STRUCTURAL ANALYSIS OF THE UNDER-REPRESENTATION

OF WOMEN ON BOARDS OF PUBLIC CORPORATIONS

by

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Structural Analysis of the Under-Representation of Women on Boards of Public Corporations

Abstract

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In this dissertation I examine the structural reasons for the persistent under-representation of women on the boards of directors of public corporations. By examining a predefined set of parameters, I verify whether the corporate directorate is equitably accessible to men and women. These parameters include certain nominal parameters (e.g. profession) and graduated parameters (e.g. including number of private company directorships). The sample of directors is drawn from the Standard & Poor 500 index of companies and extends over five years. The final sample consisted of 219 men and 147 women directors, of whom 140 were first time directors and 226 were experienced directors.

Comparisons among and between first time and experienced women and men directors revealed that the corporate directorate is differently composed for the two sets of people. Access is equitable for men with different nominal characteristics and resources of a wide range of values; this does not hold equally true for women. Access of women to the system is restricted both in terms of nominal parameters (e.g., role and

profession) as well as threshold requirements of graduated parameters (i.e., network resources).

The main implications of the findings are only women CXOs (such as Chief Financial Officer, Chief Technology Officer) without previous experience on public company boards have a better chance of obtaining a board appointment than men. In terms of all other parameters, such as role, profession, previous experience, network resources etc., men are more likely to be appointed to public company boards than similar women. Thus there is clear evidence that the standards applied for including women on public company boards are higher and different from those applied for the appointment for women. The reasons for the different standards could have two origins – supply side imbalances in the labor market or unconscious discrimination in organizations. Both women in leadership positions as well as men, who belong to the dominant group in organizations, need to work in tandem to correct the imbalance in composition of the corporate directorate. Limitations of the study as well as suggestions for future research are provided.

CHAPTER 1

1.1 INTRODUCTION

Prior research on women directors has focused mostly on human capital and demographic variables such as education, experience in leadership positions, age, and race (Singh, Terjesen & Vinnicombe, 2008), generally seeking to understand gender differences in demographic characteristics and the effects of board diversity on board and firm performance. One variable that should be of significance, yet is seldom studied given the advisory duties of directors, is the professional network of directors. The importance of networks to the advancement of men to corporate board positions is documented in the studies by Mills (1956), Mace (1971), Lorsch (1989) and Leblanc & Gillies (2005). Less well studied is the extent to which networks affect the opportunities for board membership of women.

Research on the issue of sex-based differences in organizational activity has been conducted largely under the umbrella of psychological theories related to bias, prejudice and stereotyping. There is, however, another viewpoint, the other side to the psychological explanation of the differential experiences of women in the workplace – the sociological perspective. To be more specific, the structural characteristics of the organizational environment can also be employed to explain the differential outcomes experienced by women in organizations.

The objective of this study is to provide a structural view of the characteristics of outside directors on board of public corporations that include women on their boards. Through this view, I intend to examine whether there exists a structural explanation of

the under-representation of women on the boards of public corporations. I will conduct this exploration on the theoretical foundation of structural analysis defined in terms of heterogeneity and inequality that exist within the system of public corporations. I hope, through this study, to contribute to the literature in two fields – women in organizations and structural analysis of social systems.

1.1.1 Under-representation of women on corporate boards

The choice of independent directors has invariably been from among the social elite (Mills, 1956), a phenomenon considered natural because the ownership of organizations is also vested in this community. In their dual role as members of the highest strata of society and owner of economic organizations, directors were expected to lend the reputation and legitimacy inherent in their social role to the organizations on whose boards they served. Directorships were also seen as a medium of ensuring that the common interests of that segment of society were maintained. In light of these functions of board members, it is not surprising that heterogeneity, on any dimension, in board composition was a non-issue. In 1969 Zald confirmed this view, with regard to the inclusion of women on boards, describing women as being not only less resourceful but also lacking the forcefulness necessary to be a participant in board proceedings. Just a year later, Epstein (1970) published her analysis of the barriers to career advancement of women. It was her conclusion then that women faced particularistic criteria which discriminate against a general norm of career growth. In this social system, women had to meet extra-ordinary achievement levels within universal criteria in order to obtain leadership positions.

This differential view of the availability and ability of women to participate in boards has been the crux of the debate on the under-representation of women on corporate boards for the past more than four decades. This point was illustrated beautifully in a recent article (Groysberg and Bell, 2013) based on a survey of female and male directors on several aspects of gender diversity on public boards. While men stated that qualifications and ability and not gender should be the primary criteria in selection of directors; women said that women are not considered at all unless the board is pursuing the specific agenda of gender diversity! This in essence is the psychological underbelly of the structural nature of corporate boardrooms.

1.1.2 Structural analysis of board composition

Structural analysis is an investigation of such enduring phenomena of a social system that they can be identified as characteristic of the system (Homans, 1975). In the instance of corporate governance structures in USA, given the long-standing domination by Caucasian men of a certain pedigree, it is safe to assume that board composition is one such enduring phenomenon. A phenomenon merits investigation when there is a strong impetus to challenge it. The struggle of all social groups, who do not conform to this characteristic of the corporate governance system, is one such attempt to modify the composition of corporate boards.

Any aspect of a social system is a composite of the norms (referred to earlier as phenomenon) and action. It is artificial to the system to separate the norms from action because they act reflexively (Homans, 1975; Giddens, 1984). To speak of the system of corporate directors, selective integration and discrimination were actions that resulted in

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this homogenous system; on the other hand, that self-same homogeneity propagated the norms to the extent of building systemic barriers to others becoming a part of the system. Therefore, to say that homogeneity was the pre-existing condition that resulted in the barriers would be as wrong as claiming that the rules of selection resulted in the homogeneity. Therefore, it is not my endeavor in this study to claim that structure precedes actions; it is merely to unpack the system such that the phenomenon becomes obvious. This is important because claims have been made that the system is equal and heterogeneous to the extent that the larger social system has a capacity for it (Groysberg & Bell, 2013). One of the most frequent reasons given for the under-representation of women on corporate boards is that they are not equivalent or present in adequate numbers. While not refuting it as it is outside the scope of this study, I do intend to refute the claim that the system is equal and heterogeneous.

From an economic perspective, board composition has been seen as a correlate of the performance of the company (Hermalin & Weisbach, 1988; Denis & Sarin, 1999). As such, men who were deemed to have the ability to contribute to firm performance were invited to join the board (Haunschild & Beckman, 1998; Hillman, Cannella Jr. & Paetzold, 2000). From a sociological perspective, a board appointment was possibly the symbolic apex of the powerfulness of a person (Mills, 1956). Reflexively, having powerful people on the board was reflective of the influence of the company in its economic system – be it industry, geography or economy. On both these criteria, women were and are members of the out and thus unsuitable group. The early women board members (and this is still true in many cases) were spouse to a board member who

inherited or whose appointment was supported by the husband. Later women, though professionally experienced were also connected to the board through other connections

1.1.3 Purpose of the study

In order to understand the structural factors in the landscape of corporate boards that affect the opportunities of board membership differently for men and women, it is essential that all possible such factors be mapped. Broadly such factors can be categorized as human capital and professional network capital. I demur from using the term social capital because it implies a relationship that defines the network, which is not the case in my study. In this instance I am examining networks as a proxy for the resources available to directors in terms of people that directors have access to who are also top management executives. Both human capital and professional network capital variables are explained in detail later in the appropriate section; suffice it to say at this point that between human capital and professional network capital, I attempt to take into consideration all the criteria than can be considered with reference to directorial candidates.

Literature on the gender differences in human capital of directors on corporate boards is extremely scant. In the only study I could find of a direct comparison of human capital among directors (not differentiated as insiders and outsiders) across the categories of race and gender (African-American females and males; Caucasian females and males), Hillman, Cannella, Jr. and Harris (2002) found that directors who belong to the minority group whether by gender or race tended to be more highly educated (nearly 50% of the sample) and occupied in non-business professions (over 50% of the sample) as compared

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to Caucasian male directors only about 20% of whom had received higher education and less than 5% were from non-business professions. In this study, I will extend this study by firstly including professional network capital and secondly by examining the differential effect of both human capital and professional network capital variables on the likelihood of the directors being female or male.

If studies focused exclusively on the differences between the human capital variables of female and male directors are few, those comparing professional network capital are non-existent. Given the advisory and monitoring duties of directors, particularly outside directors, such absence is particularly marked. The gap, in large part is the caused by difficulties in accessing the population of corporate directors and capturing myriad relational choices in the development of their individual networks (Mizruchi, 1996; Daily, Dalton & Cannella Jr., 2003) resulting in directors' professional networks being substituted with interlocks. More recently, the focus has shifted to the social capital of top management teams; operationalization of social capital has remained in the realm of discrete counts of ties to various entities – other directors, other executives. In the singular study I found including a network of friendship and advice ties, the population from which ties were derived was limited to those firms with whom the focal firm had a resource dependent relationship. In that study by McDonald and Westphal (2003) referred to, though no restriction was placed on the number, about 250 CEOs named about 600 executives as those whom they sought advice from and/or were friends. This indicates an average of two people that CEOs sought advice from and/or had for friends. This could have been a result of the small population from within which they had to enumerate their network i.e. firms on whom the CEO's firm relied for

resources. Stevenson and Radin (2009) also attempted to draw social networks within boards but were turned down by 80 percent of the firms they approached, because the information was too confidential and sensitive to be shared. The only firms that did participate were small to medium in size and had a direct relationship with one of the authors. Thus, it is evident that obtaining information regarding any type of complete network directly from members of top management teams of organizations is almost impossible.

I discuss the data and methods used by me to circumvent this obstacle through the use of an unconventional data source (by academic standards) and computer programming. By these methods, I am able to construct what I term the professional network of directors. The method of constructing a professional network and its utility is the contribution of this study to the domain of methods employed in research on boards of directors.

To sum, the purpose of this study is to examine (a) whether there are differences in the human and professional network capital of female and male outside directors on the boards of public corporation and (b) how the various components of human and professional network capital affect the likelihood of female and male directors being on the board of a public corporation. I aim to resolve the two issues by answering the following research questions:

1) How do female and male outside directors of public corporations differ in terms of human capital variables?

2) What is the distribution of female and male outside directors of public corporations in terms of composition of professional networks?

3) What is the distribution of female and male outside directors of public corporations in terms of structure of professional networks?

4) Do human capital variables have different effects on the likelihood of finding women and men on the boards of public corporations?

5) Do network variables have different effects on the likelihood of finding women and men on the boards of public corporations?

6) Does sex moderate the influence of human and professional network capital on the number of directorships after the first appointment?

1.1.4 Methods

The first set of methods pertains to measuring human capital and professional network variables. Human capital variables were captured by extracting and coding information present in the career biographies of directors. To obtain professional network variables, first the networks had to be constructed and then analyzed. After both sets of variables were collected, the data was analyzed for:

(a) differences between female and male directors

(b) inequality in odds of appointment based on the human capital and professional network characteristics of directors

The two groups in the sample are of unequal size and unequal variance. Therefore, non-parametric tests of multiple comparisons - Mann-Whitney U Tests, are applied to test for differences in distribution of the two groups (Bagdonavičius, Kruopis & Nikulin, 2011). To test the inequality hypotheses, I apply Logistic Regression, the method most suitable to when the dependent variable is categorical in nature (Hosmer & Lemeshow, 2000).

1.1.5 Outline of the thesis

I begin with a review of the literature, in Chapter 2, on board composition wherein I will present separately the literature on criteria of board composition and then the characteristics of women on boards. Through this review, I aim to present the juxtaposition of between norms of the social system of corporate directors in contrast to the actions of those who decide the composition of this system.

Structural analysis is not a theoretical lens that has been commonly applied to the study of under-representation of women on boards. Any social system is a composite of its structure and the actions of its constituents. They are in a constant state of reflexivity, thereby evolving as the constituents change norms and practices to meet the future expectations of structure. In the field of corporate governance structures, board composition has evolved from social hegemony to managerial hegemony and possibly moving towards a socialist hegemony. This evolution can be understood both in terms of the expectations of the then incumbent members of the system as well as changing ownership structures of organizations. Similarly, female representation on boards is evolving as a result of external pressures as well as the evolving consumer demographics. Structural analysis is my preferred theoretical framework for this study because allows me to unpack the structural aspects of under-representation of women on corporate boards while allowing me the freedom to apply existing knowledge of socio-psychological process to explain the structure. I will elaborate on the axioms, components and application of structural analysis in Chapter 3.

Chapter 4 is dedicated to describing the research design. The concept of professional networks, the theoretical underpinnings of designing the professional network and its actual construction are explained in this chapter. After which, I will describe the various measures and methods of data analysis.

The results of data analysis will be presented in Chapter 5. I will revisit the theoretical framework of structural analysis described in chapter 3 to discuss the results of statistical analysis in terms of parameters of corporate boards' structure. The parameters will each be discussed with reference to their contribution to the heterogeneity present in the system and inequality of its constituents. The heterogeneity or lack thereof in the system will be analyzed through tests of comparison of the male and female directors in the sample. Logistic regression of the odds of directorship of women, both within their own sub-group as well as relative to the odds of men will provide the data points for discussion of the inequality or otherwise social system of corporate directors.

The conclusive findings of this study are presented in chapter 6. The tests of differences provide evidence of the lack of homogeneity present in the social system of corporate directors. I found that female directors did not differ from male directors along most dimensions of human capital. There were more differences along dimensions of professional networks. The reasons, based on both the nature of professional networks and inferential reasons from existing research on psycho-sociological processes will be discussed in detail. Logistic regression results have indicated that there are differences in preferences of men and women along the dimensions of human capital and professional network variables. Women who are in certain roles and professions have better odds than

those in others and this order is not common to the male directors. This indicates a differential approach to selection of men and women to the board, possibly also acting as the mechanism propagating the under-representation of women on corporate boards.

The findings of this study have implications for two fields – academic research on corporate directors and the process in practice for the selection and appointment of women to corporate boards. These contributions and future directions of my own efforts are explained in Chapter 7. The design and utilization of professional networks in this study are still in its nascent stage. There are further improvements that can be made to the rules of association as well as the type of information that is extracted from these networks.

1.1.5.1 Scope and Assumptions

The sample is drawn from the companies listed in the Standard & Poor 500 index of companies. The Standard & Poor 500 Index comprises 500 companies across all industrial categories. The sample of directors having been drawn from this set of companies increases the external validity of the results.

The sample, however, comprises only those who were appointed to board positions in the companies listed in the Standard & Poor 500 index. Therefore, the results are not indicative of the absolute odds of appointment of women (which could be obtained from a sample containing non-director candidates). The results are indicative of the odds of women relative to those of men, after the decision to appoint a woman has

been made. The odds are therefore differential on the bases of appointment and not the decision to appoint.

It has been assumed in the model that after the decision to appoint a woman to the board has been made, it is largely human capital and professional network variables that affect the decision between a female and male candidate.

1.1.6 Summary

In this chapter, I have laid the foundation for the study of the social structure comprising corporate directors through the theoretical lens of structural analysis. I contend that the system is characterized by homogeneity along the dimensions that are pertinent to the role of corporate director. I also argue that the odds of appointment are uneven along the dimensions of human capital and professional network variables i.e. the variables affect the odds unequally and differentially for men and women. I test for these outcomes with Mann-Whitney U and Chi Square tests of multiple comparisons and Logistic regression of the two groups along the set of variables denoting human capital and professional network. I conclude this chapter by delineating the scope of this study as well as the assumptions made in the research design and data analysis of this study.

