

Women on Board and its Impact on Performance of NIFTY50 Firms

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Abstract

This research paper examines the relationship between women representation on Board of Directors and the financial performance of the NSE-NIFTY50 listed firms. The return on assets and assets turnover ratio is used as measure of firm's performance; using panel regression for a period of 2014-15 to 2018-19, the impact of specific board characteristics including diversity index is assessed. It is observed that the productivity of these firms is clearly affected by the gender diversity. The profitability ratio is not seeing any significant impact. Though there is an overall increasing trend in the representation of women on board in sample firms, just a small proportion of women may not serve the true purpose in affecting the strategic decision making. Therefore, it is suggested that the representation should be more than the mandated number, to see its true impact on firm performance in the long run.

Keywords: Board Characteristics, Board of Directors, Financial Performance, India, NIFTY50, Women Directors

1. Introduction

There has been an increasing interest in gender related research studies in the past few years. The general discussion is that since female population is almost equal, their representation in specific economic activities, strategic decision making and in areas where it matters should also be increasing to make them at par with the male population and in the process achieve parity, justice and equality.

Women representation on the board of the firms is also being argued on the same lines, as they are seen to have a strong impact on the firm's performance in the long run. A positive relation between women representation on firms board implies that higher the number of women on board, more will be the profitability. Looking at the significance of the diversity on board,

several companies have started increasing gender representation (Marinova, *et al.*, 2016). However, it is observed that the gender diversity is very low even in some of the developed countries. Many countries have moved on the path of legally mandating a minimum number of women directors and independent directors on firm's board. "Countries including Germany, Norway, Spain, France, Iceland, Italy, Belgium, Finland and Kenya have introduced a legislative quota requiring firms to appoint between 30 and 40% of women into corporate boards" (Brahma, *et al.*, 2021).

Several studies have just focused on the number of women on board, whereas, practically, it would be the independence of the directors that is expected to have more significant impact on overall performance. Female directors engage in independent thinking and diligence in governance more often compared with

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independent directors (Adams and Ferreira, 2009). Moreover, the expertise and skills achieved by these directors from other firms, also plays a major role in their contribution towards the firms profitability. It is expected that the creativity and innovation, corporate image, broader view are all important aspects that gender diversity would bring in for improved decision making process (Mehmet and Demir, 2016). It would be also interesting to note whether specific attributes of a female namely, the level of education, female age, multiple directorship, prestige, and the executive position held by the female director affect the post-appointment firm performance (Brahma, *et al.*, 2021). Research studies point out that mandating representation normally leads to just compliance for the sake of fulfilling requirements and does not serve the purpose of impacting performance parameters. Therefore, several other countries have kept the women representation in firm's board voluntary.

The research shows mixed results as far as the impact of gender diversity on the financial performance of the firms. In fact, these mixed results are not unexpected, as the link between board diversity and firm financial performance is both theoretically and empirically complicated (Carter, *et al.*, 2008). Therefore, this research paper intends to assess the association between female representations on the board of companies in India. This research paper has the following specific objectives:

- To study the impact of women representation on board of directors of the NIFTY50 firms on their financial performance for the period FY2014-15 to 2018-19.
- To evaluate the characteristics and trends in the gender diversity on the boards of NIFTY50 firms for the FY2014-15 to 2018-19.

For a systematic and structured analysis, the paper is arranged in the following sections. After a brief introduction, the history and some details about gender regulation is presented, followed by a review of literature. The research methodology is explained in detail with the sampling, data sources and period of study, models and variables. An overview of the gender

diversity is provided. This is followed by results of the panel regression, its detailed analysis, and conclusions.

1.1 History of Gender Diversity Regulation in India

The mandatory requirement of having at least one women director was first codified in the Companies Act 2013, which became effective from 1 April 2014. Rule 3 of Companies (Appointment and Qualification of Directors) Rules, 2014 deals with women director on the board. With regard to Section 149, the following companies shall appoint at least one women director on the board. Firstly every listed company and every other public company having 1. Paid-up share capital of one hundred crores rupees or more or; 2. Turnover of three hundred crores rupees or more. Thus, the 2013 landmark enactment has paved way for gender diversity and more women participation (Murthy, A., 2014).

