CHAPTER 3: CONCEPT AND METHODOLOGY

3. CONCEPT OF FDI

Foreign Direct Investment (FDI) is a key driver in the fast growing global financial integration, called Globalization. FDI provides a way of creating long term, consistent and direct relationships between the economies. Under the right policy setting, it can be a significant driver for the development of domestic enterprises of the host country. It may also assist in improvement of the competitiveness of the host as well as the investing i.e. home economy. Specifically, FDI promotes the transfer of know-how and technology between host and home economies. Further, it provides a prospect for the host economy to promote its products in the international markets. FDI is an important source of capital for the host as well as the home economies.

In 2008, in order to adapt the statistical measures for changing economic and financial realities, the OECD has adopted the 4th edition of the Benchmark Definition of Foreign Direct Investment which sets the world standard for FDI statistics. As per OECD “Direct investment is a category of cross-border investment made by a resident in one economy (the direct investor) with the objective of establishing a lasting interest in an enterprise (the direct investment enterprise) that is resident in an economy other than that of the direct investor”. The impetus for the direct investor is a planned enduring association with the direct investment firm in order to ascertain a considerable level of control by the direct investor in the running of the direct investment firm.
The “lasting interest” is verified when the direct investor possesses at least 10% of the voting rights in the direct investment firm. Direct investment may also let the direct investor to get entrée to the financial system of the direct investment firm which it might not be able to get otherwise. The OECD definition of FDI has been adopted by India in the Union Budget of 2012-13. **Direct Investment with 10% or more stake is considered as Foreign Direct Investment and any investment below 10% is treated as portfolio investment.** The stimulus to considerably control or influence a firm is the basic factor that distinguishes direct investment from portfolio investment. In portfolio investments the foreign investor’s focus is mainly on earnings consequential from the purchase and sales of shares and other securities. These categories of investors do not expect to manage the assets underlying their investments. However, direct investment associations, by their very virtue, lead to enduring relations causing consistent financial and technological transfers with the motive of maximizing production and the earnings. When a portfolio investor attains additional equity stake in a firm bringing the cumulative investment to 10% or more, the investment is reclassified as direct investment from the portfolio investment. A direct investor can be any of the following:

- an individual;
- a group of related individuals;
- an incorporated or unincorporated enterprise;
- a public or private enterprise;
- a group of related enterprises;
- a government body;
- an estate, trust or other societal organization; or
- any combination of the above.

In case where two firms own 10% or more, of each other’s voting power each is treated as a direct investor in the other firm. Direct investment financial
dealings mainly consist of three types: (i) Acquisition or disposal of equity capital, (ii) Reinvestment of earnings, not distributed as dividends; and (iii) Inter-company debt (payables and receivables, loans, debt securities).

Equity FDI is further sub-divided into two components, viz., green-field investment; and acquisition of shares, also known as mergers and acquisitions (M&A). Equity FDI may also include “brown-field investment”, a term often used in the FDI literature. This represents a hybrid of green-field and M&A foreign investment. In brown-field investment, the foreign investor acquires a firm and undertakes near-complete renovation of plant and equipment, labor and product lines (UNCTAD 2000). Such investments formally appear as M&A, though their effect resembles to that of green-field investment. Reinvested earnings represent the difference between the profit of a foreign company and its distributed dividend and thus represent the undistributed dividend.

FDI inflows in India are compiled on monthly basis, with an objective of timely monitoring of FDI activities. In many other countries FDI statistics is reported on a quarterly basis. FDI statistics encompass mainly four types of operations that qualify as FDI. These are:

- Purchase/sale of existing equity in the form of Mergers and Acquisitions (M&A);
- Greenfield Investments;
- Extension of capital (additional new investments); and
- Financial Restructuring.
3.1 RBI DEFINATION OF FDI

Post independence and till the year 1961 RBI defined foreign controlled companies in India as:

i) Companies with 40% or more of its shares held by foreign promoter;

ii) If the company was a subsidiary to a parent company in any country registered abroad;

iii) 25% or more of the shares of a company were owned by foreign controlled Indian Joint stock company, which was not a managing agent and

iv) Company managed by a foreign controlled managing agency company.