CHAPTER 2

2.1 LITERATURE REVIEW

Representation of women on boards, in board-related literature as much as reality, is a relatively recent phenomenon. Possibly the first paper dedicated to understanding the nature of this phenomenon was the study by Harrigan (1981). It was a broad and rudimentary study of the type of industry that was likely to appoint a woman to its board. Since, there have been several studies that have look at various aspects of the presence of women on corporate boards. They could be categorized as empirical studies that investigated the effects of having women on corporate boards and theoretical studies that suggested ways in which the phenomenon could be explored. Among empirical studies, those pertaining to the characteristics of women who got appointed to boards have largely been qualitative.

The nature of this body of research has been determined to some extent by the unavailability of data related to any aspect board formation and functioning. Practically every study, empirical or theoretical comes with this disclaimer. Therefore, most empirical studies have tried to indicate a relationship between board composition – the one aspect of corporate boards that is publicly known and any number of organizational outcomes that can be gleaned from publicly available information regarding organizational performance. Since representation of women on corporate boards cannot be explained by information of this nature, studies attempting to understand the paths of women to the boardroom have mostly been qualitative. However, even these studies are

constrained by access to female directors and are normally based on small samples of women directors.

Among the literature on characteristics of women on corporate boards, the focus has been mainly on human capital variables. From these studies, we know that women have to be younger, more educated, consequently more highly accomplished, presumably relative to their male counterparts. Despite the body of literature spanning four decades, it is still not very clear how the representation of women has remained at less than a fifth of all directors over the period, with a majority of firms still having only a single woman on their board. Among female respondents, a general consensus is that bias precludes more women from obtaining board positions, while male respondents decry the unavailability of women with the experience necessary to make a contribution on the board. Neither of these two claims is easily verified; however we do have some evidence that the reason for paucity of women in the kind of leadership experience that are sought after by boards are the barriers, again pointing to bias, to women reaching such positions in organizations. Therefore, under-representation of women at the top of the organizational hierarchy seems to be caught in a vicious circle of bias and scarcity, wherein one feeds the other.

The question that emerges then is how can we test whether there are such barriers and if so how are they operationalized in organizations. Given the extreme difficulty in being able to access the kind of sample that would be willing to subject themselves into an enquiry of this nature, I resort to an oblique method to try and answer these two questions. Firstly, I will move away from the psychological bases that assume the existence of bias to a structural formulation that examines the structural properties of the

social system that comprises corporate directors. Secondly, I will apply the theoretical framework proposed by Blau (1977) that characterizes a social system in terms of the heterogeneity and inequality present in it. In this manner, I hope to able to show whether these properties of heterogeneity and inequality are manifest in the social structure of corporate directors and if so, how they are operationalized, by examining the distribution of constituents – female and male directors, in terms of their characteristics.

In this section, prior to explaining the study, I will describe the studies that have already shed light on characteristics and experiences of women on boards. I will first describe empirical studies some of which are tangential to the current subject, though still relevant to the topic. Then, I will describe the results of qualitative studies which are more pertinent to the issues that I hope to discuss in this study. Finally, I will present some of the issues highlighted in theoretical papers and the methods proposed by researchers to resolve them with the aim of clarifying the reasons for the methods used in this study.

2.1.1 Empirical studies of women on boards

A survey of empirical studies has to begin with the foundational study by Harrigan (1981). Business press at the time suggested that appointment of women to boards was the result of special concessions (Harris, 1972). At the same time, Schwartz (1980) published her opinion in the Harvard Business Review that women were a resource that should be utilized for improved board performance. She examined the boards of 112 corporations to investigate the type of industry that would be most likely to have women directors and whether they would be inside or outside directors. It was her

finding that smaller firms are likely to women as inside directors and among the larger firms; those with greater visibility were more likely to have women as outside directors. Her results were pertinent firstly, her sample was not the Fortune 500 companies commonly used but it was a geographically restricted sample and as such difficult to generalize. Secondly, being the first of its kind of study, it provided a format for future studies.

This was followed by Elgart's study (1983) of women on the boards of Fortune 500 companies, complementing Harrigan's (1981) earlier study described above. He concluded that the social pressures accompanying size and importance of a company were highly correlated to the presence of a woman on the board. He followed up the census with a survey asking for reasons for absence of women on the board. Of the 126 companies that responded, 43 percent declared that the board was *"already filled with qualified candidates"*, despite 78 percent of those companies having yearly terms for their directors. Another 35 percent of the companies responded with unavailability of suitably qualified candidates. In order to examine this reason, he surveyed 50 companies and found that more than 60 percent of the directors in those companies were not-corporate employees such as lawyers, bankers, educators among others. Thus the second most popular reason was also found baseless, given the number of qualified women practicing in the same professions at the time. It is distressing that forty years hence, we are still hearing similar responses to the question of under-representation of women on corporate boards.

The next study on women directors to make an impact was published by Kesner (1988) wherein she examined the composition of board committees in terms of the characteristics of directors. Though women's participation was among one of the four variables tested by her, from the point of view of studies about women directors, it was an important finding and became the basis for future studies on women's appointment to board committees. Her results pertaining to gender were that women tended to be outside directors, from non-business professions. In terms of committee membership, differences in likelihood for membership existed for nominating and executive committees. It was her contention that this could be artifact of the other characteristics of women directors.

Fryxell and Lerner (1989) investigated female and minority representation in executive and board positions of 113 companies to tests whether there were any significant differences among firms in the representation of the two groups. They found that companies that were larger and spent more on advertising were more likely to have a woman on its board. This finding supports Harrigan's results regarding the size of the company being a factor in determining the representation of women on its board. On the other hand, advertising expenditure unless more qualified, is not readily interpretable as a variable to explain the presence of a woman on the board.

In 1992, Wang and Coffey examined, among other factors, whether proportion of women and minorities on the board was related to the philanthropy efforts of the company. They tested this relationship for 78 of Fortune 500 companies and found that there was a positive relationship between proportion of women and minorities on the board and philanthropic activity, mainly in terms of outlay. However, they found a

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similar positive relationship for the other factor in their study as well, proportion of inside directors. Therefore, it is possibly an effect of board size rather than any one characteristic of the board.

Bilimoria and Piderit (1994) tested the findings of Kesner (1988) but directly for women directors. They examined the odds of committee membership for women in Fortune 300 companies, after controlling for tenure, occupation and external links. They found that men were favored for executive, compensation and finance committees. Women, on the other hand, have an advantage in membership of only public affairs committee. In second order effects, they found that women with non-business interlocks were preferred for audit committee membership and female directors with business experience were more likely to be in finance committees. This study was perhaps the first to consider effects specifically for women directors and the findings were an important step in establishing that the under-representation of women in organizations is systemic.

Bilimoria and Huse (1997) compared the experiences of two women directors each from USA and Norway. The summary of experiences of women directors in USA was that they were both directors of large companies; both had some kind of support from family connections that may have caused the directorship to come their way, directly or indirectly. Other than these two factors, they were very different from each other but their experiences were not that very different. However, their perspective was very different; while one felt that she had to champion the cause of women, the other felt a conflict between the role of a director and a woman. The difference could be attributed to the fact that the first woman was an experienced senior executive who had retired and

therefore did not feel the pressure of having to conform to a career role other than that of a director. The second respondent was younger, heads a family business that could be characterized as masculine (manufacturing), is married but does not have any children yet and was asked to join the board of the bank after her company began a business association with them. Therefore, she was balancing the roles of a director, business owner, customer and the token woman on the board. Both of them felt the need to conform to a masculine ideal of femininity, in order to not appear aggressive or controversial. Though a very small sample, the paper offered a glimpse of the experiences of women on corporate boards and paved for more such studies.

In 1999, Daily, Certo and Dalton reviewed the progress of women into top management positions, including board appointments, over the ten year period from 1987 to 1996. They broadly hypothesized on the increases in representation of women in the roles of CEO, outside director, inside director, non-independent outside directors and women directors in general. They found that the proportional increase of women, in the roles of directors, in general, outside directors and non-independent outside directors specifically, was statistically significant. It should be noted though, that the increase in women directors, in general, did not signify an increase in the number of women per board but the number of women on the boards of Fortune 500 companies. In 1987, about 43 percent of the companies on the Fortune 500 list of companies had female representation on their board. The next statistic presented – that female representation on the boards of Fortune 500 companies was about 81% which could be due to an increase in the number of women on certain boards or increase in the number of companies with a woman or women on its board. The number of women per board had moved from 0.54 to

1.2 in the same period, which was also significant. Taking the preceding two statements together, perhaps we can infer that the number of companies with female representation on its board had increased over the decade or that more companies had more than one woman on its board.

Hillman, Cannella, Jr. and Harris (2002) explored the differences between male directors and directors who were members of two out-groups – women and minorities. In contrast to the study reported above, Hillman, Cannella Jr. and Harris (2002) reported the percent of Fortune 500 companies having at least one woman on its board as 45. Nevertheless, their study tracked the progress of white, male, female and African-American directors of Fortune 1000 companies from the time of their first appointment till 1997. The proposed a new typology for the professional expertise of directors. Senior officers of for-profit firms were categorized as business experts, the professionals in banking, insurance, public relations and marketing were called support specialists and the category of community influentials comprised politicians, academics, clergy, heads of non-profits, social celebrities and others. They found that white, female and African-American directors are both more likely to be support specialists and community influentials rather than business experts. They also found that white, female and African-American directors significantly more educated than white, male directors. They did not find a significant difference in the number of directorships held among the four groups. Their final finding was that African-American females were six time more likely to obtain a second directorship compared to white, male directors. They concluded that this was indicative of the salience of prior board experience and ethnic minority status. The other implication of this result is that the once a member of a minority group obtains

legitimacy through the first directorship, then that reduces the chances for other members of the minority group to obtain such a position; as the legitimized candidate will likely be most preferred to meet the requirement to be fulfilled by their candidacy. On examining the odds of a third directorship, they found that the odds fell dramatically for African-American females, while increasing modestly for while, female and African-American males; nearly equalizing the odds for all three groups to twice that of a white male director. To summarize, the finding really tells us that for white, males there is greater likelihood of increase in the numbers of white males in board positions, whereas for minority group members, the likelihood is greater that the same population will be given more opportunity in corporate boards. This finding confirms, though only inferentially, mechanisms against increasing representation of minority group members on corporate boards in terms of total numbers of each group.

Williams (2003) set out to test the results of Wang and Coffey (1992) if the independent variable was changed to proportion of women directors rather than the outside director ratio used in the earlier study. They also redefined the outcome variable to signify the type of philanthropic giving – education, community service, arts and culture and public policy. Based on a sample of 185 companies from the Fortune 500 list of companies, they found support for the positive relation between proportion of women on the board and philanthropic giving. However, in terms of specific activities that were contributed to, a significant relationship was found only for community services and arts. Once again, though a correlation was established, causality is unknown. Even correlation is only partially established; unless the data is compared to a similar sample containing only male directors is also tested as a control group.

Studies thus far had largely focused on outside directors as the population of interest or in some cases, this distinction was not specified. In 2004, Zelechowski and Bilimoria studied a sample of inside directors to examine whether there were differences between female and male inside directors. Their sample consisted of 40 women directors from 36 companies in the Fortune 1000 list of companies that had at least one woman inside director on its board and 60 men inside directors drawn at random from among those companies that had no women inside directors on its board. Among their findings were that nearly 90 percent of male inside directors were in top 1 percent range of compensation while only 40 percent of women featured in the list of top earners. Women inside directors were also found to be from lower ranks in the organizational hierarchy and support functions. They contended that the implication was that women were not provided the support or equivalent status despite having equivalent company and board tenure as their male counterparts, that would enable them to occupy the position of a chief executive and this was a systemic process by which the leadership pipeline is largely devoid of female presence.

Farrell and Hersch (2005) examined the impact of proportion of women in an incumbent board on the additions to the board. They collected board composition data for companies in the Fortune 500 and Service 500 lists for a period of ten years from 1990 to 1999 to track the changes in composition. They found that addition of a female outside director was significantly related to the departure of another director, whether female or male; however, the effect does not hold for departure of inside directors. On further analysis, they were able to qualify this effect to find that the likelihood of the addition of a female director is stronger when the departing director is also female. When the

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departing director is male, the chances of an addition being a woman is only slightly more than in the case of no departure, which was 10 percent. In contrast, likelihood of addition of a male outside director in the event of no departures is 43 percent, which increases to almost 50 percent in the event of a female departure and 60 percent in the event of the departing director being male.

In 2006, Westphal and Stern studied whether ingratiatory behaviors by minority group members, who also did not possess elitist educational credentials, increased the likelihood of sponsorship by their CEO to a board appointment in an organization that the CEO had influence, either directly through a board appointment or indirectly through interlocks. They found a significant effect for minority status at low levels of ingratiation. Therefore, at lower levels of ingratiatory behavior, the fact of minority status, along with non-elitist educational credentials influenced the likelihood of sponsorship by the CEO; however at higher levels, these other characteristics were rendered insignificant by the dyadic relationship. The implication strongly supports the importance of ingratiatory behavior, particularly in the event of other qualifications being unlikely to support a candidacy. However, for women, this is a double edged sword, as we have evidence from network studies that women prefer to network among colleagues and for social support rather than instrumental outcomes (Brass, 1985; Ibarra, 1992; McPherson, Smith-Lovin and Cook, 2001). The literature on ingratiation also finds that men and women employ different approaches to create favorable impressions, vary in the frequency with which they employ ingratiation tactics and the outcomes for which they aim (Guadagno and Cialdini, 2007; See Smith, Watkins, Burke, Christian, Smith, Hall and Simms, 2013 for a meta analysis). Therefore, this finding of the importance of ingratiation in overcoming

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the disadvantage of a minority group membership is an important step in developing a complete understanding of the ways in which barriers to the advancement of women in organizations is operationalized.

They followed this study with another in 2007, where they tested for the effects of ingratiation on additional board appointments. But in this study, unlike the previous, they included a board performance variable in the relationship between ingratiation and additional board appointments. Gender and minority ethnicity status were hypothesized to negatively impact the effect of board performance on additional board appointments. To recapitulate, in the previous study the researchers hypothesized that minority status, both in terms of gender and ethnicity, and non-elite educational credentials can be compensated for by using ingratiatory behavior towards CEOs, to obtain an external board appointment. In this (2007) study, they found that minority status did negatively affect the relationship between board performance and additional external board appointments. This second set of results indicates that (a) ingratiation can lead to access (b) ingratiation does not result in acceptance as indicated by the pejorative effects of performance on additional board appointments for women and ethnic minority group members. Together, these studies indicated the behavior by which discrimination is practiced in boardrooms.

Hillman, Shropshire and Cannella Jr. (2007) replicated, with extensions, the study by Harrigan to identify the organizational predictors of female representation on their boards. In addition to the size and industry type examined by Harrigan, they also tested for effect of diversification strategy and interlocks with companies that had women on

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their boards. Their sample consisted of 1000 companies, largest in terms of size, between the years 1990 and 2003. They found support for all effects except for diversification strategy. The outcome of greatest interest was the strong effect they found for positive association with interlocks with companies that had women on their boards. The implication, though not directly is for (a) inclusion of females on the board as an imitation effect rather than an attempt at diversification (b) the value of ratification or legitimization (Burt, 2000) of female directorship before it is normatively acceptable. In the same year, Peterson and Philpot replicated the study by Bilimoria and Piderit (1994) testing for the effect of director characteristics of female and male directors on committee membership. They found that women were significantly younger and consequently had shorter career tenure than men. With regard to committee appointments, they found that, in general, women are more likely to be appointed to public affairs than any of the executive committees. Thus, they found that the results of Bilimoria and Piderit (1994) still held good after more than ten years.