The Section 149 (1) under Companies Act-2013, directed every listed company (except those having paid up equity share capital not exceeding Rs. 10 crores and net worth not exceeding Rs 25 crores) and any public company having a paid up share capital of Rs. 100 crores or more, or, turnover of Rs. 300 crores, to have at least one woman director on its board by April 1, 2015. In May 2018, SEBI mandated the top-500 companies (in terms of market capitalization) to appoint an independent woman director by April 1, 2019 (Rao, D.S., 2020). Diversity in boardrooms got a big boost when SEBI mandated an independent woman director in addition to the stipulation that listed companies should have at least one female board member (Prasad, R., 2019).

SEBI (Securities and Exchange Board of India) has asked top-100 listed companies to disclose data on wages, healthcare benefits provided to women employees based on the responsibilities including skilled, semi-skilled, unskilled and differently-abled parameters in addition to representation of female directors on board. From now onwards, all the data pertaining to women employees will also be included in the business responsibility and sustainability report of listed companies, which will be published it along with their annual reports.

Theoretical approach to this paper depends on resource based view, as the Board of Directors of the firm primarily consists of human capital, their capabilities and competencies. The strategies and the policy making by these boards do affect the overall performance of these firms. In the context of corporate governance, diverse and unique human capital of a corporate board is viewed as a key resource for the firm (Reddy and Jadhav, 2019). Therefore, diversity of board members in terms of age, gender, educational qualifications and expertise is very essential for the firms from the resource theory point of view. Also, the agency theory suggests that the decisions which are communicated by the board to the stakeholders are taken very seriously as reliable information and further it gets reflected in the value of the firm. Therefore, diversity of boards in general and gender diversity in specific is important from enhancing the financial and intellectual value of the firm in the long-run.

1.2 Review of Literature

This section presents some of the earlier research in the area of gender diversity and its impact on the financial performance of firms. There are several studies in different country and industry contexts with mixed results. Some of the studies find that there is a strong impact of women representation on board on firms performance, while others find that more women on board affects the firms negatively.

Erhardt, *et al.*, (2003) find that return on assets and investment is positively related to gender diversity measured through proportion of women on board. The study also found that representation of minorities (ethnic) also improved firm performance in USA.

Gallego, *et al.*, (2010) find that representation of female in top managerial position and on board as directors of Spanish firms do not necessarily result in improved performance. Ekadiah, J.W. and Kiweu (2012) found that banks in Kenya are majorly male dominated and wherever there was gender representation it did not have any statistically significant impact on their financial performance.

Mirza, *et al.*, (2012) find negative relation between gender representation and performance for firms listed on Karachi Stock Exchange, Pakistan. Abdullah and Ismail (2013) analyze the top 100 non-financial firms of Malaysia to find an inverse association between gender diversity and firm's performance for the year 2007. Darmadi (2013) study the listed firms in Indonesia and report a strong negative relation between gender diversity and financial performance.

Tukur and Balkisu (2014) in contrast observed that foreign directors enable financial performance improvement in Nigerian insurance firms. They also found female representation to increase firm performance.

Marinova, *et al.*, (2016) in their study at Netherlands and Denmark, find that there no significant relationship between female representation on board and firm's financial performance.

Ciavarella, (2017) in the empirical evidence for European countries found that overall diversity in boards doesn't have any significant relationship with firms financial performance, except for the cases where there is high representation at executive level; Reguera, *et al.*, (2017) conducted research in Spain and report that the performance of firms with women representatives on boards is very good and increasing.

We can see a clear gap in the literature, where there are limited and no studies about the impact of women on board on the firm's financial performance. This study tries to fill in the above gap.

Thus, the following hypotheses can be tested

H1: There is a significant positive relationship between the gender diversity and financial performance of firms measured in terms of Return on Total Assets (ROTA)

H2: There is a direct association between female representation on board of directors and firms efficiency measured in terms of Assets Turnover Ratio (ATO)

2. Methods and Material

2.1 Sample and Data Sources

The NSE listed NIFTY50 index is taken as sample for studying the impact of gender diversity on financial performance of these firms. This index is considered representative of the large cap companies and is a good mix of the firms in both manufacturing sector and service sector. The details about this index are provided on the national stock exchange website (<https://www.nseindia.com>). The time period of the study is taken as FY2014-15 to FY2018-19, the pandemic years are avoided to ensure there is no bias in the data.