RBI continued to follow this format till the year 1961 after which it has been publishing annual surveys, in which it started to take firms with 25% or more foreign capital as the basis of classification for a company as a firm under “foreign control”. The International Monitory Fund too, at one point in time had suggested a single holder or organized group holding of 25% or more as the basis for categorization of a company as foreign controlled. However, later the fund redefined the definition and stated that firms with foreign share of as low as 10% or more of the voting rights or equity capital should be categorized as foreign controlled firms.

For multiple reasons, foreign companies, subsidiaries or other closely related companies in India, have never been grouped together to reveal the enormity of worldwide operations of the conglomerate operating in the country. This practice has led to major weaknesses in the Indian regulatory laws relating to foreign private investment. For example, under MRTPA regulations, many of the large international conglomerates did not attract the
anti-monopoly provisions because the Indian enterprise is seen in itself as an entity independent of other corporate associates in the world.

Till year 2012, the statutory minimum in India was dependent on the size of the companies; and varied between 10 and 15 per cent for companies whose sizes was less than Rs. 2 crores and more than Rs. 1 crore. In the present exercise Foreign Controlled Companies (FCCs) have been identified on the basis of a 10 per cent or more of foreign holding in equity.

3.2 SOURCES OF DATA

Foreign Direct Investment (FDI) is a key driver for international economic integration. With the right policy framework, FDI can provide financial stability, promote economic development and enhance the well being of societies. Financial markets have become more integrated globally, due to the increased liberalization and access to financial and product markets. This integration speeded up by escalating competition has led to the opening of new financial instruments with extensive market access and lower transaction costs. The expansion of cross-border financial flows has been further accelerated by technological innovations in communications and data processing.

As discussed in Section: 2 of the study, a firm’s location decision is partly based on externalities emerging out of “agglomeration economies” and partly on the regional investment climate which includes the relative cost of business regulations, corruption cost, cost and availability of skilled labor, consistency of power supply, promptness in enforcement of industrial regulations, ease of land acquisition etc. These factors make certain locations more preferred by investor’s vis-à-vis other locations. In order to understand the factors impacting automobile FDI location in India and the reasons for development of the four dominant automobile clusters, we have used the primary as well as the
secondary data sources; detailed analysis and study methodology is discussed in the sections below.

**Secondary Data:** The firm-level data used in this study has been obtained from Prowess Data of CMIE, DIPP Reports on Automobile Sector and Reserve Bank of India database. Combining the three data sources we compiled firm-level information on “first plant” location of 37 foreign firms established between the years 2002 to 2012. These data sources further suggest that in all, 57 foreign auto & auto-ancillary firms and 276 Indian auto & auto-ancillary firms established their “first-plants” in India before the year 2002.

In India any inflow of FDI is recorded with the RBI and is reported by the DIPP in the form of fact sheets, newsletters or annual issues. However, there is a complete absence of government reporting on the firm-level FDI statistics with comparable information on green-field vis-à-vis M&A investments in numbers or in values.

The CMIE database provides fundamental and market data on more than 14,000 listed and unlisted Indian companies, divided into more than 300 industries. Using the same we have collected firm-level information pertaining to the company profile, financial indicators and ownership patterns. Apart from this, we have also collected the addresses of the first plants of the companies used in the study from the CMIE database. FDI inflows (in rupee terms) into automobile and auto-ancillary units have been computed based on FDI records provided in DIPP’s monthly newsletters.

