Amongst the various motives of FDI, market seeking motive remains as one of the most reoccurring objective for investing firms. As the domestic market may be saturated after a point of time either due to increasing number of suppliers or due to stagnant demand, thereby necessitating a drive for the domestic firms to look for an alternative market to fully utilize their resources. The large host market proxied by population, offers numerous opportunities for these kinds of firms to serve augmented consumer base.

Now for constructing composite index we will be using Principal Component Analysis (PCA) (Jha and Murthy, 2003 and 2006). While using the component scores for all the three variables that have been primarily extracted from rotated component matrix. The difference between the scores from rotated component matrix and factor loading is division of scores from rotated component by the respective standard deviation. Each observation of the three variables has been multiplied by the respective weights of that variable and natural log of the composite figure has been taken. The variable so derived is called the market index. So, we hypothesize a positive relationship between the market index and the Outward FDI from the home country to the host country.

Based on the above discussion we can hypothesize the following:

\( H_{0a}: \text{Indian OFDI is not associated with host country market index.} \)

\( H_{1a}: \text{Indian OFDI is associated positively with host country market index.} \)

5.2.2. Exchange Rate

Exchange rate of a host country can significantly affect the Outward FDI decision of MNEs. If the relative exchange rate of the host country appreciates then the acquisitions of foreign assets becomes more expensive for the home country firms. On the other hand, the depreciation in the host country exchange rate would make the foreign assets cheaper in terms of home country currency. As a result, acquisition of foreign assets becomes a lucrative option for the home country firms. Empirically, most of the studies have shown
that the relationship between exchange rate and FDI inflows to be negatively correlated 
(Chakrabarti, 2001; Swenson, 1994; Cassou, 1997; Froot and Stein, 1991; Barrell and 
Pain, 1998) i.e. when the exchange rate of the host country is high; it makes the foreign 
capital relatively more expensive resulting low FDI inflow into the host country.

Only a few studies (Scaperlanda, 1974; Aqeel and Nishat, 2005) have shown that 
depreciation in the currency of host country discourages FDI inflows. Gastanaga et al., 
(1998) have concluded that exchange rate distortions in the host country do not 
significantly impact on the decision of FDI inflows into the country. To proxy for 
exchange rate the real effective exchange rate has been extensively used in various 
studies. But due to non-availability of data on real effective exchange rate for some of 
the host countries under consideration, data has been collected for nominal exchange 
rate from International Financial statistics.

Further Uncovered Interest Parity equation asserts that it is the difference in the interest 
rate between the home and the host countries, which influences the choice for going 
abroad or being at home only. But this interest all alone may not represent a complete 
picture unless it is being multiplied by the exchange rate of a country to account for 
appreciation in the exchange rate and for this purpose the nominal exchange rate is 
being considered rather than the real exchange rate. Based on the above discussion, we 
make the following hypotheses:

\[ H_{0b}: \text{Indian Outward FDI is not related to the exchange rate of the host country.} \]
\[ H_{1b}: \text{Indian Outward FDI is negatively related to the exchange rate of the host country.} \]

5.2.3. Trade Openness

Vast literature exists on the relationship between Trade and FDI. It has been 
comfortably proved in various studies that there is a positive synergy between exports 
and FDI to a country by firms from home country. As Vahlne and Johanson (1977), has 
also demonstrated in their internationalization model that firms move sequentially while 
pursuing the internationalization strategies. The first step toward internationalization is 
extports to a host country. As firms carry exports to a country, gradually they become 
familiar with the host country economic, political, social and cultural system and
accordingly adapt their future strategies to adequately meet the demand of foreign consumer. Such kinds of firms are better placed to organize and carry production activities in the host country as opposed to inexperienced firms. Hence, in a way, trade paves the way for Outward FDI for exporting firms from the home country. Further to strengthen trading activities at the host country, a firm may also choose to establish marketing and distribution channels.

In all these activities, the host country policies play a very significant role. It’s well documented in the literature that the liberal economic policies of the host country attract increased volumes of foreign capital. Relaxation of capital control, free movement of capital, abolition of tariffs and quota on imports and exports favorably boost the foreign trade for host country firms. TWMNEs have not only invested to boost their home country’s exports but also establish subsidiaries and joint ventures abroad to secure their exports and protect their markets (Kumar, 1982; Svetlicic, 2004). Korean MNEs have invested abroad in order to support their local exports (machinery and raw material) such as in Philippines and Singapore (Han & Brewer, 1987). During 1980s-1990s, Chinese MNEs have invested overseas to support the exports of the local firms (Wu and Sia, 2002; Buckley et al., 2007). A similar pattern has been observed for the developed MNEs. Grubert and Mutti, (1991) have concluded that US FDI is positively influenced from US exports and imports and mostly US MNEs tend to invest into those countries with whom they have traded already. Generally, MNEs invest into those countries where they have been previously exporting or importing. More liberalized foreign policy strengthens the confidence of overseas investor and bestows a sense of certainty and ease of doing the business. Hence, trade openness of host country bolsters Outward FDI from the home country. For the empirical purpose, we construct a variable called, Trade openness. Trade openness is calculated as ratio of sum of exports and imports of the host country to GDP of the host country. We expect a positive relationship between Outward FDI and Trade openness. So we can hypothesize the following:

\[ H_{0c}: \text{Outward FDI from India is not associated with the Trade Openness of the host country.} \]

\[ H_{1c}: \text{Outward FDI from India is positively associated with the Trade Openness of the host country.} \]
5.2.4. Geographical Distance

The physical distance between the home and the host country can affect the decision to take the investment overseas. As envisaged by the Investment Development Path (Dunning, 1981) in the initial stages of internationalization, firms prefer to invest in the countries that bear a physical proximity to a home country firms. As these kinds of host countries are found to be economically, socially and culturally similar, the initial startup problems can be minimized to an extent. Johansans and Vahlne (1977), explained the sequential process of internationalization of firms. They proposed that in the initial stages of internationalization firms relocate their international operations to those locations where the ‘physic distance’ between the home and host country is small. In the initial stages the motive of such outward investment may be market seeking. Gradually, as a firm build on accumulated experience of doing business in overseas market, it expands its operations to distant locations that are endowed with strategic assets and may also be culturally different from the home country.

Over a period, firms also upgrade and modify their products to suit the changing needs of different kinds of consumer in such markets. Svetlicic (2004), has found that it was a priority of TWMNEs from Central European transition economies to invest into neighboring countries and especially into those with which they have cultural and historical ties. In case of India also, Outward FDI can be differentiated in two different phase i.e. pre 1991 period and post 1991, i.e. the liberalization period. In the pre-1991 period, the major concentration of Indian Outward FDI was in under developed or developing neighboring countries (Lall, 1982).

In such countries, Indian firms competed on the basis of standard products using indigenous technology moderated to suit local operations and vied for market share in host countries on the basis of price differentials. After the implementation of 1991’s liberalization regime in India, capital controls were relaxed, foreign firms were allowed entry in to Indian markets and Indian firms were also permitted to invest abroad. Consequently, Indian firms armed with accumulated financial and human resources and vast experience of operations in volatile market ventured in to number of developed markets to not only exploit their existing assets but also to explore the
strategic assets of host countries. Pradhan (2005), has explained that geographic proximity, cultural and ethnic relationships have played an important role in Indian OFDI. As a result, closer the host country, higher the probability of Indian investment going to that host country. To proxy for the geographical distance, the air distance (in miles) between home and host country has been collected from www.geobytes.com. So we hypothesize as follows:

$H_{0d}$: Indian Outward FDI is not related with those host countries which are geographically closer.