The data for the research paper is drawn from the prowess database provided by CMIE, which is compiled from the published annual reports of the companies listed on stock exchange. The data is related to the company characteristics, board characteristics and financials. Since the data is related to a five year period, missing data cells is directly taken from annual reports available on the company's website.

2.2 Model for Panel Estimation

$$FINPERFORMANCE(ROA_{it}, ATO_{it}) = \beta_0 + \beta_1 BSIZE_{it} + \beta_2 BIND_{it} + \beta_3 CEOD_{it} + \beta_4 BACT_{it} + \beta_5 IWDPROP_{it} + \beta_6 DINDEX_{it} + \beta_7 AGE_{it} + \beta_8 TYPE_{it} + \beta_9 SALESLOG_{it} + \beta_{10} LEV_{it} + e \dots \dots \dots (1)$$

Where, ROA_{it} = Return on Total Assets of the i th company for the time period t , ATO_{it} = Assets Turnover Rati; $BSIZE_{it}$ = Size of Board; $BIND_{it}$ = Independence of Board; $CEOD_{it}$ = CEO Duality; $BACT_{it}$ = Board activity; $DINDEX_{it}$ = Index of Diversity; $IWDPROP_{it}$ = Proportion of Independent Women Directors on board; AGE_{it} = Age of the firm; $TYPE_{it}$ = Type of firm (Service or Manufacturing); $SALESLOG_{it}$ = Log of Sales (income); LEV_{it} = Leverage;

The variables for estimation are selected based on the literature review and the uniform availability of data for the sample firms over the study period. Certain type of qualitative data which are not disclosed by all the firms could not be used. The data is divided into two broad categories; one is company features related

data such as size of the firm, age of the firm, leverage and type of the firm; another set of data deals with the board features such as board size, independence of women directors, CEO duality and board activity. These variables capture the impact of composition of board.

Earlier research has used several measured the performance of firms using variables like return on investment, return of sales, Tobins Q, Return on equity, gross profit, total revenue etc. The financial performance in this study is measured with two different variables. Return on Assets (ROA) representing the profitability of the firm; Assets Turnover ratio (ATO) representing the productivity. The Return of Assets (ROA) is variable in the annual reports and directly taken as reported by the firms for various years. Assets Turnover ratio (ATO) is estimated as ratio of total assets to sales revenue.

The set of independent variables that are taken are related to board and the characteristics of the firms. Board Size (BSIZE) is the number of members on the board of the firm. Independence of Board (BIND) is measured as proportion of independent directors on board to total board members. CEO Duality (CEOD) is reflected with dummy variable, 0 if Chairperson and Managing Director is not the same person, 1 if Chairperson and Managing Director is the same person. Ratio of total independent women directors on board to total independent directors is used to show the percentage of independent women directors on board. Two measures of gender diversity is used, one is the BLAU Index (BI), measured as:

$$BI = 1 - \sum_{i=1}^2 P_i^2,$$

Where $I = (1, 2)$, P_i = proportion of board members of each category

Secondly, Shannons Index (SI) is also used,

$$SI = - \sum_{i=1}^2 P_i \ln P_i,$$

Where, P_i = proportion of board members of each category

For Blau index, the values normally range between 0 and 0.5, higher the diversity, more is the value of this index away from zero, with 0.5 indicating an equal representation of male and female on board. For Shannon Index, the value would range between 0 and 0.69. "The Shannon index is more sensitive to small changes in the gender diversity of boards because it is a logarithmic measure" (Abad, *et al.*, 2017).

Age of the firm is represented using the date of incorporation. The firms are further classified using 0 and 1 coding to show whether they belong to manufacturing sector or service sector respectively. The size of the firm is normally represented using sales, total assets or market capitalization. This paper uses log of sales to measure the size of the firm. Leverage is measured using the normal definition of total liabilities of the firms to its total equity.

3. Gender Diversity in Indian Boards - An Overview

The basic reasoning for inclusiveness and gender diversity emerges from the increasing literacy levels, increasing proportion of women in population and also their participation in workforce over a period of time. Besides fulfilling the social justice and fairness by giving representation to women on board, it has been established by several researchers that gender diversity has positive impact on the long term financial performance of the firms. (Adams and Ferreira, 2009; Low, *et al.*, 2015; Arora and Sharma, 2016; Gordini and Rancati, 2017).