Miller and Triana (2009) explored the relationship between board diversity, in terms of race and gender and firm performance. They contended that the effect will be mediated by the reputation and innovation. The contention is based on some evidence that board diversity is related to firm innovation, which has been found to be positively associated with firm performance. Similarly, board diversity, they contend, signals the firm's commitment meeting the diversity present in its markets, which helps to enhance its reputation relative to companies with less diverse governance bodies in the market. Thus, they hypothesized that diversity, through innovation and reputation (separately) impact firm performance positively. They controlled for several firm level features - size,

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liquidity, diversification in products and geography and finally, industry. Their results indicated that gender diversity was not significantly related to firm performance. Since this direct relationship was not found, the mediating effects are no longer a matter for consideration. Thus, this study provided evidence that gender diversity in the board, after controlling for firm size, liquidity and other forms of diversification in the firm, did not impact firm performance. This finding was later, both, supported (Carter, Simkins and Simpson, 2003) and not supported (Adams and Ferreira, 2009) by researchers, leading to an, as yet, unresolved question.

Bear, Rahman and Post (2010) again tested for the effect of board diversity, in terms of both function and gender, on performance of corporate social responsibility and the resulting effect on firm reputation. Functional diversity was defined on the basis of Hillman et. al's (2000) class of directors. They found the relationship to hold true for gender diversity of the board but not for functional diversity. Post-hoc analysis however revealed that the positive relationship between percentage of women on the board and CSR ratings was supported only for institutional strength, which pertains to philanthropic activity; and not technical strength rating, which corresponds with the company's ability to meet stakeholder expectations. The implication of this could be construed as either that women are able to contribute only on issues of corporate social responsibility, in keeping with the social role construction, or that their contribution is restricted to this area.

All the studies thus far have tested for effects of individual variables, in some instances controlling for organizational level variables like industry. The literature was supplemented by the study by Grosvold and Brammer (2011) who researched the effects

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of country-level institutional variables for their impact on female representation on corporate boards. They operationalized country-level variables as the degree of market co-ordination to create a binary variable with coordinated market economy and liberal market economy as categories. Another variable that is homologous with the character of market economy is the National Business System perspective. NBS is a more refined variable while the national economic system defined previously is broader in its definition. According to the national business system approach, a country can be classified as fragmented, coordinated, compartmentalized, regulated, collaborative and highly coordinated. The categories are based on the degree of interaction between the various business and state systems. The legal system of the country was also included due to its impact on labor regulations and market activities. The legal system was coded by its origin as English, German, French and Scandinavian. Nation-wide governance systems were classified by region as Japanese, German, Latin and Anglo-Saxon. This classification was based on the study by Weimar and Papi (1999, c.f., Grosvold and Brammer, 2011) who defined these categories to reflect the importance of market equity to the national economy, legal concept of the firm, normative board system, norms of market influence in corporate control, concentration of corporate ownership and the link between performance and pay in the economy. The influence of culture was operationalized on the characteristics prevalent in the four geographic regions identified previously. Thus, for culture, gender differentiation, assertiveness, uncertainty avoidance and power distance was specified by categories of Latin, Germanic, Nordic European, Eastern European, Anglo and Asian clusters. The final sample consisted of 38 countries and the period of study was 2001-2007. The results found significant positive effects, on

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female representation on corporate boards, of British and Scandinavian legal systems, Anglo, Nordic European, Eastern European and Sub-Saharan cultures. Negative effects were found for Latin and Japanese legal systems and among national business systems for coordinated and highly-coordinated systems. This study was important in firstly, establishing the importance of national systems in affecting female representation on corporate boards and secondly in identifying which of the several national characteristics have significant and substantial effects. Contrary to expectation, highly regulated national business cultures do not have a higher degree of female representation. This result along with previous results about higher female representation being positively associated with the visibility of the organization has implications for the bases on which female director appointment is being carried out. If the necessity for organizational signaling is a significant and substantial predictor of female representation on boards, then the suitability of female directors for the role may be a secondary consideration, rendering the results based on resource dependence and merit rather weak.

The final study in this section is by McDonald and Westphal (2013) testing whether extent of mentoring affects the opportunities for multiple directorships for women and members of minority ethnicities. They hypothesized that women and minority directors will receive less process mentoring than others but, that this degree will be moderated by the existence of another woman or minority director on the board. Finally they hypothesized that women and minority directors will receive fewer additional board appointments due to the lower levels of process mentoring. After controlling for social interaction among directors, elite social status, board independence (as indicated by chairperson-CEO duality, average director tenure, proportion of outside

directors and director stock ownership), they found for both effects of low level of process mentoring and for the presence of similar other directors on the board, They also found for the effect of both on the number of additional board appointments received by women and minority group members. This study, along with the previous two studies by the researchers, provides ample evidence of out-group bias practiced on boards. However, the evidence all points to individual-based biases and actions. Whether this can be generalized over all individuals is a matter for speculation. Secondly, it is still unclear whether this is even situated in the individual or the structure of the social system that is occupied by corporate directors. That is, are some directors compelled to enact these behaviors that are made normative by the structure of the social system? In other words, is the structure of the social system, comprising corporate directors, instrumental in the pervasive bias perpetrated against women and members of other minority groups?

2.1.2 Summary

Therefore, pertaining to this aspect of board composition, from the studies outlined above, it is evident that women are more likely to be found in large firms, with greater visibility, from non-business professions and most likely a replacement for another woman in the board or an increase in the board size. I also presented some evidence for relationships between gender diversity on the board and various firm outcomes like innovation, performance, corporate social responsibility and reputation. Given that the relationship between board composition and firm performance is yet to be firmly established, all results pertaining to gender composition of boards and firm outcomes are tenuous at best.

CHAPTER 3

3.1 THEORETICAL FRAMING

3.1.1 Applicability of structural analysis

Two facts have primarily been the foundations of this study: the persistent under-representation of women on corporate boards, particularly in the last decade and a gap in our understanding of how this situation has managed to persist. Much of the literature suggests that it is a manifestation of the bias against women in top management positions. The opinion of the men, which has more often been sought in popular press rather than academic literature, is that there are not enough meritorious women available to occupy such positions (Elgart, 1983; Groysberg & Bell 2013). A few studies have investigated the issue of availability of qualified women but without conclusive evidence. Such studies have indicated a steady attrition of women, disproportionate to that of women on the slope of organizational hierarchy. In other words, while there is near equal representation of women at the lower rungs of organizations, by middle management levels less than half the women are no longer participants resulting in only a fourth of middle management being female. At the top levels, this ratio recedes to single digit proportions. There is some claim among the studies that this is due to women opting out of careers to focus on family. On the other hand, there is also evidence that the reason women opt out of corporations is the lack of upward mobility in their career. Hence, we see from a psychological perspective, the issue may have been reduced to an ideological duel. Neither bias nor availability is likely to be solely responsible for the situation, but most likely both of them contribute to it. In order to better understand the situation, I

decided to change the perspective and consider the situation from another theoretical vantage. Structural analysis as proposed by Peter Blau (1977), offers the means by which to analyze a social structure in terms of its constituents. The focus of structural analysis is patterns of distribution of the constituents of a social structure[1] and the implications of the nature of distribution. Blau proposed (1970, 1972) that the distribution of constituents in a system can be evaluated along two axes – differentiation and equality. The degree of differentiation in a social system is indicative of the openness of the system to accept variance in its constituents. Extent of equality is as the name implies. The pertinence of this theoretical foundation with respect to female representation on corporate boards lies in our interest to understand the source and basis of the persistence of the state of under-representation. By applying this theoretical frame, I intend to complement the existing body of literature situated in psychological and micro-sociological theories.

3.1.2 Structural Analysis

In his book (1977) Blau codified structural analysis, based on his research on the structural configuration of organizations and its impact on several characteristics of those organizations. In it, he defined the concepts of structure and its elements. He also defined the axes of examination of organizational structures as inequality and heterogeneity. A structure was defined as a "multidimensional space of different social positions among which a population is distributed" (Blau, 1977; pg. 4). The idea behind structural analysis being that a social system can be defined in terms the heterogeneity and inequality in its

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[1] The two terms – structure and system appear to be used synonymously throughout this field of research. It could imply a differentiating factor usefully if one were studying a community in terms of its boundaries and their permeability. As it pertains to the current study, they are used interchangeably and refer to a body of people functioning in a particular occupation – independent board members of public companies

constituent groups. In order to make such a characterization of a social system, first its elements have to be identified and defined. The elements of a social structure are called its parameters as they define its limits and form its axes. Parameters are of two types – graduated and nominal. Graduated parameters are those characteristics of social structure that can be quantified and where one value can be said to be lower or higher than the other. Age, income, educational qualifications are all examples of graduated parameters as they differentiate among constituents in a rank order. Nominal parameters form the other axis because they divide the constituents into distinctive sub-groups based on their characteristics, which cannot be quantified. Race, religion, sex are characteristics that can be used as nominal parameters because they cannot be put into a rank order.

By defining the constituents of a social system in terms of nominal and graduated parameters, the system can be described as a distribution of such constituents in terms the heterogeneity and inequality inherent in the structure of the social system. Consider a social system that is homogeneous in that its constituents are all of one type. The implication of a homogeneous system is that its constituents lack opportunities to become heterogeneous or they create barriers to the intrusion of constituents of another kind or constituents of another kind may construe this homogeneity as a barrier. Similarly, in a heterogeneous social system, all of these consequences can be enacted in any number of ways depending on the distribution. Along the other axis, delineating the distribution of constituents in terms of nominal parameters is inequality. Inequality essentially is an indicator of the concentration or absence any particular variable among the constituents described as unequal. Wealth, for instance, creates inequality by its presence in one group and absence in another. Age is another graduated parameter that makes more sense as a

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marker of inequality when one puts it in a context. For example, in the context of leadership positions, age is seen as an advantage whereas in the context of studentship, it can be considered a barrier. While on the one hand inequality is indicative of resource distribution, on the other hand it creates impetus for mobility; in cases where it can be attained. To give an example, wealth while creating inequality is also of aspirational value; not being in the possession of wealth creates impetus to acquire it. In this manner, structural analysis of a social system in terms of the graduated and nominal parameters of its constituents along the axes of heterogeneity and inequality can lead to identification of the source of such characteristics of the social system.

Heterogeneity and inequality or otherwise in a social system, as suggested by this macro-sociological theory, is the result of the extent to which graduated and nominal parameters characterize the elements of the social system (Blau, 1977). Heterogeneity is created by the existence and association among constituents of various kinds, by the salience of an attribute that is common to all constituents. To illustrate, consider a group of friends that comprises several races and religions; here age and interests become more salient than the differentiating variables of race and religion. In this case, it can be said that age is applied as a universalistic characteristic on the decision to include a person into the group. Now, suppose that the group decides to not allow people of a certain category of wealth into the group even if they meet the age criterion; then that category of wealth becomes a particularistic variable. In this manner, universal and particularistic application of various criteria results in social systems that are characterized by degree of heterogeneity and inequality or the lack thereof.

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In substantive terms, this thesis is a structural perspective of the nature of the corporate board population in USA. I forward firstly, an analysis of the heterogeneity or lack of it present in corporate boardrooms in the country. The constituents of heterogeneity are both human capital and professional network variables and the groups of alignment are the two sexes. The second part of the thesis is an analysis of the effects of both human capital and professional network variables on the odds of appointment of women, relative to the odds of men being appointed to the board. From the population distribution, it is obvious that the odds of women being appointed to a board are far lower than those of men. But, we are not as well aware of the factors that shape these odds and the extent of their effect.

3.2 HYPOTHESES DEVELOPMENT

3.2.1 Graduated Parameters

Age

Age of professionals is often associated with expertise derived from experience. In the case of board members, whose role is advisory, greater experience is associated with greater breadth or depth of knowledge depending on the type of experience they bring to the role. A consistent finding of a universalistic characteristic for board membership is CEO experience. CEO positions are the culmination of a corporate career and the likelihood of becoming a CEO is strongly correlated with chronological age. Therefore, attainment of CEO-ship at a young age has a greater impact on the professional reputation of a professional than doing so at the median age. Literature on

demographic characteristics of female directors has consistently found them to be younger than male board members (Simpson, Carter & D'Souza, 2010). As such, age then becomes a particularistic requirement from being applied differently to men and women. To elaborate, if being a CEO is a universalistic requirement for directorship and if age is a factor in the attainment of such position; then evidence that women on boards tend to be younger points to the requirement that only women who become CEOs at a younger age than men find a place on the boards of public corporations.

Hypothesis 1a: Age of female directors will be significantly lower from that of male directors

Hypothesis 1b: Likelihood of board membership for women will be negatively impacted by their age, relative to the likelihood for men

Prior private company board experience

Women in private companies are difficult to enumerate as private companies do not need to share much of the information that is needed of public companies. Nonetheless, inferentially, given the number of women in management occupations and proportion in public companies; it is reasonable to say that have substantial representation in the private sector of business[2]. There is some evidence for the movement of women from public companies into the private sector by way of entrepreneurship (Daily & Certo, 1999; Bilimoria, 2000). The second consideration is for the fact that organizational

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[2] According to data as in 2010, collected by the Bureau of Labor Statistics, there are 2,512,000 employees in 'Chief
Executive' and 'General and Operations Manager' positions. Of these, approximately 27%, which translates to 678,240, are women. It is therefore, not unreasonable to assume that a substantial proportion of these women are employed in the private sector.

leadership is one of the prerequisites of board membership. It is now established that such experience is not commonly available to women in public corporations. Hence, it is very likely that women seek such positions in private companies, which are less affected by public perceptions of female leadership (Roth, 2004). To sum, women by virtue of having had to accumulate leadership credit, are more likely to have sought such leadership positions in private corporations. As such, women are more likely to have leadership experience in private companies than men.

> *Hypothesis 2a: Female directors will have significantly more prior private company board experience than male directors*

Private companies vary greatly from public companies in their orientation to strategy and regulation (Boot, Gopalan & Thakor, 2006). In that sense, in terms of professional experience, private company board experience will wield considerably lower leverage than CEOs of public corporations. The role of private-company CEOs being protected from the vagaries of the stock market and stakeholders, their experience is reasonably attributed with less value than that of public-company CEOs. In addition, the presence of private-company CEOs in the network offers another criterion of otherness of such women, based on the type of their professional experience. This is particularly true for women, as such alters will most likely strengthen the existing perception of "otherness" of women. The presence of CEOs of private companies will also indicate an indoctrination of a different kind to that found valuable in public companies, which is likely to strengthen the perception of unsuitability of such women for board membership in public corporations.