A firm has various types of offices including the head office, plants, service facilities, branches, development centers, and zonal offices. In the case of manufacturing firms, plants are the most important centers, where the actual manufacturing takes place. Our analysis is based on location of “first plant” of
foreign automobile firms in India. Plant location is a significant variable in recognizing the destination of investment by domestic and foreign automobile firms. As around 86 percent of the 342 Indian Automobile and Auto-ancillary “first-plants” established till 2012 are located in five states namely Maharashtra, National Capital Region, Tamil Nadu, Karnataka and Gujarat. There are striking similarities between the plant location of domestic and foreign auto and auto-ancillary plants across states in India, as around 83% of the 94 foreign automobile and auto-ancillary ”first plants” established till 2012 as well are located in the same five states namely Maharashtra, National Capital Region, Tamil Nadu, Karnataka and Gujarat. The simultaneous existence of domestic and foreign automobile plants in matched states is important from the point of view of agglomeration economies. The two types of manufacturing plants appear to have reinforced each other’s presence across the states.

3.3 SECONDARY DATA: ITS ASSUMPTIONS AND LIMITATION

FDI statistics in India is officially monitored and published by the Reserve Bank of India (RBI) and the Secretariat for Industrial Assistance (SIA), Ministry of Commerce and Industry. While the International Monitory Fund’s (IMF) definition of FDI incorporates equity capital, reinvested earnings (retained earnings of FDI companies) and ‘other direct investment capital’ (intra-company loans or intra-company debt transactions), FDI approvals in India till year 1994 included both GDRs and Foreign Currency Convertible Bonds. However, as per UNCTAD, 1997 GDRs shall not be treated as direct investment except for the objective of reporting.

FDI statistics compiled by the RBI in the Balance of Payment (BoP) prior to 2000 included only equity capital. This led to an underestimation of FDI inflows. The accounting system was revised in 2000 in order to align the FDI
data-reporting system with best international practices. The revised practice of reporting FDI statistics addressed the issue of underestimated FDI inflows into India. The equity inflows have been differentiated under equity inflows of incorporated bodies and equity inflows of unincorporated bodies. These disparities in FDI data reporting make comparisons between year’s pre and post 2000 difficult.

Further, there is a complete absence of government reporting of the FDI statistics with comparable information on green-field vis-à-vis M&A investments in numbers or in values in India. As per the available detailed route-wise FDI data compiled by the DIPP, equity investment excluding acquisition of shares may be considered as green-field investment. **Thus, foreign equity inflows under the SIA/FIPB and RBI route, along with the equity capital of unincorporated bodies, represent the fresh arrival of FDI into India.** The DIPP reports a separate category of FDI under; inflows through acquisition of existing shares.

While information on acquisition of shares is compiled and provided by the DIPP, there is no explicit information on cross-border mergers occurring in India; however, cross-border mergers effected by swapping of stocks may be included in the stock swaps provided by the DIPP. But another component of the stock swap, which is simply equity swaps between an Indian and a foreign company, are believed to be much higher. Therefore, in the absence of such a break-up, it is not possible to analyze any trends in the cross-border mergers in India.

In order to determine the geographical spread of foreign automobile & auto-ancillary firms vis-à-vis domestic automobile & auto-ancillary firms. We have categorized the firms based on the number of states in which they have their first-plants. Firms located in and around Noida, Ghaziabad and Faridabad have
been included in New Delhi, in-line with the DIPP’s pattern of FDI reporting, wherein National Capital Region (NCR) is taken as a collective region which includes Noida, Ghaziabad and Faridabad as parts of New Delhi and not Uttar Pradesh and Haryana for the said purpose. Further, the firms belonging to Madhya Pradesh belt too have been included in Sanand-Dholera belt due to proximity to the region. Gujarat and Madhya Pradesh are adjoining states due to which Madhya Pradesh has direct access to the supplier hub as well as the port network of Gujarat. The number of observations are only 9 states/union territories as rest of the regions in India have not attracted any new foreign investment in automobile sector, during the years 2002 to 2012. Mentioned below are the study assumptions as well as the limitations of the data:

- All automobile and auto-ancillary firms with foreign equity participation of 10 per cent and above have been considered to be FDI-enabled firms or “FDI firms”. All other firms, with less than 10 per cent foreign equity, are referred to as “domestic firms”.
- The data on location of “first-plants” of 57 Incumbent Foreign Auto and Auto-ancillary Firms, and 276 Incumbent Indian Auto and Auto-ancillary Firms spread over 9 states/union territories has been used to gauge the impact of agglomeration externalities on location choices of “first-plant” of 37 New Foreign Auto and Auto-ancillary Firms.
- Only the location of “first plant” has been considered for analysis. Factors impacting the subsequent plant locations have not been studied in the current research.
- In India any inflow of FDI is recorded with the RBI and is reported by the DIPP in the form of fact sheets, newsletters or annual issues. Information on acquisition of shares is compiled and provided by the DIPP. There is no explicit information on cross-border mergers occurring in India. Additionally firm level data on FDI inflows is not published by government sources. This information is available in
prowess data of CMIE. While these non-government sources provide a profile of FDI inflows, their reported figures are not comparable with those furnished in the official records. The inconsistencies can be due to a number of reasons such as the inclusion of approved FDI along with actual FDI; the inability to track FDI that reaches India in piecemeal, as against being approved as a whole; the failure to separate the Indian partner’s stake from that of a foreign investor resulting in an inflated FDI figure; and that some transactions may not even have been reported.

- The secondary database does not have information on the amount of FDI or the number of FDI-enabled firms/plants in the Special Economic Zones (SEZs). However, the FDI component accounts for about 8 per cent of the total investment in the SEZs in India.
- The database does not provide information on firm-wise FDI equity into Greenfield and M&A components.
- The DIPP database has divided India into 16 regions; wherein individual FDI data on many states such as Chandigarh, Haryana, Punjab and HP; Andhra Pradesh and Telangana is not available.
- Agglomeration estimates have been based on state/union territory level and have not been studied at city level.
- It has been observed that the regression model makes some independent variables consistent in terms of sign and significance, whereas other variables provide fragile results with respect to sign/significance. Variables including the share of FDI & Indian auto and auto-ancillary plants in a region and growth of per capita income between years 2002 to 2012 by state are robust across various model specifications. One variable that shows less robust results is Working SEZs. However, we have included it in the final specification of the model as a proxy for level of infrastructure development of a state/union territory.
3.4 METHODOLOGY FOR ANALYZING SECONDARY DATA

Various analytical approaches have been used for evaluating industrial location such as Ordinary least squares (Boudier-Bensabaa, 2005), Conditional logit model (Head et al., 1995, Crozet et al., 2004 and Figueiredo et al., 2002), Negative binomial regression model (Meyer and Nguyen, 2005 and Coughlin and Segev, 2000), and Generalized method of movements (Cheng and Kwan, 2000). These methods have been applied to foreign direct investment at cumulative country level or regional level and, in recent years to the firm level. By virtue of possessing near normal, small and discreet cross-section data, this study has used Dynamic Linear Programming Regression (DLPR) Model for analysis. With the state-level data across the 9 states/union territories, having foreign automobile and auto-ancillary “first plants” in India during the years 2002 to 2012.

Dependent Variables: The dependent variables used in the study are “the log of cumulative number of newly created foreign automobile and auto-ancillary firms by state, established between years 2002 to 2012” ($Y_1$) and “the log of cumulative Foreign Direct Investment in millions in newly created foreign automobile and auto-ancillary firms by state, established between years 2002 to 2012” ($Y_2$). Between the years 2002 to 2012, 37 new foreign automobile and auto-ancillary firms established in India. Dynamic Linear Programming Regression Model has been used for examining Hypothesis No. 1 & 2 (see chapter: 2 sub-section: 2.6) reproduced below:

Hypothesis 1: Higher the number of already established Indian automobile and auto-ancillary manufacturing firms in a region, higher is the likelihood of
investment by new foreign automobile and auto-ancillary manufacturing firms in that region.