The Table 1, provides an overview of the representation of women directors over the years in the sample firms. The total number of directors and the women directors in these companies has both increased over the study period. It can be observed that the proportion of women directors has almost increased by 85%, which is clear indication that the mandatory clause stipulated by regulatory authorities is being implemented by these companies. The percentage of women directors in these companies also stands at around 16%. According to Deloitte global report, 2019 women hold a meager 16.9% of board seats globally.

So we can say that Indian boards are also at par with the current average global levels. This figure however, is drastically low when compared to the proportion of women in population and their representation in board of developed countries. The representation of women across globe has a pattern of sudden increase, either after the passage of law or when the firms have put in additional efforts to ensure gender diversity. In India too, is seen to have increased by more than 50% just in last five years, i.e. post introduction of the mandate by the Companies Act-2013, Section 149 (1) in 2013. If this trend continues, it is possible that their representation reaches to at least one-third of the total. However, the Deloitte report notes that worldwide, if the present trend of growth which is 1.9% continues, it would take up to three decades for the gender parity to be achieved. Germany and Finland are ahead of other countries in gender representation.

It is also observed in the table 1, that each company on an average is nominating at least two women directors on board, which has increased from having just one director per company. All companies had at least one women director with a very small exception of the public sector companies not having the representation. It is understood that since these appointments are made by the government, there is sometimes a delay due to which the post lies vacant for some time.

One of the interesting facts that is observed is that number of companies having more than two women directors has increased from 12 to 40, which means that 80% of the companies have appointed two or more women on their board, with an exception of a few companies having as many as three to four women on their board. The number of companies having three or more women directors was just five in 2015, which is 10% of the sample. It has increased to ten firms in the year 2019 indicating a jump of 100% in just a span of five years. It is said that the real representation is observed by the proportion of Independent Women Directors (IWD), which is showing a clear increasing trend, from a point where the firms did not have even one IWD to having around 1.48 IWD. Even the number of firms having two or more IWD has increased from a meager 4 to 21, which is a little above 40% of the sample size.

Table 1. Summary statistics related to women directors - general characteristics

	2015	2016	2017	2018	2019
Total women directors in 50 companies	65	77	74	90	111
Total directors in 50 companies	658	634	631	699	699
Percentage of WD to Total directors (all companies)	9.88	12.15	11.73	12.88	15.88
Women directors per company	1.30	1.54	1.48	1.80	2.22
Number of companies having women directors	47	50	47	50	50
number of companies having women ≥ 2 women directors	12	18	19	25	40
Number of IWD in 50 companies	45	48	49	56	74
Total Independent directors in 50 companies	330	314	317	340	376
IWD per Company	0.90	0.96	0.98	1.12	1.48
Number of Companies having ≥ 2 IWD	4	7	7	12	21

Source: Estimated by the author.

Table 2. Summary statistics related to women directors - Classification based on type of industry

	2015	2016	2017	2018	2019
Service sector women directors (average)	1.50	1.65	1.55	1.85	2.15
Manufacturing sector women directors (average)	1.17	1.47	1.43	1.77	2.27
Public Sector women directors (average)	0.89	1.44	1.00	2.00	2.33
Private Sector women directors (average)	1.39	1.56	1.59	1.76	2.20
IWD in service sector (average)	0.90	0.90	0.80	0.90	1.45
IWD in manufacturing sector (average)	0.90	1.00	1.10	1.27	1.50
IWD in Public sector (average)	0.44	0.33	0.44	0.56	0.67
IWD in Private sector (average)	1.00	1.10	1.10	1.24	1.66

Source: Estimated by the author.

As on February 2020, as per market tracker nseinfobase.com, about 44 companies including 34 Nifty-500 companies had not adhered to the norms. The top-1,000 listed companies by market capitalization, for which the deadline was April 1, 2020, as many as 150 of them don't have a woman independent director on their boards yet. And this lag is spread across several industry verticals right from banking/term lending to mining, mineral and metals (Rao D.S., 2020). A spike in the number of same women hired on multiple boards on or near critical dates was observed, (Rao D.S., 2020) it was observed that majority of women hired were based on the professional network and the same women were hired on multiple boards just to satisfy the mandate. There is also a need to revamp the corporate mindset and also bring in internal processes that would encourage equal opportunity (Awasthi, S., 2018).