Hypothesis 2b: Likelihood of board membership for female directors will be negatively impacted by prior private company board experience, relative to the likelihood for men

Board membership, anecdotal evidence will have us convinced, is a function of whom you know. Mills (1956) found evidence of it in letters written by Mr. Alfred Sloan, the Chairman of the board of General Motors Corporation, endorsing directorial candidates on the basis of their networks. Mace (1971) similarly found that one of the informal practices in director selection is the influence of the CEO, which more often than not is the nomination for board membership of someone from the CEO's network. For men, invitations to the board have been known to originate in other associations, often social such as at college and/or through professional associations such as government committees (Useem, 1984; Useem & Karabel, 1986). Lorsch (1989) described the pathways of networks that lead to directorships which generally are through the networks of CEOs. As recently as 2009, Hwang and Kim (2009) found that over 40% of the directors in their sample of over 1500 directors, had third party connections to the CEO, and they were not even examining the networks per se. The above corroborate the importance of networks in obtaining directorships – for men. None of the studies cited above make particular reference to women directors.

This preference for someone from within one's own network has two explanations. One, it is an uncertainty reduction mechanism. A known person is also, to that extent, predictable. Belonging to one's society means that socialization into the norms has taken place. In other words, a person from one's own network is comfortably

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like one's own self and therefore carries minimal risk (Baron & Pfeffer, 1994; Westphal & Milton, 2000). Such homo-social reproduction is deemed particularly reasonable in light of the responsibilities and authority distribution between the board and CEO (Mintz & Schwartz, 1985). Evidence of this is present in the studies of board-related organizational outcomes such as in the situations of mergers and/or acquisitions (Kosnik, 1990; Carpenter & Westphal, 2001) and CEO-related outcomes such as executive compensation and CEO tenure (Hallock, 1997; Khatri, Tsang & Begley, 2006). In addition, restricting the source of directors to the collective networks of board members and CEO reduces the potential transaction cost of search and verification of a candidate outside the network (Williamson & Cable, 2003).

To sum, perceived benefits of homosocial reproduction in board membership are reduced uncertainty about the contribution of the new member on the functioning of the board and lower transaction cost incurred in process of director selection. There is little empirical support of the hypotheses cited above for the case of women candidates or board members. It is my expectation that women belonging to the out-group will cause this cost to be perceived as greater for women director candidates than for men. The reason can indirectly be explained by the findings of Boeker and Goodstein (1991) that a change in board composition (which is currently dominated by the social category of Caucasian males) is considered only in the presence of external pressure, even this moderated by the performance of the existing board. Therefore, the current state of marginal representation of women in over ninety percent of corporate boards is explained by the strong preference for homosocial reproduction and absence of internal motivation to change; both of which are extremely difficult to study.

Therefore, there is as yet not much evidence for the role of women's social capital on the probability of their being invited to a corporate board. In a qualitative study of comparison of women on corporate boards in Norway and the US, Bilimoria and Huse (1997) found that three of the four interviewees cited networks as a means to get past the glass ceiling. They found that networks served to make them more visible as eligible and available candidates and signaled their interests and competencies to the small world that is top management (Sheridan, 2002; Singh & Vinnicombe, 2004). There is similar evidence for the role of networks in getting those who belong to racial minority on corporate boards (Westphal & Milton, 2000). Therefore, there is support for the thesis that networks act as signals of acceptability in general (Coleman, 1988) and particularly so for those trying to transcend psycho-social barriers surmounted against those who do not belong to the in-group. The difference, I expect, will lie in the extent to which networks play a role in the odds of minority groups (women, in this study) ascending to directorships, relative to the majority (men). Therefore, I will examine the influence of network composition and structure alone and in conjunction with human capital measures, on the odds of women being directors on boards of public corporations, relative to men.

CEO alters

There is substantial evidence of the role played by the CEO in nomination and selection of independent directors (Lorsch, 1989; Westphal & Zajac, 1995). Given the influence of the CEO on board invitations, whether direct or indirect (Shivdasani &

Yermack, 1999), having CEOs in their network will facilitate board membership being acquired by or bestowed upon women in organizations.

Women belong to a lower status group in organizations, according to social identity and categorization theories (Ridgeway, 1993; Roth, 2004; Wharton, 2005), increasingly more due to occupational segregation than being the demographic minority (Lyness & Thompson, 2000). Occupational segregation also means that women are considered unqualified for top positions due to lack of experience in the core functions of the organization. In order to access higher positions, women need sponsors from among higher status groups in their network (Lin & Dumin, 1986; O'Neil, Hopkins & Bilimoria, 2008). For women who are already in top management positions, as is considered essential to be considered for board membership, such alters can only be CEOs and other board members.

Hypothesis 3a: Professional networks of female directors will comprise significantly more CEO alters than those of male directors

Hypothesis 3b: Likelihood of board membership for women will be positively impacted by the number of CEOs alters in the professional network relative to the likelihood for men

Power

In a very comprehensive study of the relationship between power and gender in organizations, Ragins & Sundtrom (1989) found that the power quotient of women in organizations is affected by their career trajectory, functional position and hierarchical

position. They also noted that the sources of power for men differ from those for women. Though not a network study, it still brought to light the different sources and effects of power for women, relative to that for men. Their conclusion was that women tend to be in functions that are less critical to organizational performance, unable to translate career movements into accumulation of power and since they begin with less power, being the outsider in the group, the growth in power is not commensurate with career advancement, relative to that of men. These results were supported in the study reported by Ibarra (1992), where she examined network relations within an organization. Though less generalizable; the result was nonetheless one of the first for women in network studies. Scott (1996) in an assessment of the networks of women working in the area of corporate-government relations found support for another of Ibarra's results that women are more likely to have instrumental (exchange-based) and expressive (support-based) ties with those at the same or lower level and more expressive ties with those at higher levels. She also found that they had fewer ties (even though only expressive) to superiors than colleagues or subordinates. Burt (2000) was a very in-depth look at the networks of women in one organization. He found that women tend to have fewer male superiors but the ones that they do have a tie with also act as legitimizing influences in their careers. Therefore, for women, utilitarian power is situated more in lower ranks and in their ties to those in higher ranks, they have more power by proxy, they are not in a position to leverage such power due to being in a less advantageous position themselves.

Hypothesis 4.1a: Women directors will have a higher coefficient of power in the professional network than men

Hypothesis 4.2a: Women directors will have a lower coefficient of power in the leader network than men

Hypothesis 4.1b: Likelihood of board membership for women will be positively impacted by their power in the professional network relative to the likelihood for men

Hypothesis 4.2b: Likelihood of board membership for women will be negatively impacted by their power in the leader network relative to the likelihood for men

Cohesion

Cohesion signifies the advantage of trust, through redundancy. Networks with more dense connectivity advantage members of the network in two ways. Being a close-knit network, there are established norms of conduct and sanctions for non-conformance (Coleman, 1988). This builds trust within the network, which is essential both in situations that are sensitive to environmental stress (Krackhardt, 1992) and as a signal regarding its members (Nahapiet & Ghoshal, 1998). Secondly, for minority group members, densely connected networks provide for multiple endorsements and validations.

For women, particularly, there are certain structural antecedents to a more closely connected network. It is known that women reach the top echelons of the organization by moving laterally up the ladder. As a result, professional networks of women run the risk of becoming disjointed and structurally weak. But the closer they get to the top, that much greater is the need for strong endorsers and supporters. On the other hand, women

tend to have sponsors in their rise to the top. Confusing as it may seem, the two network characteristics of constraint and cohesion, act as the push and pull effects on women's rise to the top; contrary to the effect on men. To sum, as hypothesized earlier; constraint has a negative impact and a densely connected network will positively impact the odds of women getting into corporate boards.

Hypothesis 5a: Leader networks of female directors will be less cohesive than those of male directors

Hypothesis 5b: Likelihood of board membership for women will be negatively impacted by the cohesion in the professional network relative to the likelihood for men

Centrality

One who occupies the central position is perceived to be more effective, leader-like and resourceful (Freeman, 1977). This was demonstrated when it was found that while centrality was highly associated with influence, its effect was marginal relative to actual position, rank and status (Sparrowe, Liden, Wayne, & Kraimer, 2001). A resource is not evenly spread in organizations nor is the distribution static (Tsai, 2001). A person who is in a position of control may be moved into a position that does not provide the same degree of access to resources. Therefore, a person who is situated on many paths is relatively less affected by such distribution and movements. Betweenness centrality also provides benefits of visibility because regardless of the strength and nature of tie, being in the same path ensures that one is visible rather than peripheral (Freeman, 1979). A

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corollary to betweenness centrality is the personal nature of antecedents to holding that position. For a person to hold a position in the paths of alters, he or she must make an investment in maintaining the relationship. Mehra and colleagues (2001) found that high self-monitors tend to occupy more central positions that low self-monitors. Another way of looking at this is that people who hold central positions are perceived to be more influential due to their position in several paths.

For women directors, betweenness centrality can be indicative of access to and influence in groups that invariably include the high-status men in the organization. In a study on performance effects of network correlates, Cross and Cumming (2004) found that betweenness centrality significantly influenced performance due to the access to information and types of information available to those who occupy more between positions in work groups. Though not a central finding, in the same study strong correlation between gender and betweenness centrality in the information network is evident. Therefore, we see the advantages to betweenness centrality and the relative opportunities for women to occupy such positions.

Hypothesis 6.1a: Position of female directors will be more central in their professional networks than that of male directors

Hypothesis 6.2a: Position of female directors will be less central in their leader networks than that of male directors

Hypothesis 6.1b: Likelihood of board membership for women will be positively impacted by their betweenness centrality in the collegial network relative to the likelihood for men

Hypothesis 6.2b: Likelihood of board membership for women will be negatively impacted by their degree centrality in the leader network relative to the likelihood for men

3.2.2 Nominal Parameters

Nominal parameters, as they pertain to professionals are mostly those that are commonly known as human capital variables. Human capital variables have been defined in literature as age, education and professional experience (Ayella & Williamson, 1976; Hull & Nelson, 2000). It signifies the quantity and quality of human capital variables indicate the breadth and depth of resources professionals bring to their position in organizational roles (Payne, Benson & Finegold, 2009). In the context of directors on boards of public corporations, professional experience is of particular importance given their advisory role on the spectrum of issues brought to discussion in boardrooms.

Education

The role of directors being mainly advisory; educational qualifications beyond the general requirement of a college degree (with the exception of the financial expert on audit committees) have not been the focus of empirical studies on the characteristics of directors. Educational qualifications of directors has been empirically examined most thoroughly by Useem and Karabel (1986) who found that the largest proportion of

directors hold a graduate degree either in management or law, followed by holder of undergraduate degrees, non-graduates comprising less than 20% of the sample. For effects of educational qualification, they found that holding an undergraduate degree from an ivy-league institution reduced the impact of an MBA; however for those holding an undergraduate degree from a non-ivy-league college, an MBA from an ivy-league college significantly improved their odds of becoming a CEO and holding multiple directorships. They did find an interaction effect between age and educational qualification i.e. those who held only undergraduate degrees were older by the time they became CEOs as opposed to those who obtained an MBA.

With respect to women, gender-comparative studies have consistently found that women who reach top management positions tend to possess on an average higher educational qualifications than men. However, this could also be an artifact of the source of women directors, which tends to be non-business organizations (Simpson, Carter & D'Souza, 2010). However, it is unlikely to a criterion for inclusion in the board. It is my contention that while women directors will be significantly higher educated than male directors; the effect of educational qualification of odds of obtaining a directorship will not be significant.

Hypothesis 7a: Level of education of female directors will be significantly higher than that of male directors

Hypothesis 7b: Likelihood of board membership for women will be positively impacted by their educational qualification

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Profession

According to resource dependence theory, the advisory role of directors requires them to be informed on a wide variety of issues pertaining to the specifics of general operation of the business as well as industry. Historically, due to the paucity of women in leadership positions of business organizations; boards resorted to non-business organization such as not-for-profit and educational institutions to source female directors (Branson, 2007). Till date, women directors have been found to be drawn more often from non-business professions such as academia, law and politics. Even within business professions, there is a significant degree of differentiation in the professional background of men and women – within women coming from service industries and support functions rather than manufacturing industries or line functions (Singh, Terjesen & Vinnicombe, 2008; Simpson, Carter & D'Souza, 2010).

Homosocial reproduction predicates that extant boards will attempt to recruit those candidates who are most similar to them. Social categorization theory indicates that when forced to include out-group members, those most unlike the in-group members will be chosen to maintain the differentiation as well as dominance of the in-group members. Research has shown that boards tend to accept the need to create gender diversity on boards largely as a result of external pressure from influential stakeholders. Taking these two conditions into consideration, it is reasonable to expect that while boards will apply universalistic characteristics in the selection of women to the board, they will categorize those universalistic norms along particularistic lines in order to maintain their minority status on the board (Knottnerus, 1997). For instance, while they will apply the

universalistic norm of leadership experience; they will tend to focus on such experience in non-business contexts or support functions. Thus, they meet universalistic norms of director selection while still maintaining a degree of homosocial reproduction through the application of particularistic standards.

> *Hypothesis 8a: Female directors will tend to practice in non-line professions in greater numbers than male directors*

> *Hypothesis 8b: Likelihood of board membership for women will be positively impacted by their experience in non-line functions, relative to the likelihood for men*

Role

Most previous studies have incorporated some aspect of profession in their studies (Hillman, Cannella Jr. and Paetzold, 2000); role categories have been absent from among human capital variables. It is known the leadership experience is desirable in directors, in general; as such it is taken as a given in most studies. In order to test whether this holds true for women, given that there are so few women who actually hold CEO positions in public corporations, I coded for the role occupied by the directors in the sample. In light of the scarcity of women in CEO positions, I contend that women will occupy leadership roles that are not that of a CEO. Therefore, there are likely to be more women in non-CEO leadership roles than men. However, I also believe that it is likely to be a negative influence on their likelihood for board appointment, when compared with the effect that role will have on the likelihood for men.

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Hypothesis 9a: Female directors will tend to occupy non-CEO roles in greater numbers than male directors

Hypothesis 9b: Likelihood of board membership for women will be negatively impacted by their occupation of non-CEO roles, relative to the likelihood for men

CHAPTER 4

4.1 RESEARCH DESIGN

The first objective of this study was to examine the differences present in the sample of directors. Such differences can be inferred to indicate the propensity to create heterogeneity in boards through director appointments. The second objective was to study the differences in the factors that influence the appointment of men and women to boards of public corporations.

Board members, as a population of study, are notoriously difficult to access. Further, my interest was in the structural, rather than psycho-social aspects of women's appointment on boards. The choice of public company boards was inevitable, the entire study being contingent on publicly available information. Therefore, the combination of my desire to study the structural aspects of women's appointment to boards and the availability of information made it a study of archival data. My interest in the criteria of appointment as applied to men and women resulted in the choice of a cross-sectional design. Hence, data was collected as at the time of appointment to the board of a public corporation.

In this study, the dependent variable is the sex of the appointed director and the sample is drawn from among directors appointed to boards. On the surface, it appears to suffer severely from the sampling bias and the cardinal sin of sampling on the dependent variable. The fact is that the sample has been based on the dependent variable. However, there is strong justification for it. Firstly, sampling has been designed as if for a case-control study. For every woman in the sample, I have also sampled men who were appointed at the same time, making them control observations. Secondly, given the rarity

of the event (being 4% of the population makes the appointment of women to boards a statistical rarity), the sample comprises disproportionately larger number of women, to counter the effect of biasing the slope coefficient (Forgues, 2012). As a result of the case control design of sampling and categorical nature of the dependent variable, logistic regression was the most suitable method of data analysis.