$H_{1d}$: Indian Outward FDI is positively related with those host countries which are geographically closer.

5.2.5. FDI Openness

Openness to FDI by the home as well as the host country is found to be an influential determinant for Outward FDI in the existing literature. When India embraced liberalization and globalization regime, it relaxed number of fiscal and financial restrictions to create investment friendly atmosphere at home (Diana and Adil, 2004). Consequently, when an economy opens its doors to foreign firms, the economic and business scenario is sharply altered. The arrival of foreign firms in the domestic market displaces local firms and compels them to look for an alternative. This phenomenon has a dual effect – one it improves the competitiveness of local firms by making them more product and process efficient. Secondly, the increasingly crowded market at home forces domestic firms to find another market for their products. Meanwhile, if the host country has a conducive environment for investment and offers liberal capital norms, it is likely to attract larger foreign investments from such home countries. There exists a positive relationship between market openness and FDI (Chakrabarti, 2001; Gastanaga et al., 1998; Lall, 1996).

However, number of the studies have explained that tariff or non-tariff barriers discourage trade but encourage MNEs to invest abroad (e.g. Caves, 1996; Barber, 1955; Vernon, 1966; Moran, 1998; Wallis, 1968; Schmitz, 1970), as MNEs are left with no other option to cover a market. As a result, we expect a positive effect of host country
FDI Openness on inward FDI, i.e. greater FDI openness would attract larger Outward FDI from the home country firms. To measure the FDI openness of the host country, the ratio of Inward FDI stock to GDP of the host country is being considered. So it can be hypothesized as:

\( H_{0e} \): Indian Outward FDI is not associated with host country’s FDI openness.

\( H_{1e} \): Indian Outward FDI is positively associated with host country’s FDI openness.

### 5.2.6. Infrastructure

The robust infrastructure of the host country is always a crucial determinant while choosing location for Outward FDI. Indian economy has witnessed a tremendous upheaval in its infrastructural facilities. Before 1947, India had an insufficient infrastructure base owing to colonial rule for nearly two centuries. Whatever infrastructure we had, was primarily built to accommodate trading or business requirements of Britishers. Post-independence, India has been making sustained endeavors to carve out a well-connected infrastructure base. Robust infrastructure not only strengthens the economic activities but also provides better standard of living. Infrastructure base also remains as one of the criterion to measure the economic development of a country. Though India’s infrastructure facilities have been growing, yet they will take years to match standards with the rest of the developed or some of the developing nations. Further, for safer and lucrative investment, a well laid out infrastructure base is utmost important. Hence, the infrastructure facilities like, air transport, telephone lines, electricity production and energy production at the host country are crucial. As a result we expect a positive relationship between the infrastructure base of the host country and Outward FDI from the home country. To take effect of the above said four variables as a proxy for infrastructure, we create a new variable called “Infrastructure Index” which is a composite index. To create this variable we employ Principal Component Analysis (PCA), as earlier also used for market index.

Using PCA, component scores for all the four variables for infrastructure, i.e., telephone lines, air transport, electricity production and energy production have been extracted from rotated component matrix. The difference between the scores from rotated
component matrix and factor loading is division of scores from rotated component by the respective standard deviation. Each observation of the four variables has been multiplied by the respective weights of that variable and natural log of the composite figure has been taken. The variable so derived is called infrastructure index. We would like to examine whether there exists a positive relationship between Outward FDI from India and infrastructure index of the host country.

**H₀:** Indian Outward FDI is not related to the host country Infrastructure Index.

**H₁:** Indian Outward FDI is positively related to the host country Infrastructure Index.

### 5.2.7. Technology

There exists a vast literature showing the linkages between technology and Outward FDI (Cantwell, 1981; Grubaugh, 1987; Pearce, 1989; Dunning, 1993). Traditionally FSAs like technology has driven Outward FDI by MNCs from developed countries. MNCs from developed economies exploit their state of the art technology at the host country that could be developed or developing country. Under Dunning’s Ownership competitive advantage theory, if technology is information intensive in a country, the exploitation of technologically intermediate goods across national boundaries is achieved by a firm through OFDI. Advanced technology enables a firm to efficiently combine various productive resources and produce goods economically.

Firms from developing countries like India generally may not possess the state of the art technology as enjoyed by their counterparts in developed countries and therefore Strategic Asset seeking, can be a significant objective for Indian firms. Hence, we can expect Indian firms to enter industrialized countries especially those one with significant levels of human and technological capital, with the aim to strengthen their competitiveness abroad (Dunning, 1988; Dunning, 2006). Indian firms venture foreign markets either to explore technological advantages of the host country or advantageously combine advanced technology with their existing technological capabilities. Hence, we expect a positive relationship between the technological capability of host country and Outward FDI from India. To measure the variable technology, we consider the number of
high technology exports made by a country in a year. Based on the above technological capabilities of the host country, we make the following hypotheses:

**H\textsubscript{0g}:** Indian Outward FDI is not related with the technological capabilities of the host country.

**H\textsubscript{1g}:** Indian Outward FDI is positively associated with the technological capabilities of the host country.

### 5.2.8. Bilateral Investment Treaty

A bilateral investment treaty (BIT) is an agreement establishing the terms and conditions for private investment by nationals and companies of one state in another state. This type of investment is called FDI. BITs are established through trade pacts. Most BITs grant investments made by an investor of one contracting state in the territory of the other. A number of guarantees, offered by host country may include factors like fair and equitable treatment, protection from expropriation, free transfer of means and full protection and security of property and people. The distinctive feature of many BITs is that they allow for an alternative dispute resolution mechanism, whereby an investor whose rights under the BIT have been violated could have recourse to international arbitration, often under the auspices of the International Center for the Settlement of Investment Disputes (ICSID), rather than suing the host state in its own courts. By providing protection, BITs are expected to reduce the risks of investment and promote Outward FDI.

BITs were initially signed exclusively between developed and developing countries, mainly because developed countries were the major source of investments. However, the decade of the 1990s witnessed an increasing number of BITs among developing countries themselves. By facilitating the operations of foreign firms in the host countries, BITs may favorably impact Outward FDI from developing economies (Banga, 2007). BIT, DTT and Free Trade Agreements (FTAs) have also played an important role in enhancing OFDI from TWMNEs (UNCTAD, 2005a). India has increasingly entered into large number of BITs after 1991 liberalization period. To specifically measure the impact of BIT in our model, we have considered BIT as a binary variable that takes value of one from the year a BIT has been signed for all the
previous years, value of zero. As a treaty gets older, its economic impact may be more pronounced. Hence, to consider the time effect of BIT, the binary variable is being multiplied by time. So we hypothesize as follow:

\[ H_{0h} : \text{BITs signed between India and the host country would have no impact on Outward FDI from India.} \]

\[ H_{1h} : \text{BITs signed between India and the host country would positively affect Outward FDI from India.} \]