Another basis of analysis of gender diversity is based on the average representation of women on board classified based on the type of industry. The summary is presented below in the Table 2; these figures are calculated by dividing the total number of IWD in that group divided by the number of company in that group. It is clearly observed that the average representation of women (over all as well as IWD) in manufacturing sector is higher and grown faster than service sector. The overall female proportion in total directors is marginally higher in public sector than in private sector. However, the representation in case of IWD is lower than the mandated levels in public sector. The reason for this is that the appointment of such directors is done directly by the ministry to which the company is reporting. Another reason is some companies are not finding suitable women at the top management to be eligible as members of board. This results in avoidable delays in several cases and sometimes, also results in vacant positions on board. The Economic Survey 2020-21 noted that this problem can be addressed by "completely revamping the Boards of the central public sector enterprises to reorganize their structure, enhance their operational autonomy coupled with strong corporate governance norms including listing on stock exchanges for greater transparency" (Sahu, P., 2021).

4. Panel Regression on Gender Diversity and Financial Performance - Results and Analysis

The results of two models with fifty firms are presented in the Table 3, as it can be observed that all the models are statistically significant ($p < 0.000$). The performance is indicated through return on total assets show that except for CEO duality, none of the other characteristics of the board has an impact on it. It may be true in Indian context that when the Chairman and Managing Director is the same person, quick response to changing environment, efficient decision and policy making, consolidation of skills and experience, strong leadership might be resulting in increasing the performance of the concerned firm (Rashid, 2010). Therefore this result supports the stewardship theory of leadership rather than the agency theory. However, the end of CEO duality, i.e., CEO/MD and Chairperson being different persons for listed companies (applicable only for the top 500 listed entities in terms of market capitalization) was mandated from April 1, 2020. This law was brought into effect due to the recommendations of the Kotak Committee (Business Today, 2018).

Sales of the firm used as a proxy for determining size are seen to be highly associated with the return on total assets. The impact of gender diversity on performance would be higher in larger firms. There are several reasons that can be attributed for this. The market and general investors do not observe the changes in small firms on a regular basis, whereas the public scrutiny of large firms is much closer and continuous. Therefore, the large firms usually lay the roadmap for best practices in the industry through demonstration effect which is later followed by smaller firms.

The age of the firm (0.097) also is a determinant; it is observed that older firms have higher profitability. Leverage follows an inverted U shaped relation with profitability of firms, beyond a particular level it is seen to have negative impact on profitability of these firms (Dalci, 2018). There is no significant impact of gender diversity, in both models when BLAU index is replaced with Shannon's diversity Index. Both indexes

Table 3. Results of regression - Financial performance

Dependent Variables	ROTA		ATO		ROTA		ATO	
N	50		50		50		50	
Adjusted R ²	0.370		0.598		0.377		0.588	
F statistic	13.889		35.175		14.313		33.801	
p-value	0.000		0.000		0.000		0.000	
		t-value		t-value		t-value		t-value
Intercept	23.230***	4.298	-0.469**	-1.980	23.620***	4.469	-0.437*	-1.859
Explanatory Variables	Beta		Beta		Beta		Beta	
Size of Board	-0.160	-0.999	-0.037***	-5.171	-0.108	-0.715	-0.037***	-5.175
Independence of Directors	0.226	0.770	0.022**	2.056	0.154	0.541	0.023**	2.116
Board Activity	-0.171	-0.696	-0.016**	-1.971	-0.105	-0.437	-0.017**	-2.043
CEO Duality	1.534*	1.763	-0.013	-0.2783	1.358*	1.604	-0.005	-0.1096
Independent Women Directors on Board	-0.340	-0.072	0.704***	2.932	-0.440	-0.096	0.669***	2.882
BLAU Index	8.413	1.194	-0.555**	-2.009	--	--	--	--
Shannon Index	--	--	--	--	6.249	1.258	-0.396*	-1.962
Service/Manufacturing	-0.125	-0.129	0.471***	8.263	0.047	0.049	0.469***	8.164
Sales	-1.216***	-2.641	0.098***	4.848	-1.328***	-3.017	0.097***	4.895
Lev	-2.825***	-7.100	-0.053***	-5.875	-2.851***	-7.313	-0.052***	-5.779
Age	0.097***	4.793	0.005***	3.679	0.098***	4.933	0.005***	3.657

Source: Estimated by the author.