**Hypothesis 2:** Higher the number of foreign automobile and auto-ancillary manufacturing firms already established in a region, higher is the likelihood of investment by new foreign automobile and auto-ancillary manufacturing firms in that region.

**Agglomeration Variables:** In order to examine Hypothesis 1, the log of cumulative number of Indian automobile and auto-ancillary manufacturing firms by state up to the year 2002 ($Y_1$) has been used as a proxy for “host country’s agglomeration economies”. To examine Hypothesis 2, the log of cumulative number of foreign automobile and auto-ancillary manufacturing firms by state up to the year 2002 ($Y_2$) has been used as proxy for “foreign agglomeration”. By the year 2002, there were 57 Incumbent foreign automobile and auto-ancillary “first-plants” and 276 Indian Incumbent automobile and auto-ancillary “first-plants” in 9 states/union territories of India.

**Control Variables:** While investors in industrial plants may not follow a highly structured theory-based model with regard to the choice of a particular location, there would be some rule-of-thumb consideration for these decisions. Multiple factors are likely to play a simultaneous role when a firm makes a decision on where to locate a plant. The decision would be based primarily on the nature of the plant. For example, an integrated iron and steel plant would prefer to locate close to regions producing primary inputs (iron ore and coal), whereas a cement plant would locate closer to the limestone quarries.

State-level factors may include the number of SEZs, Per Capita Income (PCI), and availability of skilled/unskilled labor (factor endowment). Agglomeration variables could be the share of FDI plants and Indian plants
from specific industry in total plants, among others. The share of FDI plants in the total number of plants in a state may be taken as a proxy for FDI agglomeration.

We worked with various alternative model specifications based on the agglomeration and control variables with firm and region-specific characteristics. Following the work of Meyer and Nguyen (2005) in Vietnam, the control variables included in our regression estimate are “Log of growth in Per Capita Income by state between the years 2002 to 2012” & “Log of Per Capita Income by state in the year 2002”, respectively as alternate proxies for emerging demand, proxy for infrastructure conditions is “Log of number of working SEZs by state in the year 2012”, while human capital development has been measured by the “Log of growth of pass-outs from Engineering and Polytechnic colleges by states between the years 2002 to 2012” and “Log of pass-outs from Engineering and Polytechnic colleges by states in the year 2002” respectively. The size of local consumer market has been measured by “Log of number of Vehicles registered by state in the year 2002” and “Log of growth of vehicles by state between the years 2002 to 2012”, respectively. Regional growth has been proxied by “Log of urbanization by state in the year 2002” and “Log of growth of urbanization by state between the years 2002 to 2012” respectively.

The data on annual per capita income has been collected from the annual publications of Directorate of Economics & Statistics of respective State Governments, and for All-India. The data on the number of working SEZs has been collected from the official website of Special Economic Zones in India. State-wise yearly data on Engineering and Polytechnic colleges pass-outs has been taken from the published reports of Ministry of Education. State-wise yearly data on number of vehicles registered has been collected from the annual
publications of Ministry of Road transport and Highway. Urbanization data has been collected from the Census of India 2001 and 2011.

In order to check whether the Dependent Variables are normally distributed or not, Normality Test has been conducted on both the dependent variables i.e. Number of newly created foreign auto and auto-ancillary “first plants” by state between years 2002 to 2012 and amount of FDI in millions in auto and auto-ancillary plants by state between years 2002 to 2012. The Normality Test for number of newly created foreign auto and auto-ancillary “first plants” by state between years 2002 to 2012 showed that the data is not normally distributed. Same has been the result of the Normality test conducted on second dependent variable i.e. Amount of FDI in millions in auto and auto-ancillary plants by state between years 2002 to 2012. In order to make the dependent variables normally distributed, following the work of Hilber and Voicu (2006) we have adjusted the dependent and independent variables by transforming all the variables into log. After log adjustment the Normality tests of both the dependent variables have given positive results. All the variables have become normally distributed and hence more suitable for carrying Dynamic Linear Programming Regression model. The analysis with log version of $Y_1$ and $Y_2$ has considerably improved the results. The results without log of $Y_1$ and $Y_2$ have not been reported due to space consideration.