### 5.2.9. Regional Trade Agreements

Regional Trade Agreements (RTAs) facilitate conducive investment environment to the trading partners. RTAs in the first place offer new markets to the firms of the home country. As firms may initially undertake exports to the members countries and later on, after becoming familiar with local consumers tastes and preferences, may choose to relocate production to these countries. This in turn would result in free flow of trade as well as FDI to this region by firms from domestic territory (UNCTAD, 2005a). Further, as a country may gradually enhance the number of RTAs, the resultant bottlenecks of initial startup can be easily overcome by experienced firms. India has entered number of RTAs with the developed as well as developing countries over years. These include RTAs like Association of Southeast Asian Nations (ASEAN), ASEAN Free Trade Agreement (AFTA) and the related ASEAN Investment Area (AIA) in 1999. All the member countries of these agreements are required to open up their industries for foreign investors and treat them at par with domestic firms. To capture the trade agreements, instead of a dummy variable, we have taken specific RTAs between India and the host country. If with a same host country, India has entered RTA as well as a standalone trade agreement, then we have considered both, by including the signing of new RTA or stand-alone agreement from the year it has been entered into. For the years before signing any of the above said agreement, we have taken the value as zero, and from the year of entry of force of agreement onwards we have taken value as one. This variable is not in the form of dummy, as we have added the signing of new agreement to the tally of the existing agreement.
Chapter 5  Determinants of Outward FDI from India: An Empirical Study of Host Country Factors

H₀ᵢ: RTAs between India and the host country will not enhance Outward FDI from India.

H₁ᵢ: RTAs between India and the host country will enhance Outward FDI from India.

5.2.10. Dummy for Global Recession

As most of the economies of the world have suffered economic recession during 2007-09, we would like to assess whether Outward FDI from India to other host countries was also affected on account of global melt down. For this purpose, we would assign value of one for the years from 2007-09 and for the remaining years, i.e. from 2000-2006, value of zero would be assigned. Accordingly, we can make the following hypotheses:

H₀ₒᵢ: Global financial crisis has not affected FDI outflows from India.

H₁ₒᵢ: Global financial crisis has adversely affected FDI outflows from India.

5.2.11. Country Dummies

As we have employed the fixed effects model to account for individual country differences, we would be constructing n-1 dummies, i.e. fourteen country dummies for our empirical model. It may be possible that due to various country specific characteristics, like natural resource endowments, policy framework w.r.t foreign investments, availability of advanced technology or superior brands, a particular country may appear more lucrative avenue for Outward FDI from India. For this purpose, Netherland, the second largest recipient of OFDI from India, has been taken as the base country. The respective interpretation for all the remaining countries would be done in reference to Netherlands only. Hence we can make the following hypotheses:

H₀ₖ: There are no individual country differences in receiving FDI outflows from India.

H₁ₖ: There are significant individual country differences in receiving FDI outflows from India.

11 The largest recipient of OFDI from India is Singapore, but due to liberal tax laws and its status of being a tax heaven country, it has not been considered as a base country. We have taken Netherlands, the second largest recipient of OFDI from India, as a benchmark category.
The construction and sources for the independent and dependent variables and the postulated expected signs have been summarized in following Table 5.1.

Table 5.1: Description of the Variables

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Name of the Variable</th>
<th>Abbreviation</th>
<th>Definition</th>
<th>Expect Sign</th>
<th>Source of Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Log of Outward FDI</td>
<td>LOFDI</td>
<td>Log of outward FDI outflows from India</td>
<td></td>
<td><a href="http://www.rbi.org">www.rbi.org</a></td>
</tr>
<tr>
<td>2</td>
<td>Bilateral Investment Treaty</td>
<td>BITS</td>
<td>Time interactive dummy variable calculated by multiplying BIT dummy variable for the respective years for each country</td>
<td>(+)</td>
<td><a href="http://www.unctad.org">www.unctad.org</a></td>
</tr>
<tr>
<td>3</td>
<td>Log of Market Index</td>
<td>LMKT</td>
<td>Log of sum of Real Gross Domestic Product, Real GDP per capita and population. All the three constituents being multiplied by respective weights obtained through PCA.</td>
<td>(+)</td>
<td>World Development Indicators</td>
</tr>
<tr>
<td>4</td>
<td>Log of Exchange Rate</td>
<td>LNEX</td>
<td>Log of nominal exchange rate of the host country</td>
<td>(-)</td>
<td>World Development Indicators</td>
</tr>
<tr>
<td>5</td>
<td>Log of Distance</td>
<td>LDIST</td>
<td>Log of distance in miles between New Delhi and capital of the respective host country</td>
<td>(+)/(-)</td>
<td><a href="http://www.geocities.com">www.geocities.com</a></td>
</tr>
<tr>
<td>6</td>
<td>Trade Agreements</td>
<td>TRADEAG</td>
<td>Cumulative number of trade agreements entered by respective country</td>
<td>(+)</td>
<td><a href="http://www.unctad.org">www.unctad.org</a></td>
</tr>
<tr>
<td>7</td>
<td>Log of Trade Openness</td>
<td>LTOPN</td>
<td>Log of trade openness of the host country calculated as ratio of sum of exports and imports of the host country to GDP of the host country</td>
<td>(+)/(-)</td>
<td>World Development Indicators</td>
</tr>
<tr>
<td>8</td>
<td>Log of FDI Openness</td>
<td>LFDIOPN</td>
<td>Log of FDI Openness of the Host country calculated as ratio of inward FDI of the host country to GDP of the Host country</td>
<td>(+)</td>
<td>World Development Indicators</td>
</tr>
<tr>
<td>9</td>
<td>Log of Technology</td>
<td>LHTECH</td>
<td>Log of number of high technology products exported by a host country in a year</td>
<td>(+)</td>
<td>World Development Indicators</td>
</tr>
<tr>
<td>10</td>
<td>Log of Infrastructure Index</td>
<td>LINFRA</td>
<td>Log of sum of energy production, electricity production, number of telephone lines and air transport (million ton-km), again being calculated after multiplying the four variables with respective weights obtained through PCA</td>
<td>(+)/(-)</td>
<td>World Development Indicators</td>
</tr>
</tbody>
</table>
5.3. DATA SAMPLES AND DATA SOURCES

We have employed Least Square Dummy Variable Model for fifteen countries for a period of ten years (2000-2009). The countries included are a mixed bag of developed and developing one, specifically they include- Singapore, Netherlands, Australia, USA, UK, UAE, Italy, Switzerland, Russia, Hong Kong, China, Cyprus, Canada, Brazil and France. These countries together account for nearly 90% of the total Outward FDI from India during 2000-2009. We have considered Netherlands as the base country while considering Fixed effects Model. Netherland is the second largest recipient of Outward FDI from India. Further the period for the study has been taken from the year 2000 onwards only. Though Outward FDI from India started taking place since 1991 only, but the pattern was erratic and the figures of OFDI were miniscule till the year 2000. The data on the dependent variable i.e. Outward FDI flows has been compiled from RBI (SIA Newsletters, (Annual Issue 2005 and July 2008). For the dependent variable like GDP, GDP per capita, Population and Infrastructure variables, data has been collected from World Development Indicators.

As in the traditional Gravity Model, distance is found to be a significant factor explaining trade between nations; the variable has been computed using air distance (in miles) between the capital cities of the host and the home country (Blonigen and Davies, 2000). The information for the same is being taken from www.geocities.com. Further, trade openness of a host country is calculated by dividing the host country’s total trade flows (exports + imports) by its GDP. Another variable FDI openness is calculated as the value of FDI stock of the host country divided by the host country’s GDP. The data on exports, imports is obtained from International Financial Statistics, IMF. Data on Outward FDI stock, BITs and RTAs has been obtained from www.unctad.org.