4.1.1 Data source

Data was sourced from a commercial organization called Boardex, an information processing company that collates information on boards of corporations listed on stock exchanges all over the world. As per Boardex, information is collected from numerous public sources such as legal filings, social registers and company announcements. In view of the number of sources and sheer labor/technology mobilization involved in collating this data, makes such organizations a valid source of raw data. Previously and in fields of study like finance and strategy, data sourced from organizations like Compustat, Bloomberg has been used. Data from Boardex is more conducive to network studies due to the nature of data, professional histories, which can be converted into networks such as the one employed in this study. For every individual in their database, all her/his known professional connections are also listed. Naturally, only those connections are listed on whom information is publicly accessible; predominantly associates in other public corporations. Therefore, this aspect of the data was taken into consideration at the time of sampling.

4.1.2 Sample selection

A popular choice for sampling directors is the Fortune set of companies. Quite a large proportion of studies on board members have samples drawn from this set because

of the availability of information. However, Boardex did not have this choice and at that point in time, I was not entirely confident that it would make a good choice set. The set of companies that comprise the Fortune set are highly homogenous, being selected into that set on the basis of some metric of size. Fortunately, Boardex had the choice of Standard & Poor 500, which is a more varied range of companies. The sample is selected entirely from companies listed in the Standard & Poor 500 set of companies.

Representation of cases of interest in the population is a major issue in social science research, particularly pertaining to minority communities. In the face of overwhelming numbers of one category and the opposite for another, the population is sampled in such as way as to minimize the impact of the imbalance. In practice, this takes the form of sampling a disproportionate number of the under-represented category and equal or a convenience based size of the over-represented group. The larger group may be sampled to match the smaller group on certain criteria of interest or randomly sampled, depending on the agenda for the study. This design, from experimental research design, is called the case-control design. I follow this design in sampling albeit with random sampling of the 'control' group i.e. male board appointees. I did not match the two groups – men and women, in the sample because the objective of the study was to investigate the differences between the two groups. Therefore, I selected all the women who met the criteria of appointment explained below and the men who were appointed at the same time. As a result of the small number of women appointed in each year and the numbers were further reduced on account of the sampling criteria, I had to extend the sampling time period backwards five years – from 2010 to 2005. By the year 2005, I had a sample of 434 directors, 173 women and 261 men.

The foremost condition of sampling was the concurrent appointment of a man and a woman to the board. The second criterion was that the appointment was a non-renewal appointment for both sexes. The reason for this was the completely different process inherent in renewing a board appointment of a known candidate. The third criterion was that the appointee not be in any way related to (e.g. by employment, marriage or birth) the company. One of the conditions alluded to earlier, the issue of missing information was the fourth condition applied to the sampling process. Only those appointees who had a career in the public corporations were retained in the sample. There were two exceptions to this condition. One exception was if the career trajectory up to the last job was in public corporations but the latest appointment was in a private company. The other exception was organizations such as educational, research and non-profit institutions that traditionally publicize their constituents readily. Sampling criteria was verified through the career biography. Specific details of the sampling process and sample are described further on under the section on sampling.

I refer to the appointees as outside directors previously because not all outside directors are actually also independent directors. Identifying and removing such appointments was the second step in the sampling process. Some outside directors are nominees of large stakeholders, particularly since large shareholding by investment companies is a common phenomenon now. Some appointees may also be nominees of founding families, who while no longer being majority shareholder still yield considerable influence on the board. A prominent case in point occurred during the time of sampling; Dow Jones & Company was acquired by News Corp. who then appointed the daughter of the founder of Dow Jones Co. to the board of the new acquisition as a

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gesture of goodwill. After removing all such appointments as were not deemed to be independent and recruited from the larger population of suitable candidates, the final sample comprised 366 independent directors. The sample consisted of 147 women and 219 men appointed to the boards of 133 public companies. Of this set, 59 women and 81 men were first time directors. For the remaining directors in the sample – 88 women and 138 men, the sampled appointment was not their first board appointment.

4.2 SAMPLING ON THE DEPENDENT VARIABLE

Sampling on the dependent variable is a serious concern because it is ubiquitous in research on subjects in social sciences. Studies of crime are plagued by sampling of criminals, economic decisions are endogenously related to previous outcomes, social programs are based on occurrence of events which impact the way outcomes of the programs are evaluated are just a few examples of social science research affected by sample selection bias. The effect of this bias is manifested mainly in the value of errors that appear in the relationship equation between independent and dependent variables. This is due to the fact that of the two sides of the equation being related in latent ways that are not a part of the equation developed in the study. It is implausible to imagine a situation where this error could be completely accounted for as it is implausible to take into considerations all the factors affecting any given social situation. Therefore, statisticians have suggested ways in which the effect of this conjoint error may be minimized (Heckman, 1979; Winship and Mare, 1992; Bourguignon, Fournier and Gurgand, 2008); most methods are applicable under assumptions of linear distribution. Dubin and Rivers (1989) suggested methods of correcting for truncated and censored sampling biases. Their tests ultimately revealed that for a non-parametric method like

logistic regression, which does not require that assumptions of normality be satisfied and when the outcome is a binary categorical variable, selection bias only results in more conservative estimates of effects rather than over-estimation or spurious effects. This was also shown in the study by Timpone (1998) of voter turnout and behavior. Pape (2003; 2008) also showed how limiting the conclusion to the context in which sampling is carried out retains the validity of the study. True error from restricted sampling occurs when conclusions are generalized beyond the context in which the study is situated. In conclusion, I would like to submit that the population under consideration in this study is not easily accessible though the issue under consideration is of importance both from the organizational as well as sociological perspective. Should we not attempt more sophisticated analysis due to statistical exigencies? Therefore, though extremely restricted statistically, it is still hoped that this study will pave the way for researchers to find more ways in which to study the phenomenon of female under-representation in leadership positions in organizations.

4.3 THE PROFESSIONAL NETWORK

Professional networks are essentially structural ego networks in which the link or connection between nodes is common membership in organizations. A major difference between professional networks as defined in this study and ego networks, is the absence of a specifically defined relationship namely friendship, support or advice as it is done traditionally. To illustrate with a simple example, suppose A's career has spanned 20 years and 6 companies; A's network comprises all contemporary connections over the 20 years and across the 6 companies. There are, as is warranted, rules that define alters. The rules of inclusion in the professional network are based on the notion of hierarchical

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similarity. Therefore, the nodes in A's network from the first company will include only those who were also in the same level as A; in order to ensure that the nodes in the network had the highest probability of actually being at least an acquaintance of A. On the basis of this rule, as A progresses up the organizational ladder, the number of nodes decreases and probabilities of connecting increase. At the end of this process, the network of A as a member of the top management team includes those with whom A would maintain at least acquaintanceship, in keeping with the norms of the group (Brass, Galaskiewicz, Greve & Tsai, 2004; Rivera, Soderstrom & Uzzi, 2010). An example illustrating the format data, purchased from Boardex, was converted into before building the sociomatrix is shown below.

4.3.1 Network Terminology

Ego: owner of the network. It is the reference point of the network in relation to whom all others in the network are identified

Alter: the 'others' in the network who are not the ego. In other words, the people to whom the ego is connected, both directly and indirectly are called alters.

Connection: is the association between two people in a network. In relational networks, a connection may be indicative of a type of relationship like friendship or support. In structural networks, they are indicative of what is common between the two people at a given point in time like employment in the same organization or membership in the same club.

Tie: A connection that has met the requirements necessary to be included in an ego's network

Attribute: is qualitative data of the ego and alters in the network. Attributes are used in network analysis to partition the network for analysis of particular groups or for heterogeneity measures among other things. Attribute information is also required to be on the same scale for everyone in the network. Therefore though I had human capital data for the director, in this case the ego, I had to once again encode attribute data for the director along the same lines as the other alters in the network.

Sociomatrix: it is one of the format in which network data can be arranged for analysis. It is an array of numbers arranged in rows and columns. The rows and columns represent the ego and alters. The numbers in the sociomatrix indicate the encoded tie between ego and alters and among alters.

4.3.2 Design and construction of professional networks

The raw form of the data was a table of one-to-one connections between a pair of people accompanied by certain details of the pair like the organization where the tie existed, the designations of the pair of people and the duration of the connection. The raw data format is shown in Figure 1 below. In the example shown in Figure 1, director X with ID 1 was a colleague of director A with ID 1213 in company 559 Inc. between the years 2000 to 2003. In this period, X was first a Marketing Director (2000-2002) and then a Chief Marketing Officer (2002-2003). A was a Chief Technical Officer of the same company during period 2000-2003.

Figure 1

Format of Directors' Connections Database

Ego Dir. ID	Ego Dir. Name	Ego Dir. Role	Co. ID	Co. Name	Org. Type	Alter Dir. ID	Alter Dir. Name	Alter Dir. Role	Overlap Start Year	Overlap End Year
1	X	Marketing Dir. (Non-Board)	18814	559 Inc.	Quoted	1213	A	Chief Technical Officer (Non-Board)	2000	2002
1	X	Chief Marketing Officer (non-Board)	18814	559 Inc.	Quoted	1213	A	Chief Technical Officer (Non-Board	2002	2003
1	Y	CEO (Board)	18814	559 Inc.	Quoted	1285	F	Independent NED (Board)	2001	2010
2	B	Chief Legal Officer (Non-Board)	23451	451 Inc.	Quoted	1286	A	Chairperson (Executive) (Board)	1988	1992
2	B	Technical Director (Non-Board)	72654	654 Inc.	Quoted	2588	A	Various Positions (Non-Board)	1988	1990
2	B	Finance Director (Non-Board)	18814	559 Inc.	Unlisted	2588	G	Financial Controller (Non-Board)	1990	1992
3	C	CEO (Board)	34568	568 Assn.	Non-profit	3190	G	ED (Board)	2001	2003
3	C	Managing Director (Board)	3362	62 Inc.	Quoted	3626	G	NED (Board)	1996	2001
3	C	CEO (Board)	7448	48 Inc.	Quoted	3626	G	NED (Board)	2001	2010

ED=Executive (or inside) director
NED=Non-executive (or outside) director.

In the first step, everyone in the dataset was categorized into four groups (organizational levels) by the hierarchy of their company position title:

Group 1 - Directors and CEOs on the board

Group 2 - CEOs who are not also members of the board and CXOs

In public companies it is not common to find CEOs who are not board members.

However, in other types of organizations like private companies, educational

institutions, it is very common for the CEO to not be a part of the board

Group 3 - Functional and Regional Heads

Group 4 - All others

The reason for such categorization was to specify people in the three levels closest to board members (to indicate those immediate contacts more likely to yield resources for the ego director), and all other contacts of the ego director acquired through the course of his/her education and career. The purpose of doing this was to be able to standardize the various designations which indicate the same hierarchical level in organizations. This was also necessary to optimize identifying the direction of ties, which was based on distance in the organizational hierarchy.

The second step was to identify the direction of a connection. The ego director was to be connected only to those contacts that are at the equivalent or adjacent higher level in the four groups identified in step 1 above. The reason for defining directionality in this way is that it is unlikely for corporate directors to seek resources from someone other than those in top management positions. A connection that fulfilled the requirements of adjacency and directionality was defined as a tie and the person in the tie as belonging to the ego's network.

The final step was to encode the tie between persons in the director's network. The ties among the persons in the directors' network were encoded in three different ways – frequency, multiplexity and strength of ties.

Frequency of ties is the number of the times the same pair connects over the duration of their respective careers. A person who was a colleague at a lower level in the hierarchy may once again become a colleague later at a higher level. The recurrence may

be through the same organization or another organization. Each occurrence is counted separately for a count of frequency of ties.

A tie that occurs through organizations of different types i.e. public company, private company, charitable institutions or other establishments like business associations, is called a multiplex tie. Each occurrence of a tie through a different type of organization than the previous is counted towards identified the degree of multiplexity. Since the number of types of organizations in the dataset is four - public company, private company, charitable institutions or other establishments like business associations, the value of the multiplexity of a tie can range between 2 and 4.

Frequency and multiplexity were both taken into consideration to determine the strength of a tie. It is very likely that a pair connected over a period of time in more than one instance is likely to have greater recall of each other than those who were connected only once. It is also not essential that people should be associated with a wide variety of organizations. If a person spends her/his entire career in public companies, such person may have no connections with those in private companies. Consequently, frequency was given greater weight in formulating the strength of a tie than multiplexity. Strength of a tie was encoded as strong if the frequency of a tie was greater than two with at least one occurring in the first, and therefore highest and chronologically latest, group (Board Members and CEOs who are also on their board). If a tie did not qualify as a strong tie, it was coded to be weak tie.

Once the ties were identified, the data had to be transformed from the relational database as shown in Figure 1 to a mathematical representation called sociomatrix (shown in Figure 2). A matrix is any array of data i.e. data arranged in row and columns.

A sociomatrix is similar except that the rows and columns have an identity as people, organizations or any other entity and the elements of the matrix (i.e. contents of the cell at the intersection of each row and column) indicate a pre-defined relationship between the elements of the rows and columns.

A set of three sociomatrices were constructed for each director as follows:

1) a sociomatrix indicating the frequency of connections between an ego and alter, i.e., the number of times they overlapped across all types of organizations

2) a sociomatrix indicating the number of multiplex connections or the number of organizations (greater than 1) across which the ego and alter overlapped. By definition, the value of multiplexity must be greater than 1 because the connection is not multiplex unless overlap occurs in more than 1 type of organization.

3) A sociomatrix indicating the strength of ties

The sociomatrix based on strength of ties was used in the creation of professional network variables. The reason for this is that it incorporates the elements of both frequency and multiplexity of ties. Strength of ties was categorized into three levels – 2 for a strong tie, 1 for a weak tie and 0 for no ties. Strength of tie was defined by the period of frequency of connection and degree of multiplexity in the connection. For example, A and B have been connected throughout their professional career by having a common employer thrice – once when they were in junior management, once in middle management and once in senior management. Now let us suppose that A and B are also members of the same charitable institution and professional association. The tie between A and B can therefore be said to span three hierarchical categories, including group 1 – senior leadership position as well as have a multiplexity value of 2 – the common

charitable institution and professional association. Therefore, the tie between A and B is categorized as strong and given the value of 2. This was a generalized illustration which was actually implemented as a set of conditions. The set of conditions are as follows:

Strong ties (2): The connection should occur when the sender of the connection is in, ATLEAST:

- More than 1 of the top three groups (1, 2 & 3)

OR

- Group 4 AND Group 1

AND

The value of multiplexity should be greater than 1

Weak tie (1): that which is not a strong tie (if you did need a rule; it would be that the connection occurs only in 1 of the groups).

No Tie (0): absence of association

Figure 2

Examples of strong ties

Connection from		Connection to		Multiplexity value	Tie Strength
Name	Group	Name	Group		
A	2	B	1	2	Weak
A	2	B	1	1	Weak
A	3	B	2		
A	2	B	2	2	Strong
A	3	B	3		
A	2	B	2	1	Weak
A	3	B	4		
A	4				
A	2	B	2	2	Strong
A	3	B	4		
A	1	B	1	1	Weak
A	4	B	4		
A	2	B	2	2	Weak
A	4	B	4		
A	1	B	1	2	Strong
A	4	B	4		

After the sociomatrix was created, the next step was to extract attributes of the ego and alters. Attributes are an important component of network analysis as many measures cam be calculated for particular groups and such groups are defined according to the attributes of the constituents of the network. The attributes extracted for this study were:

1) Hierarchical group to which the alter belonged at the last instance of the connection (as defined above in the first step)

2) Type of organization in which the last instance of the connection occurred,

3) Sex of the alter

Figure 2 is an example of the format of the sociomatrix of director X indicating the frequency of ties with alters in his network constructed using the steps described above. To construct this sociomatrix, rules described in steps above were applied to the data shown in Figure 1. Between 2000 and 2002, X was in a lower group (Marketing Director-group 3) than A (Chief Technical Officer-group 2), yielding a value of 2 overlapping years from X to A, following the rule of directionality from a lower to higher group. In 2003 both X and A were in equivalent groups (group 2), yielding a value of 1 overlapping year from X to A and A to X, following, the rule of reciprocal directionality. The value of the tie is the count of each occurrence of a tie, which in this case is 3 from X to A and 1 from A to X, as shown in Figure 2 below. Cell values are not symmetrical on the two sides of the diagonal because of the directionality rules.