For all Regression Tables: *Indicates that beta is significant at 10%; **significant at 5%; ***indicates beta significant at 1%.

are used in the models because they represent different aspects of diversity in their unique form.

The average turnover of assets which is indicative of productivity of the firms shows that all the factors in board have an impact. The size of the board (-0.037), independent women directors as well as BLAU index has a very strong impact. Several studies have shown that boards beyond optimum levels have proven to be counter-productive to firm's performance (Gomez, et al., 2017; Kamath, 2019). The result of this study too validates the same. Whereas, independent directors (0.023) and board activity (-0.017) is seen to be having moderate impact on ATO. Presence of independent women directors (0.669) enhances productivity. Some of the prior literature also arrived at the same result (Kilic and Kuzey, 2016; Gordini and Rancati, 2017).

This positive association is because women bring in with them not only the requisite competency, but also diversity in views and discipline in board meetings. Proponents of greater diversity contend that female representation brings in a different perspective, intuitiveness and a more collaborative style of leadership into corporate boardrooms (Prime database, 2017). Though several companies have started giving representation to women on board, but the proportion is meager when compared to the developed countries. Moreover, one woman on board for complying with regulation does not help much in realizing the full potential of the impact of gender diversity on board (Prime database, 2017). Therefore, the fact that just representing women on board doesn't serve the purpose, the women directors have to be given powers to play a positive and constructive role in decision making.

It is also observed that the productivity is definitely associated with the nature of firm (0.469), age (0.005), size of firm (0.097) and also leverage (−0.052). Service sector firms have a higher association with productivity than the manufacturing counterparts. It is observed that knowledge intensive sectors usually correlated with gender diversity (Christiansen *et al.*, 2016). All the variables including Shannon's index is seen to have a significant impact on the productivity. However, both Blau (−0.555) and Shannon (−0.396) diversity index shows a negative impact on ATO. The reason for this may be the very low representation of women on board by many firms to have a substantive impact on performance. Similar negative impact was also reported by several studies (Gallego, *et al.*, 2010; Mirza, *et al.*, 2012; Darmadi, 2013). Thus, hypothesis 2 can be accepted only in case of productivity and gender diversity.

5. Conclusions

The objective of the paper was to assess and analyze the trends in the women representation on Board of the Directors and evaluate its impact on the profitability and productivity of these firms. The number and proportion of women directors in general and independent women directors is seeing an increasing trend for the period of study. However, the gender diversity is very low when compared to the developed countries. The panel regression analysis revealed that the profitability of the sample firms was not seen to have any association with women representation on board. This paper looks at the diversity index as an independent variable which is novel in Indian context. There has been no study that tried to associate NIFTY50 firm's financial performance with gender representation on board.

The results of the study provide clear evidence that productivity of the firm is definitely associated with the gender diversity and board characteristics. The findings of the paper are a starting point to seriously consider increasing gender diversity as it's an important factor that would influence the firm's productivity over time. The size of board, its independence, the proportion of independent women directors and the gender diversity index all is seen to be highly statistically significant.

However, in case of return on total assets, only CEO duality is observed to have an impact. Thus, it can be concluded that only certain aspects of financial performance of the firms in the select firms in India is influenced by gender diversity. Other characteristics of firms such as size of firm, its leverage and age also impact the performance of these firms.

These results prove as a starting point for the policy makers as well as industry experts to start debating seriously on the role of women in strategic decision making of the firms and consider voluntarily increasing their representation in their board over and above the mandated quota, where their presence can have a real impact on the firm's all-round performance. Further studies can focus on specific sectors or on a wider cross section data for a detailed and in-depth analysis.

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Appendix 1
Sector Representation of NIFTY50

S. No.	Sector	Number of companies
1	Financial Services	11
2	IT	5
3	Oil & Gas	5
4	Consumer Goods	6
5	Automobile	6
6	Pharmaceutical	4
7	Construction	1
8	Metals	4
9	Telecom	1
10	Cement & Cement Products	3
11	Power	2
12	Services	1
13	Fertilizers & Pesticides	1
	Total	50

Appendix 2
Breakup of sample

Type	Number of companies
Manufacturing	30
Services	20
Type	Number of companies
Private sector	41
Public Sector	09