5.4. RESEARCH METHODOLOGY

5.4.1. Conceptual framework of Composite Index

The large number of explanatory variables in our model, can possibly lead to problem of multicollinearity. In order to avoid large number of explanatory variables, we proposed to incorporate the concept of composite index. Composite index primarily
integrates and summarizes the information of variables included in it. The usage of composite index results in large number of variables being avoided. For our empirical work, we will be forming two composite indexes. The first will for market variable and second for infrastructure variable. The market index will be formed of variables like GDP, GDP per capita and population while infrastructure index will be formed by using variables like electricity production, air transportation, telephone lines and energy production. To create composite index we will, be employing Principal Component Analysis (PCA) (Jha and Murthy, 2003 and 2006), which will summarize the information and also avoid the possibility of multicollinearity.

5.4.1.1. Correlation Matrix

In order to assess the possibility of correlation between any of the explanatory variables, we make use of correlation matrix. The correlation matrix would showcase the correlation that may exist in any two or more than two explanatory variables leading to the problem of multicollinearity. The Table 5.2 depicts the correlation matrix, between various explanatory variables. It can be seen from the correlation matrix table 5.1, that the variable inward FDI stock has a high correlation with technology (LHTECH), market size (LMKT) and infrastructure (LINFRA) while the variable LDIST is found to have high degree of correlation w.r.t to Inward FDI (LIFDIST) and market (LMKT).

As a result we decided to drop the variables Inward FDI stock and distance between the host and the home country from our estimating model.

Table 5.2: Correlation Matrix

<table>
<thead>
<tr>
<th></th>
<th>LIFDIST</th>
<th>LHTECH</th>
<th>TRADEAG</th>
<th>LTOPN</th>
<th>LNX</th>
<th>LMKT</th>
<th>LINFRA</th>
<th>LDIST</th>
<th>LFDIOPN</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIFDIST</td>
<td>1.000</td>
<td>0.819</td>
<td>-0.003</td>
<td>-0.040</td>
<td>-0.026</td>
<td>0.780</td>
<td>0.621</td>
<td>0.516</td>
<td>0.330</td>
</tr>
<tr>
<td>LHTECH</td>
<td>0.819</td>
<td>1.000</td>
<td>0.266</td>
<td>-0.114</td>
<td>0.212</td>
<td>0.744</td>
<td>0.643</td>
<td>0.458</td>
<td>0.110</td>
</tr>
<tr>
<td>TRADEAG</td>
<td>-0.003</td>
<td>0.266</td>
<td>1.000</td>
<td>-0.239</td>
<td>0.679</td>
<td>-0.021</td>
<td>0.040</td>
<td>-0.025</td>
<td>0.027</td>
</tr>
<tr>
<td>LTOPN</td>
<td>-0.040</td>
<td>-0.114</td>
<td>-0.239</td>
<td>1.000</td>
<td>-0.133</td>
<td>0.034</td>
<td>-0.082</td>
<td>-0.226</td>
<td>-0.112</td>
</tr>
<tr>
<td>LNX</td>
<td>-0.026</td>
<td>0.212</td>
<td>0.679</td>
<td>-0.133</td>
<td>1.000</td>
<td>-0.242</td>
<td>-0.258</td>
<td>-0.204</td>
<td>0.325</td>
</tr>
<tr>
<td>LMKT</td>
<td>0.780</td>
<td>0.744</td>
<td>-0.021</td>
<td>0.034</td>
<td>-0.242</td>
<td>1.000</td>
<td>0.916</td>
<td>0.549</td>
<td>-0.334</td>
</tr>
<tr>
<td>LINFRA</td>
<td>0.621</td>
<td>0.643</td>
<td>0.040</td>
<td>-0.082</td>
<td>-0.258</td>
<td>0.916</td>
<td>1.000</td>
<td>0.471</td>
<td>-0.446</td>
</tr>
<tr>
<td>LDIST</td>
<td>0.516</td>
<td>0.458</td>
<td>-0.025</td>
<td>-0.226</td>
<td>-0.204</td>
<td>0.549</td>
<td>0.471</td>
<td>1.000</td>
<td>-0.052</td>
</tr>
<tr>
<td>LFDIOPN</td>
<td>0.330</td>
<td>0.110</td>
<td>0.027</td>
<td>-0.112</td>
<td>0.325</td>
<td>-0.334</td>
<td>-0.446</td>
<td>-0.052</td>
<td>1.000</td>
</tr>
</tbody>
</table>
Now for constructing composite index we need to employ PCA. Before PCA can be applied, we need to discuss the conceptual framework behind using PCA and the procedure for applying PCA. The same is discussed in the following section.

5.4.2. Principal Component Analysis

Large number of explanatory variables in the model can lead to a possibility of multicollinearity, where two or more than two variables are associated with each other in such a manner that their impact on the dependent variable cannot be estimated. Keeping all the components of market index i.e. GDP, GDP per capita and population, and that of infrastructure index i.e. air transport, electricity production, energy production and telephone lines on individual basis would have resulted in the problem of multicollinearity. On the other hand, when we club the above said variables into a composite index, then the number of variables is comparatively reduced and still the explanatory power of the model is retained. Hence, to avoid multicollinearity, these variables have been integrated in a composite index. The composite index for market and infrastructure has been created by applying PCA (Jha and Murthy, 2003 and 2006).

5.4.2.1. Rationale for using PCA

The central idea for applying PCA is to

1. Reduce the dimensionality of a data set consisting of a large number of interrelated variables, while retaining as much as possible of the variation present in the data set.
2. Reduce multicollinearity amongst the variable, and
3. Summarise the maximum information by forming composite index. This is achieved by transforming to a new set of variables, the principal components (PCs), which are uncorrelated, and which are ordered so that the first few retain most of the variation present in all of the original variables. On the other hand, eliminating some variables does not affect the explanatory power of the equation because the retained variables contain the information of those which are eliminated.
5.4.2.2. Procedure for Applying PCA

The following procedure is used for applying PCA:

1. For determining the retained components we need a criterion. We use the Kaiser criterion for determining the number of retained factors. Kaiser criterion states that Eigen value should be greater or equal to one and through this we determine the explained variation. The PCA methodology tells us the total variance explained by each retained principal component as well as the cumulative percentage of the explained variation. This is a measure of the explanatory power of the component for the information content of the procedure.

2. For better interpretation of the factors, we use the rotated component matrix and for this we use the most popular method of rotation, i.e. Varimax rotation which maximizes the variation between the factors. The purpose of the rotation is to make the interpretation of the PCA more meaningful. Method of rotation however retains the same information and explanatory power.

3. After doing these procedures, we use the Joliffe criterion for adopting the weights necessary for construction of composite index. The steps in the Joliffe criterion are as follows:
   - Selecting the variable with the highest rotated component score in the first factor,
   - Next is to select that subsequent variable which has the highest rotated component score in the second factor and so on. This way we get the principal factors which represent the maximum information and eliminate the variables that are correlated to them.

4. The most essential step is to combine these variables so selected to finally form a composite index.

5.4.3. Measurement of Composite Index

To develop composite index for market and infrastructure, we will be employing PCA. The rationale and procedure for PCA has already been given in previous sections.