Figure 3

Format of a Sociomatrix (frequency of ties) of Director X

Org. Type	Org. Level (Group)	Sex	Dir. ID	X	A	B	C	D	E	F	G	H	I
			X	0	2	0	3	5	0	8	2	7	9
Public	Director (1)	F	**A**	1	0	1	0	4	0	0	6	1	1
Public	Director (1)	M	**B**	2	0	0	3	0	0	0	1	2	2
Public	Non-board CEO (2)	M	**C**	5	0	0	0	5	1	4	0	0	2
Private	TMT Executive (2)	M	**D**	5	0	0	5	0	4	12	7	0	2
Public	TMT Executive (2)	M	**E**	4	1	0	3	4	0	4	0	4	1
Private	Non-board CEO (2)	F	**F**	4	0	0	4	4	4	0	0	0	1
Private	Other (4)	M	**G**	2	0	1	0	19	0	0	0	2	0
Non-Profit	Marketing Director (3)	F	**H**	6	1	3	7	0	0	0	2	0	7
Other	Director (1)	M	**I**	0	8	2	2	14	1	1	0	7	0

The sociomatrix, when converted into a diagram represents the map of ties of the ego to its alters. A network can be represented by any of the characteristics of the attributes of the alters. Hence, an ego's network can be represented as a set of ties to men and women, to alters by their position in the organizational hierarchy or any other attribute of the researcher's choice. An few illustrations of the different representations of the same network are presented in Figures 1-4 below. The networks can also similarly be analyzed along any given attribute. The only constraint to doing this, at this point in time, is that UCINET does not possess the capability to process a set of sociomatrices for a set of outcomes. This makes the process of obtaining network measures a labor-intensive and time-consuming process.

Each network was subdivided further to obtain a set of two networks for each director in the sample – collegial network and leader network. Collegial and leader networks are subsets of the professional network. Essentially, there are three types of networks from which measures are extracted – professional network which includes

everyone the ego worked with over her/his career tenure, collegial network which includes only colleagues at the same level as the ego and subordinates, and leader network which comprises only those who were in supervisory positions related to the ego at the time of connection.

Therefore, in some cases, different measures had to be used for one network variable to avoid future issues of multicollinearity. For instance, in the case of centrality, which is a fairly linear measure, the measure from professional network was almost fully correlated with the measure derived from collegial and leader networks. Therefore, I obtained betweenness centrality measure, which is a positional measure of centrality (explained in greater detail in the next section), for collegial networks and degree centrality (a count based measure) for leader networks. In conclusion, each director's professional network was analyzed individually to obtain measures of composition and structure of her/his professional network. UCINET (Borgatti, Everett and Freeman, 2002) was the software used to perform network analysis. UCINET is a widely used software program for network analysis, particularly in social sciences. Only the sociomatrices indicating the strength of ties was used for network analysis.

Figure 4

Network map of frequent connections in listed companies with representation of alters in terms of sex

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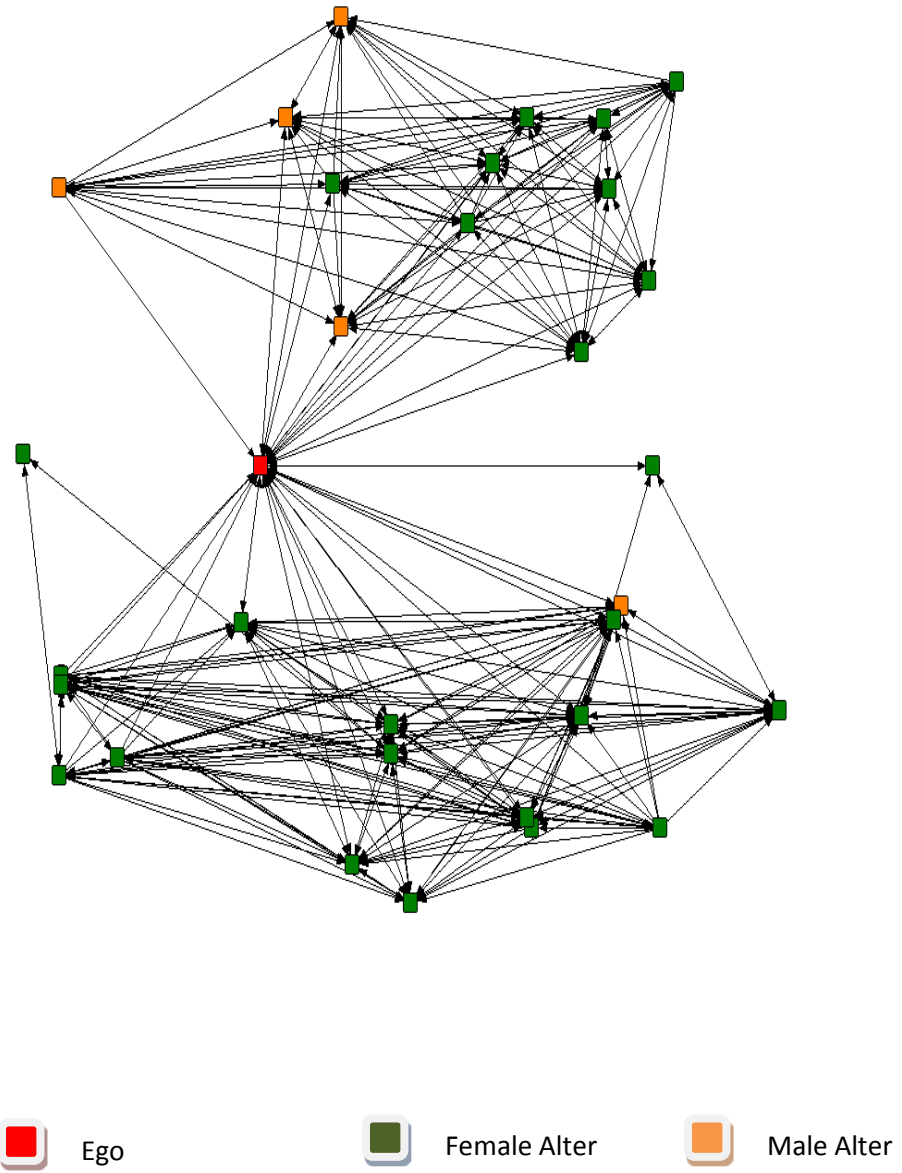
Figure 5

Network map of Professional Network with representation of alters in terms of leader role

Ego   Leader Alter   Non-Leader Alter
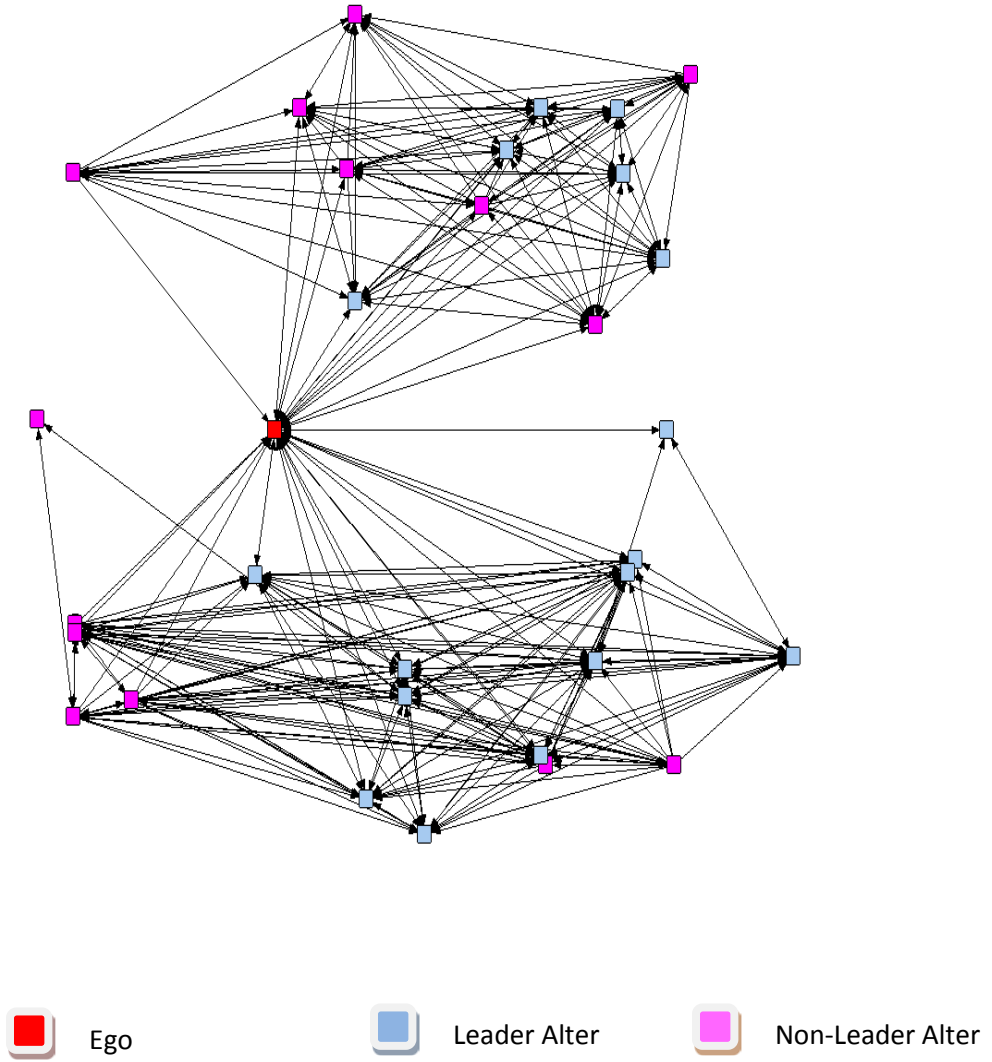
Figure 6

Network map of Leader Network with representation of alters in terms of leader sex
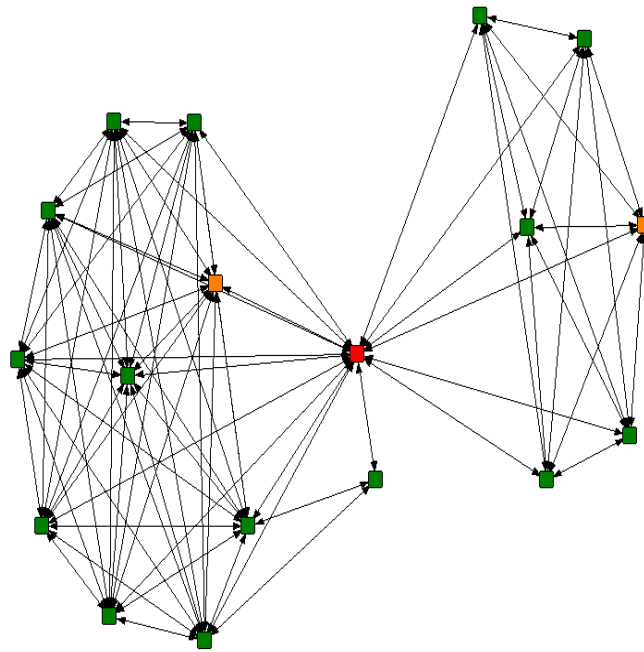
Figure 7

Network map of Leader Network with representation of alters in terms of leader by type of organization

	Ego		Public Company Leader		Private Company Leader
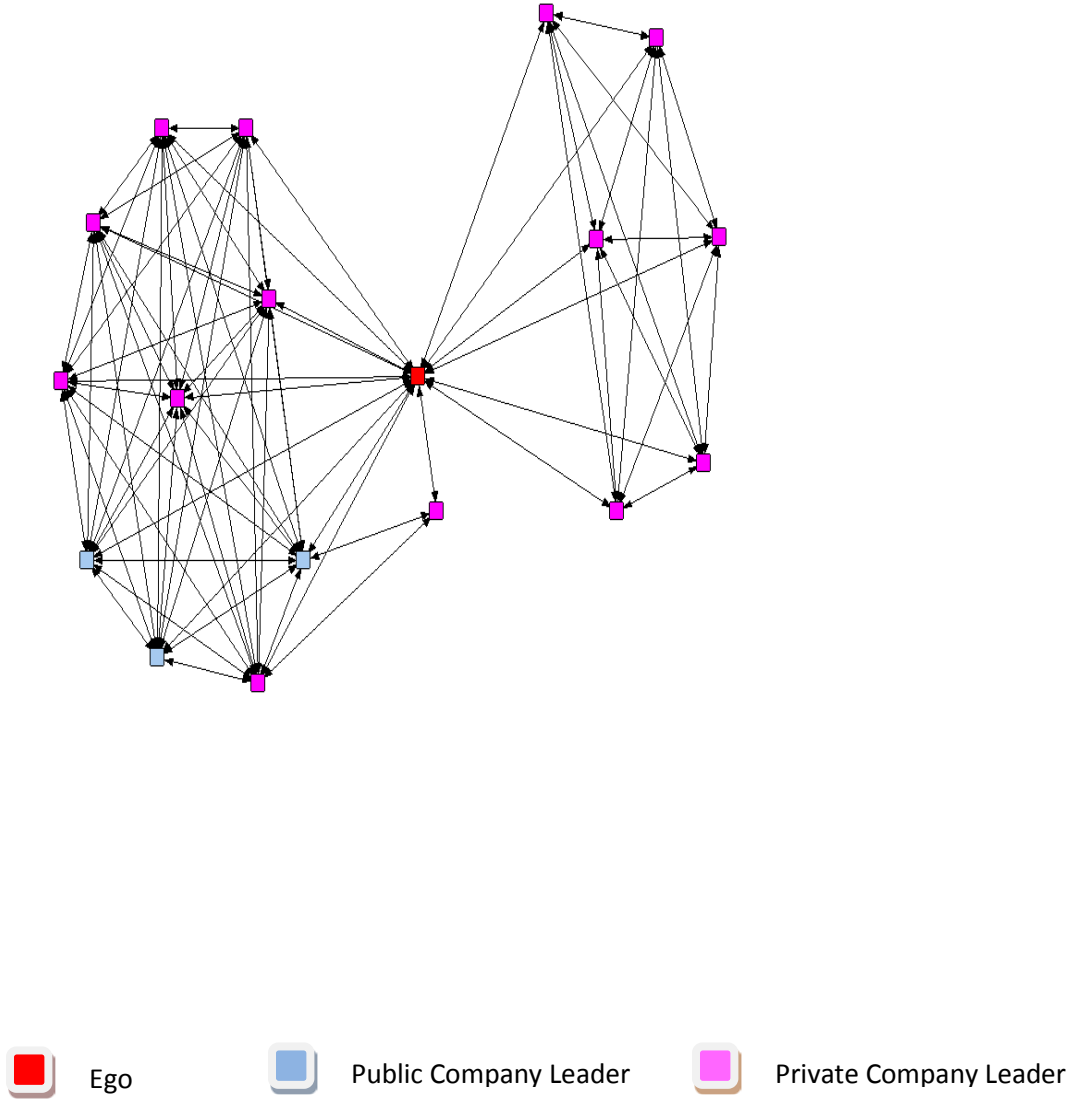
4.4 MEASURES

4.4.1 Dependent variables

The dependent variables of interest in this study are two dichotomous variables – Sex of the appointee (female/male) and the whether the appointee is a first-time director as compared to an experienced director. I am interested in evaluating firstly the relative odds of a woman's appointment to that of a man and secondly, the relative odds of an inexperienced person's appointment to those of an experienced director. Based on prior research as well as anecdotal evidence in respected business press, a set of independent variables were identified as being capable of influencing the outcome odds.