Using Dynamic Linear Programming Regression model, we undertook stage-wise regression, of all 2 agglomeration and 9 control variables identified above. Initially individual regression for each one of the 11 agglomeration and control variables was undertaken, in order to determine their individual impact on the 2 dependent variables used in the study i.e. $Y_1$ and $Y_2$ respectively. The Independent Variable with highest R Square value out of all 11 variables has been selected as $X_1$. After fixing $X_1$, we looked for $X_2$ by calculating multiple regression using two Independent Variables simultaneously namely $X_1$ (which
has already been freezeed) and one of the other 10 trail variables left. The second variable out of the 10 variables, giving maximum R Square value with $X_1$, was fixed as $X_2$. The same process was continued till all variables (in certain cases 5 variables and certain other cases 4 variables), having an impact on the independent variables $Y_1$ and $Y_2$ have been determined. Dynamic Linear Programming Regression has been applied using SPSS Statistics Software of IBM, Version: 20. The description of dependent variables, agglomeration variables and control variables used in the study, are mentioned in Table: 14 below.

**TABLE 14 DESCRIPTION OF DEPENDENT & INDEPENDENT - AGGLOMERATION AND TRAIL CONTROL VARIABLES**

<table>
<thead>
<tr>
<th>Trail Variables</th>
<th>Dependent/Independent</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. New Foreign Firms</td>
<td>$Y_1$ (Dependent)</td>
<td>Log of Number of newly created foreign auto and auto-ancillary “first plants” by state between the years 2002 to 2012.</td>
</tr>
<tr>
<td>B. New Foreign Investment</td>
<td>$Y_2$ (Dependent)</td>
<td>Log of amount of FDI in millions in auto and auto-ancillary plants by state between the years 2002 to 2012.</td>
</tr>
<tr>
<td>C. Incumbent Foreign Firms</td>
<td>$x_1$</td>
<td>Log of Number of foreign auto and auto-ancillary “first plants” by state cumulated up to the year 2001.</td>
</tr>
<tr>
<td>D. Incumbent Indian Firms</td>
<td>$x_2$</td>
<td>Log of Number of Indian auto and auto-ancillary “first plants” by state cumulated up to the year 2001.</td>
</tr>
<tr>
<td>E. PCI2002</td>
<td>$x_3$</td>
<td>Log of per capita income by state in the year 2002</td>
</tr>
<tr>
<td>F. PCI</td>
<td>$x_4$</td>
<td>Log of growth in per capita income by state between years 2002 to 2012.</td>
</tr>
</tbody>
</table>
### TABLE 14 DESCRIPTION OF DEPENDENT & INDEPENDENT - AGGLOMERATION AND TRAIL CONTROL VARIABLES (CONT..)

<table>
<thead>
<tr>
<th>Trail Variables</th>
<th>Dependent /Independent</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>G. Working SEZs</td>
<td>x5</td>
<td>Log of number of working SEZs by state in the year 2012</td>
</tr>
<tr>
<td>H. Urbanization 2002</td>
<td>x6</td>
<td>Log of urbanization by state in the year 2002</td>
</tr>
<tr>
<td>I. Urbanization</td>
<td>x7</td>
<td>Log of growth of urbanization by state between the years 2002 to 2012</td>
</tr>
<tr>
<td>J. TechPass-outs2002</td>
<td>x8</td>
<td>Log of pass-outs from Engineering and Polytechnic colleges by state in the year 2002</td>
</tr>
<tr>
<td>K. Tech Pass-outs</td>
<td>x9</td>
<td>Log of growth of pass-outs from Engineering and Polytechnic colleges by state between the years 2002 to 2012.</td>
</tr>
<tr>
<td>L. Vehicles 2002</td>
<td>x10</td>
<td>Log of Number of Vehicles registered by state in the year 2002</td>
</tr>
<tr>
<td>M. Vehicles</td>
<td>x11</td>
<td>Log of growth of Vehicles by state between the years 2002 to 2012.</td>
</tr>
</tbody>
</table>