The two composite indexes would be created by using the component scores of respective variables drawn from rotated component matrix. To create the composite
index we will be using the weights drawn from rotated component matrix and subsequently multiplying these weights with corresponding values of the respective variable.

Table 5.3: Rotated Component Matrix for Market Index

<table>
<thead>
<tr>
<th>Component</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP</td>
<td>.976</td>
<td>.144</td>
<td>.163</td>
</tr>
<tr>
<td>GDPPC</td>
<td>.149</td>
<td>.966</td>
<td>-.209</td>
</tr>
<tr>
<td>Population</td>
<td>.171</td>
<td>-.212</td>
<td>.962</td>
</tr>
</tbody>
</table>

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 5 iterations.

Table 5.4: Rotated Component Matrix for Infrastructure Index

<table>
<thead>
<tr>
<th>Component</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENE</td>
<td>.333</td>
<td>.540</td>
<td>.773</td>
<td>.012</td>
</tr>
<tr>
<td>ELC</td>
<td>.610</td>
<td>.539</td>
<td>.542</td>
<td>.209</td>
</tr>
<tr>
<td>ATP</td>
<td>.951</td>
<td>.205</td>
<td>.231</td>
<td>.011</td>
</tr>
<tr>
<td>TEP</td>
<td>.237</td>
<td>.895</td>
<td>.376</td>
<td>.030</td>
</tr>
</tbody>
</table>

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 5 iterations.
ENE – Energy Production
ELC - Electricity Production
ATP – Air Transportation
TEP – Telephone Lines

Table 5.3 and 5.4 present the rotated component matrix for market index and infrastructure index respectively. As we have already discussed the procedure for drawing the principal components, we draw three principal components for the market index with their respective weights, where, GDP, 0.976, GDP per capita, 0.966 and population, 0.962. These three variables have been further multiplied by the respect values of each variable. The algebraic form of the composite index is given below:
Composite index = \( \Sigma W_i X_i \), where

\( W_i \), respective weights of the variable drawn from rotated component matrix and \( X_i \), will be the corresponding value of the variable.

This is how we shall be finally forming a composite index for infrastructure index also.

### 5.4.4. Panel Regression Model

In the previous section, we have reduced the number of explanatory variables through composite index while using PCA. Now the two composite indexes namely, market index and infrastructure index will be incorporated in the regression equation along with the other explanatory variables like FDI openness, trade openness, exchange rate etc.

The general form of the model, can be explained by the following equation:

\[
\text{OFDI} = f (\text{Market Index, Trade openness, FDI openness, Exchange rate, Technology, Infrastructure Index, Distance, Trade agreements})
\]

Eq. (2)

Now, we will be using Least-Squares Dummy Variable (LSDV) method with fixed effects to empirically test the macro level determinants of OFDI from India during the post liberalisation period. Before, we can begin estimating the model we need to draw references from theory w.r.t the modality of panel data regression. The conceptual framework w.r.t panel data is explained in the following paragraphs:

A common panel data regression model looks like

\[
Y_{it} = a + bx_{it} + \varepsilon_{it}
\]

Eq. (3)

where \( y \) is the dependent variable, \( x \) is the independent variable, \( a \) and \( b \) are coefficients, \( i \) and \( t \) are indices for individuals and time. The error \( \varepsilon_{it} \) is very important in this analysis. Assumptions about the error term determine whether we speak of fixed effects or random effects. In a fixed effects model, \( \varepsilon_{it} \) is assumed to vary non-stochastically over \( i \) or \( t \) making the fixed effects model analogous to a dummy variable model in one dimension. In a random effects model, \( \varepsilon_{it} \) is assumed to vary stochastically over \( i \) or \( t \) requiring special treatment of the error variance matrix.
5.4.5. The Fixed Effects Least-Squares Dummy Variable (LSDV) Model

The models which capture the individual effects are called Fixed Effects models. Random effects models, on the other hand capture the generalized effects. One kind of the fixed effects panel model would have constant slopes of the independent variables but intercepts would differ according to the cross-sectional (group) unit which, in our case, is the country. In such cases although there are no significant temporal effects, there are significant differences among countries in this type of model, which is what we would normally expect if we were to analyze FDI flows in general. The LSDV model allows us to account for heterogeneity among the cross-section units by allowing each unit to have its own intercept value.

To allow for the (fixed effect) intercept to vary among countries, we use the *differential intercept dummy technique*. The number of dummy variables introduced is one less than the number of cross-section units. This is done to avoid falling into the dummy-variable trap (which is the situation of perfect collinearity). As we have 15 countries in our panel data, we introduce 14 (n-1) dummies. The unit for which no dummy variable is assigned is known as the base or benchmark. For our paper, we have taken Netherlands as the benchmark which is the second largest recipients of OFDI from India. All comparisons are made in relation to the benchmark category.

The general form of the fixed effects model is:

\[ Y_{it} = \alpha_1 + \alpha_2 D_2 + \alpha_3 D_3 + \cdots + \alpha_i D_i + \beta_1 X_{1it} + \beta_2 X_{2it} + u_{it} \]  

Eq. (4)

where

- ‘i’ = is the number of cross-section units
- \(\alpha_1\) = intercept of the base country
- \(D_i\) = difference dummy with respect to \(\alpha_1\)

The intercept value \(\alpha_1\) represents the mean value of the benchmark category. The intercept for Country 2 would also include an additional intercept, \(\alpha_2\), so the intercept for Country 2 would be \(\alpha_1 + \alpha_2\) and so on. The intercept for Country 3 would include an additional intercept. Hence, its intercept would be \(\alpha_1 + \alpha_3\).
In the light of above discussion, the relationship among Indian OFDI and its determinants that are likely to influence the flow of FDI in the host country, is expressed in econometrics terms. The paper uses fixed effects model (FEM) in the panel data regression. That enables us to allow for individual country differences. First, difference dummies are introduced. For 15 countries, we introduce 14 \((n-1)\) dummies.

Thus, the functional form of our model is given as:

\[
Y_{it} = \alpha_1 + \alpha_2 D_2 + \alpha_3 D_3 + \cdots + \alpha_i D_i + \beta_1 X_{1it} + \beta_2 X_{2it} + u_{it}
\]  

Eq. (5)

where

\(\alpha\) = intercept of the base country

\(D_2 \cdots D_{15}\) = dummied for fourteen countries

\(\beta_i\) = coefficient values of the respective explanatory variable

5.4.6. Double Log Model

Further, we have employed the functional form of a Double Log model for our estimating equation. A functional form refers to the algebraic form of a relationship between a dependent variable and regressors or explanatory variables. The simplest functional form is the linear functional form, where the relationship between the dependent variable and an independent variable is graphically represented by a straight line. A double log model can be written as

\[
\ln Y_i = \alpha + \beta_2 \ln X_i + u_i
\]

Eq. (6)

where, \(\alpha = \ln \beta_1\)

This model is linear in the parameters \(\alpha\) and \(\beta_2\), linear in the logarithms of the variables \(Y\) and \(X\), and can be estimated by OLS regression. Because of this linearity, such models are called log-log, double-log or log-linear models. If the assumptions of the classical linear regression model are fulfilled, the parameters of Eq. (6) can be estimated by the Ordinary Least Square (OLS) method by letting

\[
Y^*_{i} = \alpha + \beta_2 X^*_{i} + u_i
\]

Eq. (7)

where \(Y^*_{i} = \ln Y_i\) and \(X^*_{i} = \ln X_i\)
The OLS estimator $\hat{\alpha}$ and $\hat{\beta}$ obtained will be best linear unbiased estimators of $\alpha$ and $\beta_2$, respectively. One attractive feature of the double log model, which has made it popular in the applied work, is that the slope coefficient $\beta_2$ measures the elasticity of $Y$ with respect to $X$, i.e. the percentage change in $Y$ for a given small percentage change in $X$. Thus if we $Y$ represents the quantity of a commodity demanded and $X$ its unit price, $\beta_2$ measures the price elasticity of demand, a parameter of considerable economic interest (Gujarati, 2004).