Prior research on the characteristics of directors has been mainly centered on human capital variables. From these studies, human capital variables are identified as age, educational qualification, role in the organizational hierarchy, area of professional expertise, years of previous non-board experience, previous board experience (by type i.e. public company boards and private company boards. Literature on the importance and utility of networks for individuals in organizations gives us the professional network variables. They are divided into two categories – network composition and network structure variables. Network composition variables comprise the number of board members in the network (including CEOs who serve are also board members), number of CEOs in the network (by type i.e. CEOs of public and private companies) and number of weak ties in the network. Network structure as the name indicates refers to the configuration of ties in the network and positional attributes of the director in her/his network. Size, density, betweenness centrality, power and cohesion are the network variables of interest. Each of these variables is defined in the following sections. Human

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capital variables are well-known and understood in common parlance. Explanation of network variables, because of the novelty of method employed in its design and construction, is more involved. Therefore, the section on network variables is sub-divided into description of the concept of professional networks, design and construction of the networks and lastly the variables extracted from analysis of the individual professional networks. Thereafter, the dependent variable and its justification are explicated.

4.4.2 Independent variables

Human capital variables

1) Age

   This is the age of the director as in the year of appointment to the directorship that was sampled

2) Educational Qualification:

   a. Undergraduate

   b. Graduate

   c. Post-graduate

3) Role

   Coding of the role was done on the basis of the occupation of the 10 years prior to appointment to the board that was included in the sample. In the event that a director held multiple appointments in that period, the last longest-held appointment was coded as the role. The reason behind this was that long-held roles have greater significance than recently occupied roles on which one has not yet had the opportunity to become established.

   a. CEO/COO of a public company

b. CEO/COO of a private company

c. Entrepreneur

d. CXO

e. Professional director/Advisor

A professional director is someone who has no other occupation than that of being a director of public companies. An advisor is someone whose sole occupation is in an advisory position in an organization(s). An advisor who also holds a board position is coded as a professional director.

4) Profession

The categories of education and research, marketing and sales, engineering and technology were combined due to very few directors in the sample having such expertise separately. It was also a logical pair to combine as they are often overlapping or concurrently held positions in organizations.

a. Finance

b. Human resource management

c. Law

d. Operations

e. Education and Research

f. Marketing and Sales

g. Government

h. Engineering and Technology

5) Years of experience prior to the year of sampling

6) Number of directorships held in public companies prior to the year of sampling

7) Number of directorships held in private companies prior to the year of sampling

Professional network variables

Before defining the professional network variables used in this study, the concept of professional networks as defined in this study will be explained. This will be followed by a detailed description of the design and construction of professional networks. I will then define the professional networks variables in the last section.

Measures of professional network were of two types, those pertaining to the composition of the network and the other pertaining to the configuration of ties in the network.

The network composition variables used in this study are:

1) Number of CEO alters

Variables describing the network configuration are:

2) Centrality

Two measures of centrality were calculated, to circumvent the problem of complete separation f data by measuring centrality of the larger professional network and collegial network. Centrality in the collegial network was calculated as the proportion of pairs of alters between whom the ego director lies to all pairs of alters in the network. Among colleagues, given the inequality in the relationship, it is important that the measure of centrality be based on the strength of ties. In a leader network, on the other hand, where network resources are an accepted currency, the number of direct connections is of greater relevance than the strength of the tie (D'Aveni and Kesner, 1992). Leader network centrality was calculated as a ratio of number of alters that the ego is directly

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connected to in proportion to all alters that the ego is connected to, both directly and indirectly.

3) Bonacich's measure of power

The measure of power used in this study was proposed by Phillip Bonacich (1987) after the publication of some results that indicated the difference between centrality and power. Cook, Emerson, Gilmore and Yamagishi (1983) found that power is not always vested in the most central unit in an exchange network. Consecutively, Bonacich (1987) proposed that power be based on not just a units centrality but also the extent to which the alters of the unit are central. When the network ties are valued (rather than binary), power becomes more than a compounded measure of centrality. In valued networks, power is determined by two factors – a) whether the relationship between the commodity of exchange and number of ties is positive or negative (b) whether the value of the tie of alters are also taken into consideration. In the case of this study, it is assumed that the relationship between the commodity of exchange and number of ties is positive i.e. the more people, ego knows; the more resourceful, ego is. But, this relationship is qualified by the degree of resourcefulness (measured by the number of people and the value of the alters ties to its alters) of the alter. Hence, not only does the measure take centrality into consideration, to some extent but more importantly the value that alters bring to the ego in terms of their own alters.

Thus, it is a composite measure of centrality and influence. The power of a person is calculated as cumulative of the connectedness of the person as well as the connectedness of such person's alters. Two separate measures of power were also calculated – one each for the complete network and the leader sub-network

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4) Cohesion of the network

   It is the proportion of triads to dyads in a network. It is a measure of the potential for consensus in the network. It is based on Heider's theory of balance, wherein he stated that a triad will always move towards consensus generated by a pair in the triad. In an unsigned network, a triad is taken to indicate a unit capable of generating consensus. Two separate measures of power were also calculated – one each for the complete network and the leader sub-network

To recapitulate, the independent variables in this study are as follows:

Human Capital:

1) Age

2) Educational Qualification:

   a. Undergraduate

   b. Graduate

   c. Post-graduate

3) Role

   a. CEO/COO of a public company

   b. CEO/COO of a private company

   c. Entrepreneur

   d. CXO

   e. Professional director/Advisor

4) Profession

   a. Finance

   b. Human resource management

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       c. Law

       d. Operations

       e. Education and Research

       f. Marketing and Sales

       g. Government

       h. Engineering and Technology

5) Number of directorships held in private companies prior to the year of sampling

Professional Network

1) Number of CEO alters

2) Centrality of the director

3) Bonacich's measure of power

4) Cohesion of the network

4.4.3 Statistical control variables

The odds of appointment of women to the board are primarily affected by the number of women already present in the board composition. Many more companies are willing to appoint the first woman to their board, whether as an experiment, to fulfill diversity requirements or genuine desire to introduce a different viewpoint. However, the number of companies willing to appoint a second or third woman to the board falls exponentially. As of data collected in 2011, among the Fortune 1000 companies there are about 13 percent companies that had none or had three or more women on their board. There were 313 companies with one woman on its board and 290 with two[3]. However, it is a possibility that smaller boards may be less willing to accommodate a woman director.

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[3] 2012 Census of women on boards of Fortune 1000 companies by CTP partners. 2012 Catalyst census of Fortune 500 women board directors.

Therefore, I decided to control for both the size of the board as well as the proportion of women already present on the board as in the year of appointment of the director in the sample. While women have tended to deny promoting the cause of greater female representation in organizations as a separate cause, it has been observed that women board members tend to encourage greater female representation in the higher levels of the organization (Bilimoria, 2006). But, we are not aware if the effect holds for female CEOs; though there is some evidence that women CEOs do feel the responsibility to mentor other women in organizations (Ragins, 1993). Hence, the I included sex of the CEO among the statistical controls. The final statistical control is separation of the roles of chairperson of the board and CEO. There is ample evidence of the role of a CEO in director appointment (Westphal and Zajac, 1995; Zajac and Westphal, 1996; Shivdasani and Yermack, 1999); it has been found to be dependent on the relationship between the CEO and the board. The influence that a CEO has on the board is determined by whether the CEO is also chairperson of the board. Separation of the roles of CEO and board chairperson can be predicated to affect the likelihood of board appointment for women given the impact that directors have on the performance of CEOs. It is for this reason that CEOs have been found to favor similar and acquiescent candidates for directors; the first of which women are not and the second is unknown about women. Thus, Separation of the roles of board chairperson and CEO was included as a statistical control in the equation to determine the likelihood of female board appointment. Finally, the variables selected as statistical controls are as follows:

1) Size of the board, measured in the year of appointment

2) Proportion of women on the board, measured in the year of appointment

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3) Sex of the CEO

4) Chairperson-CEO Duality

4.5 DATA ANALYSIS

4.5.1 Analysis for hypothesized differences

To test for the hypothesized results, the data was binary i.e. measures pertaining to female and male directors. Consequently, to test for differences in the distribution of men and women in terms of the continuous independent variables, I used the Mann-Whitney U Test (henceforth referred to as MWU). The MWU Test is the non-parametric approximation of the t-Test used for normally distribution samples. MWU test is applicable in situations where:

a) The samples are not of equal size

b) The population is known to not be normally distributed

Unlike the t-test which is a test of equality of means, MWU is a rank test, which evaluated the distribution of cases on the basis on their rank in the entire sample comprising cases from all the groups. If the probability that the average value of the ranks for each group approximates the overall average of ranks for the entire sample, is above the significance levels; then the null hypothesis that the two groups have a homogeneous distribution is accepted. On the other hand, if the probability is lower than the significance level; the alternative hypothesis that the distribution of the two groups with respect to the independent variable is not homogeneous is accepted (Bagdonavičius, Kruopis and Nikulin, 2011).

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To test for the effects of the independent variables of the likelihood of appointment of a female independent director, relative to a male independent director is evaluated using Logistic regression. The justification for using logistic regression is strong because:

a) The dependent variable is binary categorical

b) The population distribution is not normal

Unlike linear regression where the outcome variable is continuous and the effect of independent variables is measured in terms of increments of a unit, the outcome of logistic regression is the probability of the occurrence of an event relative to the probability of occurrence of the non-event (Hosmer and Lemeshow, 2000). As such, the outcome is always relative, never an absolute probability for a particular event. However, the outcome is presented in terms of odds ratios, which is an approximation of a continuous variable. The odds ratio can be converted to probabilities by calculating the ratio of the odds of the event to the odds ratio incremented by one. In this study, the dependent variable as described earlier is the appointment of a female independent director. The non-event in this case is the appointment of a male independent director. Therefore, the test of effects indicates the increase or decrease in the likelihood of appointment of a female director as a result of the particular independent variable. The total effect of all the independent variables can be calculated by taking into calculating the sum of the product of coefficients of the independent variables with their average value. In the case of categorical variables, the effect of any particular category can be evaluated by assigning it the value of one and all other categories in the variable, zero.

4.5.2 Post-hoc analysis

Two sets of data analysis were conducted, one to test for heterogeneity and the other to test for hypotheses pertaining to inequality in the corporate board structure. The heterogeneity hypotheses were tested using one-way ANOVA, wherein the four group composite variable indicating the sex of the director by the degree of experience. The composite variable comprises four categories of directors – female first time director, male first time director, female experienced director and male experienced director. The categories of the data are not of equal size and some of the variables do not meet the assumptions of equal variance across the four groups. In order to assess the heterogeneity or lack thereof among the four groups for the variables that do not fulfill the assumptions of ANOVA, I will use the Games-Howell (G-H) test. G-H is a preferred test not only because it can test for differences between groups of unequal size, mean and variance but also because it calculates a conservative estimate of the critical value. The range of significance for a G-H test is limited to a maximum of 0.065 for groups of unequal size, mean and variance (Toothaker, 1993).

The inequality hypothesis were tested through three sets of logistic regression, one on the full sample to address differences in odds for an undifferentiated sample of men and women, second on a split sample of first time and experienced directors and the last set on a sub-samples of male and female directors. A composite of these three sets of analyses will provide a more comprehensive view of the odds of men and women for appointment to public company boards. The last analysis was a generalized linear regression of the number of board positions an individual occupied at the time of sampling on human and professional network variables. In this analysis, first the general

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linear model will be run on the entire sample with sex of the director as a moderating variable. Then the same model will be run on sub-samples of male and female directors. Once again, these three analyses will contribute to a composite picture of the differential effects of the variables on the number of boards to which men and women are appointed. Therefore, the analysis of difference and inequality will be conducted using the following methods:

1) One-way Analysis of Variance

    a. Games-Howell test for unequal groups for differences between female and male directors on graduated parameters

    b. Chi-Square test of differences between female and male directors on nominal parameters

2) Logistic regression to assess the odds of appointment of women compared to men

    a. Complete sample comprising both first-time and experienced, male and female directors

    b. Sample of first-time directors to assess the odds of appointment of women relative to men

    c. Sample of experienced directors to assess the odds of appointment of women relative to men

    d. Sample of women directors to assess the odds of first-time appointment to multiple appointments

    e. Sample of men directors to assess the odds of first-time appointment to multiple appointments

3) General linear regression to assess the effects of human and network capital variables on the number of board appointments

   a. Complete sample comprising both first-time and experienced, male and female directors

   b. Sample of women directors

   c. Sample of men directors

4.6 SUMMARY

In summary, the research design is contingent on two factors, the nature of the dependent variable and characteristics of the data. To test the differences among the four groups – first-time and experienced, female and male directors, one-way analysis of variance is applied. Games-Howell post-hoc test statistics is used because the sample contains groups of unequal group size and variance. To evaluate inequality in effects of human capital and professional network variables on the odds of the four different groups, I will use logistic regression and from another perspective test the effects of the same set of variables on the number of board appointments.

CHAPTER 5

5.1 RESULTS OF DATA ANALYSIS FOR HYPOTHESIZED OUTCOMES

Data analysis was conducted in two stages. In the first stage, I conducted a detailed analysis of the hypothesized differences between and effects for female and male directors. In post-hoc analyses, I differentiated within the group on the basis of experience and formed four groups of first-time and experienced, female and male directors and examined the differences among the four groups.

To begin, descriptive statistics are provided in Table 1, which reveal that the data quite severely violates the norms of normality. Quite a few of the variables are significantly correlated and are also not normally distributed. In order to assess the extent to which this direct correlation may have translated into co-occurring effects (multicollinearity) on the dependent variable, tolerance and variance inflation factor statistics were obtained for the relationship between this setoff independent variables and the binary dependent variable – female appointment (See Appendix 2 for table of multicollinearity coefficients). Both statistics show that this set of independent variables are not multi-collinear with the likelihood of female board appointment.

This and more importantly, the nature of the dependent variable, being binary, is the reason for the choice of methods of data analysis. I use the Mann-Whitney U Test for homogeneity of distribution of female and male directors, on graduated parameters (continuous variables) and Chi square tests to assess whether the distribution of men and women are homogeneous or otherwise in terms of the nominal parameters (categorical

variables). I use logistic regression to evaluate the effects of independent variables on the

likelihood of appointment of a female director, relative to that of a male director.