*Source: Compiled by researcher on the basis of literatures reviewed*

### 3.5 PRIMARY DATA COLLECTION

As stated in Section 3.2. above, a list of 94 Foreign Auto and Auto-ancillary firms has been compiled using various government and non-government data sources. Initially executive level employees of all 94 foreign firms with their “first-plant” in four automobile clusters in India have been approached through
e-mails addressed to the Investor Relations Officers (IRO) of the company. The response rate through this mode has been low. So, we have built up a data of the executive level employees of all the 94 foreign companies using LinkedIn, company websites and by approaching dealer networks. The main criterion for the selection of the respondents has been the headquarters or plant-based executives with a good knowledge of the overseas investment strategies and procedures in their respective companies and a willingness to be open and candid.

After creating a data of the executives qualifying the above specified criteria, we have directly contacted the executives through e-mails and phone calls. Post giving a brief about the study objectives, we requested the executives for appointments. In certain cases one to one interview or telephonic interview of the respondent has been conducted, where in all questions mentioned in the questionnaire have been asked and responses have been recorded in an excel file. Whereas in certain other cases the questionnaire has been mailed to the respondents in the document format or as an HTML link created on Google drive. The data collection technique had been customized as per the comfort and time availability of the respondents.

Due to non-disclosure policies many executives, declined to provide any information. Still after repeated requests and reminders, we have been able to collect responses from the employees of 50 Foreign Auto and Auto Ancillary firms with more than 10% foreign promoter holding in India. All the 50 firms, so surveyed have their first or multiple manufacturing plants in any of the four auto-clusters. Since, the objective of our study has been to understand the motives driving the location decision of foreign firm’s “first-plant” in India. Information has been collected with respect to only the first manufacturing plant of the company set up in India and not for the subsequent plants.
Questionnaire responses have only been collected from the employees of company’s having their first manufacturing plants in any one of the four auto-clusters identified namely Mumbai- Pune Cluster, NCR Cluster, Chennai-Bangalore Cluster and Sanand- Dholera Cluster. A list of companies so surveyed has been produced in Annexure: 2. approximately 92% of the total Foreign Direct Investment in Indian Automobile sector is getting invested in these 4 auto clusters. Individual share of Automobile FDI (during January 2002 to March 2012) in each of the four clusters in mentioned in Table: 15 below.

**TABLE 15 SHARE OF FDI IN FOUR AUTOMOBILE CLUSTERS**

<table>
<thead>
<tr>
<th>Rank</th>
<th>Automobile Clusters</th>
<th>Rupees in Crores</th>
<th>%age with FDI inflows of Automobile industries</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mumbai-Pune Cluster</td>
<td>9,431.80</td>
<td>36.85</td>
</tr>
<tr>
<td>2</td>
<td>NCR Cluster</td>
<td>6,783.36</td>
<td>25.50</td>
</tr>
<tr>
<td>3</td>
<td>Chennai- Bangalore Cluster</td>
<td>5,440.94</td>
<td>21.12</td>
</tr>
<tr>
<td>4</td>
<td>Sanand- Dholera Cluster</td>
<td>2,170.06</td>
<td>8.36</td>
</tr>
<tr>
<td></td>
<td>Total of above</td>
<td>23,826.16</td>
<td>91.83</td>
</tr>
</tbody>
</table>

*Source: Compiled using Department of Industrial Policy and Promotion Reports on Auto FDI*