Thus the estimating equation becomes as follows:

$$
\text{LOFDI}_{it} = \alpha + \beta_1 D_2 + \beta_2 D_3 + \beta_3 D_4 + \beta_4 D_5 + \beta_5 D_6 + \beta_6 D_7 + \beta_7 D_8 + \beta_8 D_9 + \beta_9 D_{10} + \beta_{10} D_{11} + \beta_{11} D_{12} + \beta_{12} D_{13} + \beta_{13} D_{14} + \beta_{14} D_{15} + \beta_{15} (\text{LTOPN}) + \beta_{16} (\text{LNEX}) \\
+ \beta_{17} (\text{LFDIOPN}) + \beta_{18} (\text{LINFRA}) + \beta_{19} (\text{TRADEAG}) + \beta_{20} (\text{LHTECH}) + \beta_{21} (\text{LMKT}) + \beta_{22} (\text{LDIST}) + \beta_{23} \text{BTD}_{2} + \beta_{24} \text{BTD}_{3} + \beta_{25} \text{BTD}_{4} + \beta_{26} \text{BTD}_{5} + \beta_{27} \text{BTD}_{6} + \beta_{28} \text{BTD}_{7} + \beta_{29} \text{BTD}_{8} + \beta_{30} \text{BTD}_{9} + \beta_{31} \text{BTD}_{10} + \beta_{32} \text{BTD}_{11} + \beta_{33} \text{BTD}_{12} \\
+ \beta_{34} \text{BTD}_{13} + \beta_{35} \text{BTD}_{14} + \beta_{36} \text{BTD}_{15} + \beta_{37} \text{DGR} + u_{it}
$$

where

- $\text{LOFDI}_{it}$ = log of FDI outflows
- $\text{LMKT}$ = log of market index of the host country (composed of GDP, GDP per capita and Population)
- $\text{LFDIOPN}$ = log of FDI openness of the host country
- $\text{LTOPN}$ = log of trade openness of host country
- $\text{LNEX}$ = log of nominal exchange rate of the host country
- $\text{LHTECH}$ = log of High technological exports made by the host country
- $\text{LINFRA}$ = log of infrastructure index of the host country
- $\text{LDIST}$ = air distance between New Delhi and host country Capital (in miles)
- $\text{BTD}$ = whether there exist a BIT between India and Host country
- $\text{TRADEAG}$ = whether India and Host country are members of any RTA
- $\beta$ = the intercept terms
- $\beta_{1...\beta_{37}}$ = the coefficients to be estimated
- $\text{DGR}$ = dummy for global recession
- $\mu$ = is the error term in the model which accounts for all the omitted variables that may affect the OFDI from India.
5.5. RESULTS AND ANALYSIS

The results of two models, Estimated Model I and Estimated Model II derived through the fixed effects Least Squares Dummy Variable model (LSDV) after applying the PCA are given in Table 5.5 and 5.6 respectively. In the initial regression with all explanatory variables and dummy variables, we observed the problem of multicollinearity. The variable distance had a high correlation with the other variables, namely with technology (Lhtech) and trade openness (Ltopn). As a result, to run the panel data regression, the variable distance has been dropped from the equation. This exercise was run in the statistical package E-views 6.0. We have presented two models in the following section. The first model excludes the time interactive bilateral investment dummy variables. When we incorporate this variable in to the second iteration and also do away with exchange rate and trade agreements, we observe that the explanatory power of the model is improved. We find that the adjusted R square is reasonable at 55.63% in the first model which increases to 58.3072% in the second model. This in turn means that the explanatory power of all the independent variables, together can explain Outward FDI from India to the extent of 58.3072%.
### 5.5.1. Estimated Model 1 (First Model)

**Table 5.5: Estimated Model 1**

Dependent Variable: LOFDIIN  
Method: Panel Least Squares  
Sample: 2000-2009  
Periods included: 10  
Cross-sections included: 15  
Total panel (balanced) observations: 150

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>-87.4415</td>
<td>13.77613</td>
<td>-6.34732</td>
<td>0.000</td>
</tr>
<tr>
<td>LHTECH</td>
<td>1.01997</td>
<td>0.27597</td>
<td>3.695943</td>
<td>0.0003</td>
</tr>
<tr>
<td>LTOPN</td>
<td>-0.01002</td>
<td>0.017381</td>
<td>-0.57633</td>
<td>0.5654</td>
</tr>
<tr>
<td>LFDIOPN</td>
<td>0.647689</td>
<td>0.423371</td>
<td>1.529836</td>
<td>0.1285</td>
</tr>
<tr>
<td>LINFRA</td>
<td>0.327628</td>
<td>0.397885</td>
<td>0.823424</td>
<td>0.4118</td>
</tr>
<tr>
<td>TRADEAG</td>
<td>0.685509</td>
<td>0.703464</td>
<td>0.974476</td>
<td>0.3316</td>
</tr>
<tr>
<td>LNEX</td>
<td>1.58058</td>
<td>0.368624</td>
<td>4.287778</td>
<td>0.00</td>
</tr>
<tr>
<td>LMKT</td>
<td>1.621754</td>
<td>0.536</td>
<td>3.025658</td>
<td>0.003</td>
</tr>
<tr>
<td>D2</td>
<td>7.183974</td>
<td>1.227932</td>
<td>5.850464</td>
<td>0.000</td>
</tr>
<tr>
<td>D3</td>
<td>3.492155</td>
<td>1.225461</td>
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<td>0.0051</td>
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<tr>
<td>D4</td>
<td>2.245485</td>
<td>0.862709</td>
<td>2.60283</td>
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</tr>
<tr>
<td>D6</td>
<td>18.31225</td>
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<td>8.514042</td>
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<td>4.992244</td>
<td>0.00</td>
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<td>D9</td>
<td>1.842592</td>
<td>0.969951</td>
<td>1.899674</td>
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</tr>
<tr>
<td>D10</td>
<td>5.900834</td>
<td>0.99428</td>
<td>5.934781</td>
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<tr>
<td>D12</td>
<td>5.825255</td>
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<tr>
<td>D13</td>
<td>17.56377</td>
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<td>4.86495</td>
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</tr>
<tr>
<td>D14</td>
<td>4.71702</td>
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<td>1.301955</td>
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</tr>
<tr>
<td>R-squared</td>
<td>0.612408</td>
<td>Mean dependent var</td>
<td>3.59267</td>
<td></td>
</tr>
<tr>
<td>Adjusted R-squared</td>
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<td>S.D. dependent var</td>
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<td></td>
</tr>
<tr>
<td>S.E. of regression</td>
<td>1.736884</td>
<td>Akaike info criterion</td>
<td>4.059957</td>
<td></td>
</tr>
<tr>
<td>Sum squared resid</td>
<td>395.1962</td>
<td>Schwarz criterion</td>
<td>4.441305</td>
<td></td>
</tr>
<tr>
<td>Log likelihood</td>
<td>-285.497</td>
<td>Hannan-Quinn criter.</td>
<td>4.214887</td>
<td></td>
</tr>
<tr>
<td>F-statistic</td>
<td>11.49911</td>
<td>Durbin-Watson stat</td>
<td><strong>1.774488</strong></td>
<td></td>
</tr>
<tr>
<td>Prob(F-statistic)</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 5.5.2. Estimated Model 2 (Second Model)

**Table 5.6: Estimated Model 2**

Dependent Variable: LOFDIIN  
Method: Panel Least Squares  
Sample: 2000 – 2009  
Periods included: 10  
Cross-sections included: 15

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
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<td>-4.42848</td>
<td>0.000</td>
</tr>
<tr>
<td>LHTECH</td>
<td>0.37428</td>
<td>0.126049</td>
<td>2.96933</td>
<td>0.0035</td>
</tr>
<tr>
<td>LFDIOPN</td>
<td>0.754828</td>
<td>0.331281</td>
<td>2.27851</td>
<td>0.0243</td>
</tr>
<tr>
<td>LMKT</td>
<td>1.450551</td>
<td>0.542146</td>
<td>2.675573</td>
<td>0.0084</td>
</tr>
<tr>
<td>LINFRA</td>
<td>-0.99416</td>
<td>0.512331</td>
<td>-1.94046</td>
<td>0.0545</td>
</tr>
<tr>
<td>DGR</td>
<td>1.435268</td>
<td>0.371299</td>
<td>3.865528</td>
<td>0.0002</td>
</tr>
<tr>
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<tr>
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<td>-1.96602</td>
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<td>-3.07957</td>
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<td>D8</td>
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<td>385.778</td>
<td>-2.23972</td>
<td>0.0268</td>
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<tr>
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<td>BTD6</td>
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<td>BTD7</td>
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<td>0.192455</td>
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<td>BTD10</td>
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<td>0.000559</td>
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<tr>
<td>BTD9</td>
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<td>0.191766</td>
<td>0.939131</td>
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<tr>
<td>D9</td>
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<td>S.D. dependent var</td>
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<td>Sum squared resid</td>
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<td>Schwarz criterion</td>
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<td>Hannan-Quinn criter.</td>
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<td>Durbin-Watson stat</td>
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<td>Prob(F-statistic)</td>
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5.5.3. Market Index

The variable market index (Lmkt) is highly significant at p value of 5% in both the models. When we look at the basic model without including time interactive dummies for bilateral investment treaties, we find that the value of the coefficient is 1.62 (p value of 0.003) which decreases to 1.454 when we introduce the time dummies for bilateral investment treaties. (Time interactive dummies that had multicollinearity problem have been removed). It means that if the market index increases by 1% then the Outward FDI from India will increase by 1.454%. This change can be probably attributed to inclusion of bilateral investment time dummies (BTD) in the model. As discussed earlier, the variable market index is a composite index, constructed of three variables namely GDP of the host country, GDP per capita of the host country and population of the host country. Market index coefficient is positive and statistically significant, there by implying that all the three variables have an important role in attracting Outward FDI from India. Even observing the growth trend of these three variables we observe that GDP and GDP per capita of host countries have been largely increasing from the base year except during the last three years (namely, 2007, 2008, 2009) on account of global recession. While population of developing countries observe an upward trend as compared to those of developed nations that either experience stagnation or in some cases downfall also. So greater the GDP, GDP per capita and population of the host country, higher the possibility of Indian OFDI taking place there in. Hence, our null hypothesis is rejected and the alternate hypothesis (H_{1a}) that, Indian OFDI is associated positively with host country market index is being accepted.

5.5.4. Technology

The second variable highly statistically significant at the p value of 5% (0.0003), is technology. Again like market index this variable is also positive indicating a positive relationship between technological capability of the host country and Outward FDI from India. In the initial basic model, the coefficient of this variable is 1.01997, implying that 1% increase in technological capabilities of the host countries, would lead to approx. 1.1% increase in Outward FDI from India. When we iterate our model further and include uncorrelated BTDs, we observe that the value of the coefficient is
reduced from 1.01997 to 0.3748 (at p value of 0.0035). The results support the strategic assets seeking motive of Outward FDI pursued by Indian firms. The technological capabilities situated at the host country can possibly augment the learning skills of Indian firms to successfully execute overseas venture. As a result we reject our null hypotheses and accept the alternate hypotheses, $H_{1f}$, that, Indian Outward FDI is positively associated with the technological capabilities of the host country.

5.5.5. FDI Openness

The third statistically significant variable is FDI openness (LFDIOPN) which is not only significant but depicting a positive sign also. The host country liberal policies towards inward FDI were postulated to favorably affect the outbound investments from India. The results indicate that LFDIOPN variable in the basic model is significant at the p value of 0.1285, bearing the coefficient at 0.647689. After inclusion of BTDs, we observe that the value of the coefficient is slightly improved from 0.647689 to 0.7548 at the p value of 0.0243 (p value < 5%). This improvement in the coefficient value as well as in the significance level can be most likely attributed to bilateral investment agreements entered between the host and the home country. These agreements can facilitate better and conducive environment for investment at the host as well as at home country to organize overseas production. Consequently, we reject our null hypotheses. The results prove the alternate hypotheses ($H_{1h}$), that Indian Outward FDI is positively associated with host country’s FDI openness.

5.5.6. Trade Openness

This variable is found to be insignificant at p value of 5%, while the coefficient of trade openness is also negative and being very small in value. If we run another iteration of the same equation after dropping variables like exchange rate and trade agreements, trade openness still remain insignificant at the p value of 0.4635, bearing the coefficient of -.0.0039. However, during this exercise, the adjusted R Square has improved from 55.63% to 58.30%. This indicates that the trade openness though found to be influential in literature (Johanson and Vahlne, 1977; Buckley et al., 2007), does not exert much influence on the results of our model. Hence, we reject our alternate hypotheses and
accept the null hypotheses that there is no relationship between Outward FDI from India and Trade Openness.

5.5.7. Infrastructure

The infrastructure (LINFRA) facilities at the host country are expected to boost the Outward FDI from the home country. However, in the first model, this variable is found to be insignificant at the p value of 0.4118, having a coefficient of 0.3276. While in the second model, it becomes significant at the p value of 0.0545, bearing a negative coefficient value of -0.99415. This variable is in the form of a composite index formed of namely four variables which is log of electricity production, log of energy production, log of number of telephone lines and log of air transportation. The sign of the coefficient of infrastructure index is actually determined by rate of the growth of dependent as well as independent variables. Of the two, the stronger variable is likely to dominate the sign part of the coefficient. Lending a closer look at LOFDI as well as at LINFRA, we find that none of the two variables register a definite trend marked by a steady fall or rise.