### 3.6 METHODOLOGY FOR PRIMARY DATA ANALYSIS

The data collected using the questionnaire-cum-interview method has been entered into Excel in numeric codes. Likert Rank responses have been coded on a scale of 1 to 5, with 1 being “Unimportant/ Very bad/ Strongly disagree” to 5 being “Most important/ Very good/ Strongly agree”. Association of
Attributes: Chi Square Test has been used for questionnaire analysis using a two by two matrix. In order to generate the matrix, a dividing line based upon the positive and negative aspects of responses has been drawn. Responses on a scale 5 to 3 have been put in the positive range as they represent optimistic assertions like “Most important, important and moderately important/ Very Good, Good and Moderate/ Strongly Agree, Agree and Neutral”. Whereas, the responses with value 1 and 2 have been put in negative range as they represent pessimistic assertions like “Of little important & Unimportant/ Bad & Very Bad/ Disagree & Strongly Disagree”.

Amount of foreign investment (in Rs.) in automobile and auto-ancillary sector between the years 2002 to 2012 has been used as the basis for demarcation between high and low investment zones. Mumbai- Pune Cluster and NCR Clusters have been taken as High Investment Zones as between the years 2002 to 2012 these two regions have received 62.35% of the cumulative FDI in the auto sector. The Chennai- Bangalore and the Sanand- Dholera belt have been taken as Low Investment Zones with cumulative automobile FDI being 29.48% between the years 2002 to 2012.

Attributes of Association: Chi Square Test has been used for analysis as:

- Most of the questionnaire data is qualitative in nature and is not a time series data;
- Further the qualitative data is discreet and non continuous;
- As the number of observations is less i.e. nine, regression analysis is ruled out;
- We have 50 observations which makes this data valid for Association of Attributes, as this technique is used when observations are equal to or more than 50;
Therefore, Chi Square has been applied as other tools are neither relevant nor valid for this study.

Chi Square calculations have been carried out in Excel after codifying the data collected using questionnaire-cum-interview method. Below mentioned Hypotheses have been tested using the Association of Attributes- Chi Square Test:

- **Hypothesis 1**: Higher the number of already established Indian automobile and auto-ancillary manufacturing firms in a region, higher is the likelihood of investment by new foreign automobile and auto-ancillary manufacturing firms in that region. \( Y_1 = f(x_2) \)

- **Hypothesis 2**: Higher the number of foreign automobile and auto-ancillary manufacturing firms already established in a region, higher is the likelihood of investment by new foreign automobile and auto-ancillary manufacturing firms in that region. \( Y_2 = f(x_1) \)

- **Hypothesis 3**: Foreign Investors prefer to locate in regions with superior factor endowments

- **Hypothesis 4**: Foreign Investors prefer to locate in regions where information about local markets and required documents to operate business are transparent and easy to access.

- **Hypothesis 5**: Regions with superior Infrastructure facilities in terms of connectivity, industrial zones and consistent power & water supply are more likely to receive foreign investment.
• **Hypothesis 6:** Regions with superior market-supporting institutions are more likely to receive foreign investment.

• **Hypothesis 7:** Foreign Investors prefer to locate in regions with high exports potential and incentives on exports and imports.

### 3.7 LIMITATIONS OF PRIMARY DATA ANALYSIS

The primary data collected also suffers from some of the limitations held below:

• **Duplication of existing work:** In some states of India, the nature of investment climate constraints, and the actions required to solve them, are already known, as in states like Andhra Pradesh and Karnataka. Many potential remedies have been identified, for example, the concept of a single window for license clearances.

• **Geographic focus:** Investment climate conditions can vary significantly by geographic area — across states, across municipalities, and even within municipalities. While we show variations in investment climate indicators across four auto clusters, there may be a need to focus at the sub-regional level.

We have attempted to verify the hypotheses (as stated in section: 3.6), with the primary as well as secondary data methodology as entitled above. The results for the data analysis are to be seen in the results in Chapter 4 and 5.