As far as LOFDI for most of the countries under the study is concerned, the stock levels undergo both increase and decrease. On the other hand, the four constituents of the infrastructure index also demonstrate an erratic behavior with surge and downfall. Downfall found mainly towards the last few years, probably on account of global economic recession. Looking at the semi log equations of all the four constituents of infrastructure index we observe that none of them is growing even at the rate of 1% annually (electricity production (coefficient- 0.030388004), energy production (coefficient - 0.018176466), air transport (coefficient -0.043425625) and telephone lines (coefficient - 0.005330077)). Further, the coefficient for log of Outward FDI is also growing at the rate of 0.457206303. These kinds of growth rate when coupled together can’t result in positive coefficient for LINFRA. One further possible reason for such a miniscule rise in the four variables of LINFRA can be attributed to increasing awareness for environmental concerns across nations. Due to higher sensitivity towards containing global emissions and gradually moving towards alternative sources of natural resources, the production as well as the consumption levels of these four
variables may experience meager surge. As a result, we reject our alternate hypotheses and accept the null hypotheses, that there is no relationship between Infrastructure facilities of the host country and Indian OFDI.

5.5.8. Exchange Rate

We have considered the nominal exchange rate of the host county as a proxy for exchange rate. Though we have postulated a negative relationship between exchange rate of the host country and Outward FDI from India, but we observe in the first model that this variable is though significant at the p value of 5% but presents a positive coefficient of 1.58058. However, in the second model, when BTDs are introduced, we noticed that the variable exchange rate became insignificant (at the p value of 0.3702) as well as negative (-0.67088). Consequently we have dropped this variable in the final second model. Hence, we stand to reject our alternate hypotheses and accept the null hypotheses that the exchange rate of a country does not affect Outward FDI from India.

5.5.9. Trade Agreements

This variable was earlier postulated to bear a positive sign with Outward FDI. In the first model, this variable is found to be positive but insignificant at the p value of 0.3316, having a coefficient of 0.6855. In the second model, it was dropped from the model on account of being again insignificant. After doing so the adjusted ‘R’ square has slightly increased from 55.63% to 58.30% in the second model. Therefore we can conclude that though trade agreements with the host countries positively affect Outward FDI from India yet they may not be a very significant factor in promoting Outward FDI from India. Hence, we reject our alternate hypotheses and accept the null hypotheses that the trade agreements with a host country do not influence Outward FDI from India.

5.5.10. Bilateral Investment Treaties (BTDs)

This variable has been constructed as time interactive dummy variable and is also found to be statistically significant at 5% confidence interval for only three countries namely Cyprus, France and Switzerland (BTD6 BTD7 BTD12) out of the sample of fifteen countries. Unlike other host countries which have experienced frequent ups and downs
in the Outward FDI flows from India, these countries have witnessed consistent increase in Outward FDI from India. Hence, we believe that the Bilateral Trade Agreement made with these nations has a positive effect on Outward FDI from India. Hence, we reject our null hypotheses and accept the alternate hypotheses that the Bilateral Investment treaties with a host country positively affect Outward FDI from India.

5.5.11. Dummy for Global Recession (DGR)

We constructed DGR, a dummy variable to assess the impact of global recession on Outward FDI from India. This variable is found out to be significant at the p value of 5% in both the models (0.0019 and 0.001) having coefficient of 1.301955 and 1.39488 respectively. It is only a time interceptive dummy around those years where global recession hit various economies across the world. These results indicate that OFDI from India has increased during those three years of recession (2007-09). During this period Indian companies who were competing with the developed countries took the opportunity to acquire those foreign companies which were earlier out of their reach. It is a discreet jump in the level of OFDI across all the developed host countries which were adversely affected by the global meltdown. As a result MNE’s from developed host countries could not acquire other companies on account of poor financial performance. It shows that India could take advantage of the vacuum created by the decline of interest in developed countries as they were more severely hit by recession. India on other hand, stood firmly during the global melt down primarily due to robust economic fundamentals. Therefore we reject alternate hypotheses, $H_{1ij}$ and accept the null hypotheses, $H_{0ij}$, that Global recession did not impact FDI Outflows from India.

5.5.12. Country Dummies

Netherland has been taken as the base country for dummy variables. In the first model, the p value of dummy variable for most of the countries is statistically significant except for China, France and Singapore. If we analyze the semi log equation for these three countries we find that for China – OFDI from India is growing at the annual rate of 0.233%, for France- 0.28% and for Singapore, at the rate of 0.7033% annually. The growth rate for these countries has been really slow as well as erratic especially for
France. Further the rest of the countries i.e. namely Australia, Brazil, Canada, Cyprus, Hong Kong, Italy, Russia, Switzerland, UAE, USA and UK, depict statistically significant p values (at 5%). If we look more closely at the results, we assess that amongst fifteen countries, nine countries are developed and six are developing ones. The above said countries which have statistically significant p values, are a mix of developed and developing countries both. In turn this means that both, the market seeking objective as well as the strategic asset seeking objective as a motive for Outward FDI are being pursued by India. On the other hand, in the second model when we introduce the BTDs, we find only the dummy variable for Brazil, Canada, Hong Kong, Switzerland and UAE are found to be significant. Therefore we reject our null hypotheses, $H_{0k}$ and accept the alternate hypotheses, $H_{1k}$ that there exist individual country differences while receiving Outward FDI from India.

5.6. CONCLUSION

In this chapter, we started our discussion with the objective of studying the macro level determinants of Outward FDI from India. For this purpose, we considered the pull factors, i.e. the factor situated at the host country that attracts Outward FDI from India. For the construction of various variables for regression analysis, references were being drawn from the existing literature. We considered a number of economic variables like exchange rate, market index, infrastructure index and policy variables like FDI openness, trade openness and bilateral investment treaties along with dummy variable for global recession.

Market index and infrastructure index were constructed using components scores drawn from PCA. Market index was constructed using namely three variables i.e. GDP, GDP per capita and Population of the respective host country while infrastructure index was created employing variables like energy production, electricity production, telephone lines and air transportation respectively. We used the LSDV model for panel data composed of fifteen host countries over a period of nine years, i.e. from 2000-09. Since both the dependent and the independent variable are in the log form, we have employed a double log model. We developed two regression models to capture the effects of various variables. The first model was iterated without including the BTDs. In the
second model, we dropped the insignificant variables like exchange rate and trade agreement and included the BTDs. The explanatory power of the second model judged by adjusted R square was found to be higher at 58.30% as compared to adjusted R square of 55.63% in the first model.

We finally observed that variables like market index, FDI openness, Technology and BTDs were found to be significantly influential in attracting Outward FDI from India. Therefore, we accept the corresponding alternate hypotheses of these four variables, i.e. we accept the \( H_{1a}, H_{1e} \), \( H_{1g} \) and \( H_{1h} \). Therefore we can say that market index, FDI openness, Technology and BTDs, do positively affect Outward FDI from India. Further, number of host countries like Australia, Brazil, Canada, Cyprus, Hong Kong, Italy, Russia, Switzerland, UAE, USA and UK were observed to be statistically significant, thereby meaning that these countries have remained as the preferred locations for investing Indian capital overseas. Hence, we can conclude that at the macro level, host country policy framework and its economic well being can stimulate Outward FDI from India. In this regard Indian Government should also facilitate more liberal and conducive policy framework, thereby promoting Outward FDI from India.

In the following section, our research work will be directed towards identifying and determining, firm level determinants of OFDI from India during post liberalization period.