Table 1

Descriptive statistics and correlations

	Variables	Mean	SD	1	2	3	4	5	6	7	8	9	10
1	Size of the board	13.70	4.21										
2	Proportion of women on the Board	0.14	0.08	0.08									
3	Sex of the CEO	0.18	0.97	-0.20**	-0.06								
4	Chairman-CEO Duality	0.43	0.50	-0.01	-0.23**	0.17**							
5	Female	0.40	0.49	-0.04	-0.03	0.03	0.01						
6	Age	55.35	7.28	0.12*	0.02	-0.11*	-0.06	-0.15**					
7	Undergraduate	0.27	0.44	-0.01	0.08	-0.06	0.00	0.00	-0.07				
8	Graduate	0.64	0.48	0.03	-0.04	0.07	0.00	-0.05	-0.05	-0.80**			
9	Postgraduate	0.10	0.30	-0.04	-0.06	-0.02	-0.01	0.08	0.18**	-0.20**	-0.44**		
10	Public company CEO	0.14	0.35	0.08	0.06	-0.03	-0.06	-0.21**	-0.10	0.03	0.00	-0.06	
11	Private Company CEO	0.19	0.39	0.04	-0.01	0.01	-0.05	-0.03	0.04	0.05	-0.11*	0.10	-0.20**
12	Entrepreneur	0.07	0.25	-0.05	-0.02	0.07	0.09	0.04	-0.01	-0.04	0.02	0.02	-0.11*
13	Non-Board CXO	0.28	0.45	-0.06	-0.02	-0.05	0.00	0.20**	-0.22**	0.01	-0.02	0.02	-0.26**
14	Professional Director/Advisor	0.32	0.47	-0.01	0.00	0.02	0.04	-0.03	0.25**	-0.06	0.10	-0.07	-0.29**
15	Finance	0.26	0.44	-0.01	-0.03	-0.06	0.05	-0.09	-0.04	0.04	0.08	-0.20**	-0.16**
16	Human Resource Management	0.04	0.20	-0.09	0.01	-0.01	-0.05	0.13*	-0.07	0.05	-0.03	-0.03	-0.09
17	Law	0.04	0.20	0.05	-0.06	-0.04	-0.04	0.03	-0.04	-0.06	0.04	0.02	-0.05
18	Operations	0.38	0.49	0.06	0.12*	0.03	-0.06	-0.12*	0.02	0.03	0.04	-0.11*	0.30**
19	Education & Research	0.08	0.27	-0.03	-0.02	-0.04	0.02	0.06	0.17**	-0.16**	-0.11*	0.40**	-0.12*
20	Marketing & Sales	0.10	0.30	-0.08	-0.12*	0.17**	0.06	0.07	-0.10*	0.05	-0.04	-0.02	0.05
21	Government	0.06	0.23	0.07	-0.03	-0.05	-0.03	0.13*	0.12*	-0.04	-0.08	0.20**	-0.10
22	Engineering & Technology	0.04	0.19	-0.02	0.07	-0.02	0.03	0.01	-0.08	0.04	0.00	-0.07	-0.04
23	No. of private company directorships	1.23	2.23	0.02	0.04	-0.03	0.05	-0.07	0.10	0.02	-0.01	-0.03	-0.01
24	Power - professional network	1.55	0.88	-0.08	0.06	0.00	0.00	0.14**	-0.04	0.00	-0.01	0.03	-0.02
25	Centrality - collegial network	44.11	19.51	0.04	0.05	-0.04	0.00	0.16**	0.13*	-0.10*	0.04	0.10	-0.10
26	No. of CEO alters	61.56	56.24	-0.01	0.00	0.17**	-0.05	-0.13*	0.02	-0.03	0.05	-0.04	0.02
27	Power - leader network	21.46	15.71	0.10	0.10	-0.04	-0.04	-0.01	0.25**	-0.10	0.11*	-0.03	-0.01
28	Centrality - leader network	0.38	0.20	0.115*	0.07	-0.09	0.05	0.04	0.28**	-0.14**	0.06	0.11*	-0.02
29	Cohesion - leader network	46.71	16.56	0.08	-0.08	0.01	0.06	-0.06	-0.13*	0.18**	-0.10	-0.11*	-0.02

** correlation is significant at the 0.01 level (2-tailed)
* correlation is significant at the 0.05 level (2-tailed)

Table 1 (continued)

Descriptive statistics and correlations

Variables	11	12	13	14	15	16	17	18	19	20
1 Size of the board										
2 Proportion of women on the Board										
3 Sex of the CEO										
4 Chairman-CEO Duality										
5 Female										
6 Age										
7 Undergraduate										
8 Graduate										
9 Postgraduate										
10 Public company CEO										
11 Private Company CEO										
12 Entrepreneur	-0.13^*									
13 Non-Board CXO	-0.30^{**}	-0.17^{**}								
14 Professional Director/Advisor	-0.33^{**}	-0.19^{**}	-0.43^{**}							
15 Finance	-0.11^*	0.06	-0.02	0.19^{**}						
16 Human Resource Management	-0.03	0.00	0.14^{**}	-0.03	-0.13^*					
17 Law	0.01	0.00	0.03	0.00	-0.12^*	-0.04				
18 Operations	0.03	-0.03	-0.17^{**}	-0.07	-0.46^{**}	-0.17^{**}	-0.16^{**}			
19 Education & Research	0.22^{**}	0.04	0.01	-0.12^*	-0.18^{**}	-0.06	-0.06	-0.23^{**}		
20 Marketing & Sales	-0.09	0.02	0.08	-0.05	-0.20^{**}	-0.07	-0.07	-0.26^{**}	-0.10	
21 Government	0.06	-0.07	0.06	0.01	-0.15^{**}	-0.05	-0.05	-0.19^{**}	-0.07	-0.08
22 Engineering & Technology	-0.06	-0.05	0.10	0.01	-0.12^*	-0.04	-0.04	0.16^{**}	-0.06	-0.07
23 No. of private company directorships	-0.10	0.09	-0.08	0.12^*	0.01	-0.06	0.13^*	-0.04	-0.03	0.03
24 Power - professional network	0.05	-0.08	0.06	-0.04	-0.07	0.11^*	0.02	-0.06	0.03	0.07
25 Centrality - collegial network	0.04	0.06	-0.20^{**}	0.21^{**}	-0.05	-0.05	0.07	0.10	0.11^*	-0.14^{**}
26 No. of CEO alters	-0.01	-0.02	-0.03	0.04	0.09	-0.04	-0.06	-0.02	-0.07	0.02
27 Power - leader network	-0.04	-0.06	-0.09	0.16^{**}	0.03	-0.03	-0.05	0.02	0.02	-0.04
28 Centrality - leader network	0.04	0.01	-0.34^{**}	0.31^{**}	-0.02	-0.12^*	0.07	0.12^*	0.10	-0.15^{**}
29 Cohesion - leader network	0.06	0.00	0.06	-0.09	0.01	0.04	0.03	-0.01	-0.06	0.02

** correlation is significant at the 0.01 level (2-tailed)
* correlation is significant at the 0.05 level (2-tailed)

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Table 1 (continued)

Descriptive statistics and correlations

	Variables	20	21	22	23	24	25	26	27	28
1	Size of the board									
2	Proportion of women on the Board									
3	Sex of the CEO									
4	Chairman-CEO Duality									
5	Female									
6	Age									
7	Undergraduate									
8	Graduate									
9	Postgraduate									
10	Public company CEO									
11	Private Company CEO									
12	Entrepreneur									
13	Non-Board CXO									
14	Professional Director/Advisor									
15	Finance									
16	Human Resource Management									
17	Law									
18	Operations									
19	Education & Research									
20	Marketing & Sales									
21	Government	-0.08								
22	Engineering & Technology	-0.07	-0.05							
23	No. of private company directorships	0.03	-0.07	0.09						
24	Power - professional network	0.07	0.02	0.01	0.05					
25	Centrality - collegial network	-0.14**	-0.04	-0.06	0.19**	0.12*				
26	No. of CEO alters	0.02	-0.05	0.07	0.00	0.03	-0.06			
27	Power - leader network	-0.04	0.00	-0.01	0.15**	0.36**	0.20**	0.17*		
28	Centrality - leader network	-0.15**	0.00	-0.08	0.23**	0.07	0.74**	-0.05	0.35**	
29	Cohesion - leader network	0.02	-0.02	0.01	-0.05	-0.16**	-0.27**	0.00	-0.37**	-0.25**

** correlation is significant at the 0.01 level (2-tailed)

* correlation is significant at the 0.05 level (2-tailed)

5.1.1 Tests of hypothesized differences in the characteristics of female and male directors

The parameters to define any social system are evaluated along two axes – inequality and heterogeneity. Properties of constituent groups of a social system that have an associated value which categorizes them in a hierarchical order are called graduated parameters. Existence of variation on graduated parameters is indicative of inequality in the social system. Inequality in a social system can be inferred as (a) there is status differentiation among the constituent groups and the corresponding social categorization effects (b) there is aspirational value attached to the various levels of the order in which the population is distributed. Therefore, variance in graduated parameters is a sign of not only inequality but also the aspirational value corresponding to group membership (Blau, 1977). However, in order to infer an aspirational value to the variation in the social system on graduated parameters, it is essential to know the value of the difference between the constituent groups on such parameters. In this case, the output for Mann-Whitney U Test is such that it does not indicate the value of the difference on graduated parameters between groups, being a rank test. Therefore, at this point, I will be able to assess if inequality exists between groups of female and male directors but unable to assign a value to the inequality. But, in further sections, when I use one-way analysis of variance with the Games-Howell test, I will be able to clarify result I found here.

Characteristics of the population that differentiate among the constituent groups without assigning a value to the difference are called nominal parameters. Nominal parameters are indicators of the extent to which the social system is heterogeneous.

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Heterogeneity is a sign of the permeability of group boundaries (Blau, 1977). In a heterogeneous society, there is greater likelihood of interaction among groups engendering greater likelihood of acceptance of out-group members into the in-group. Or the other outcome of heterogeneity could be the assimilation of the two groups into a hybrid group that then takes on the stature of an in-group or out-group based on the other constituents in the social system. In principle, it can be said that heterogeneity is a manifestation of the permeability of group boundaries.

The tests used to analyze the differences were also of two kinds, based on the nature of the variables of interest. For continuous variables, I used the Mann-Whitney U (MWU) Test for independent samples. For categorical variables, I used Chi-Square tests.

5.1.1.1 Test of differences between groups of female and male directors on graduated parameters

The first set of tests of differences was conducted to test for the differences between pairs of female and male directors. To this purpose, I ran a Mann-Whitney U Test on the sample as well as Chi-Square tests on the two groups. I used the MWU for graduated parameters and Chi-Square test for nominal parameters.

Graduated parameters in this study are age, number of private company directorships previously held by the director, number of CEO alters in the professional network of the director, coefficients of power and cohesion in the professional and leader network and finally, coefficient of centrality in the collegial and leader network.

Nominal parameters used in this study are categories of educational qualification, professional affiliation and role occupation. The categories of education qualification are undergraduate, graduate and postgraduate degrees. Professional categories are finance, human resource management, law, operations, education & research, marketing & sales, government and engineering & technology.

Table 2, given below shows the differences between the two groups on graduated parameters. The sample comprised 147 women and 219 men, serving on the boards of public companies. The two groups were differentiated on age, previous board experience in private companies, number of CEO alters in the network, power in the complete professional network and the truncated leader network, similarly for centrality in the collegial network and leader networks and finally cohesion in the leader network.

Table 2

Mann-Whitney U Test for homogeneity of distribution of female and male directors

Variable		Mean	SE	Sig. U Statistic	Decision (Null Hypothesis)
Age	Female	53.99	0.52	0.001	Reject
	Male	56.27	0.53		
Prior private company directorships	Female	1.05	0.19	0.012	Reject
	Male	1.36	0.15		
No. of CEO alters	Female	52.48	3.75	0.073	Reject
	Male	67.65	4.18		
Power in professional network	Female	1.70	0.08	0.009	Reject
	Male	1.45	0.05		
Power in leader network	Female	21.35	1.35	0.951	Accept
	Male	21.53	1.03		
Cohesion in leader network	Female	45.41	1.31	0.465	Accept
	Male	47.58	1.15		
Centrality in collegial network	Female	47.86	1.56	0.004	Reject
	Male	41.60	1.32		
Centrality in leader network	Female	0.74	0.01	0.497	Accept
	Male	0.76	0.01		

N (Female) = 147
N (Male) = 219
*** p < 0.001
** p < 0.01
* p < 0.05
† 0.05 < p < 0.1

Hypothesis 1a: Age of female directors will be significantly less than that of male directors

Hypothesized difference in age between female and male directors was found to be true as per the data presented in table 2 above. Women directors were younger than male directors, on an average by more than two years, which was significant at a p value of less than 0.001. The MWU test results find for the overall difference in mean age of female and male directors. This has implications for expectations that only women who are younger; consequently more accomplished - one of the definitions of being at the same level as men but at a younger age, will be able to gain access to corporate boardrooms.

Hypothesis 2a: Female directors will have more private company board experience than male directors

On average, women had less private company board experience than men. From table 2, we can see that although in raw numbers this difference was only of 0.31, in the rank distribution of men and women on number of private company board appointments they held prior to the current public company board appointment, women hold significantly fewer of them. Thus, while the hypothesized difference was in favor of women having more prior private company board experience, I found that they actually had less than men. But, the rank distribution of prior private company board experience for women was significantly different than that for men.

Hypothesis 3a: Professional networks of female directors will comprise significantly more CEO alters than those of male directors

Men had, on average at least two more CEOs in their professional network than women. This difference measured at -15.17, with a random probability of occurrence of

0.073. Though the number of CEOs in the professional network of women on average seems substantially less than that in the professional network of men, the difference in rank distribution of CEOs alters in the professional networks of men and women was not significantly different; only marginally so at a p value of 0.07. Thus, the results did not support the hypothesized difference in the number of CEO alters in the professional networks of female directors, compared to men.

Hypothesis 4.1a: Female directors will have a higher coefficient of power in their professional network than male directors

Hypothesis 4.2a: Female directors will have a lower coefficient of power in their leader network than male directors

The hypothesized difference in the power quotient of women in their professional network was found to be significant in the direction predicted. Female directors, on average, were connected to more alters who were also well connected thereby contributing to the power of these women in their professional network. This difference in rank distribution of the coefficient of power in the professional networks of men and women was also statistically significant at a p value of less than 0.01. The hypothesized difference in the power of women in their leader network was also found to be true but not statistically significant. The difference in mean unit of power in the leader network between men and women was only -0.11, contributing to a non-significant difference in the rank distribution of coefficient of power in the leader network of men and women.

Hypothesis 5a: Leader networks of female directors will be less cohesive than those of male directors

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Difference in the degree of cohesion of leader network of women was in the direction predicted. Leader networks of women were less cohesive than those of men, but the difference was not statistically significant (Mean difference = -1.97, p = 0.21).

Hypothesis 6.1a: Female directors will occupy a more central position in their collegial network than male directors

Hypothesis 6.2a: Female directors will occupy a less central position in their leader network than male directors

In the network comprising their colleagues, women held a more central position than did in their leader network. This difference in their mean centrality in the collegial network for men and women is 6.26, significant at p value less than 0.01. In their leader network, women held a less central position than men (Mean difference = 0.02) but the difference was not statistically significant. Thus, both hypothesized differences in the centrality of women in their professional network were found to hold good but the hypothesized difference was statistically significant only for the collegial network.

Figure 8

Graph depicting the difference between female and male public company board members, in the sample, on graduated parameters
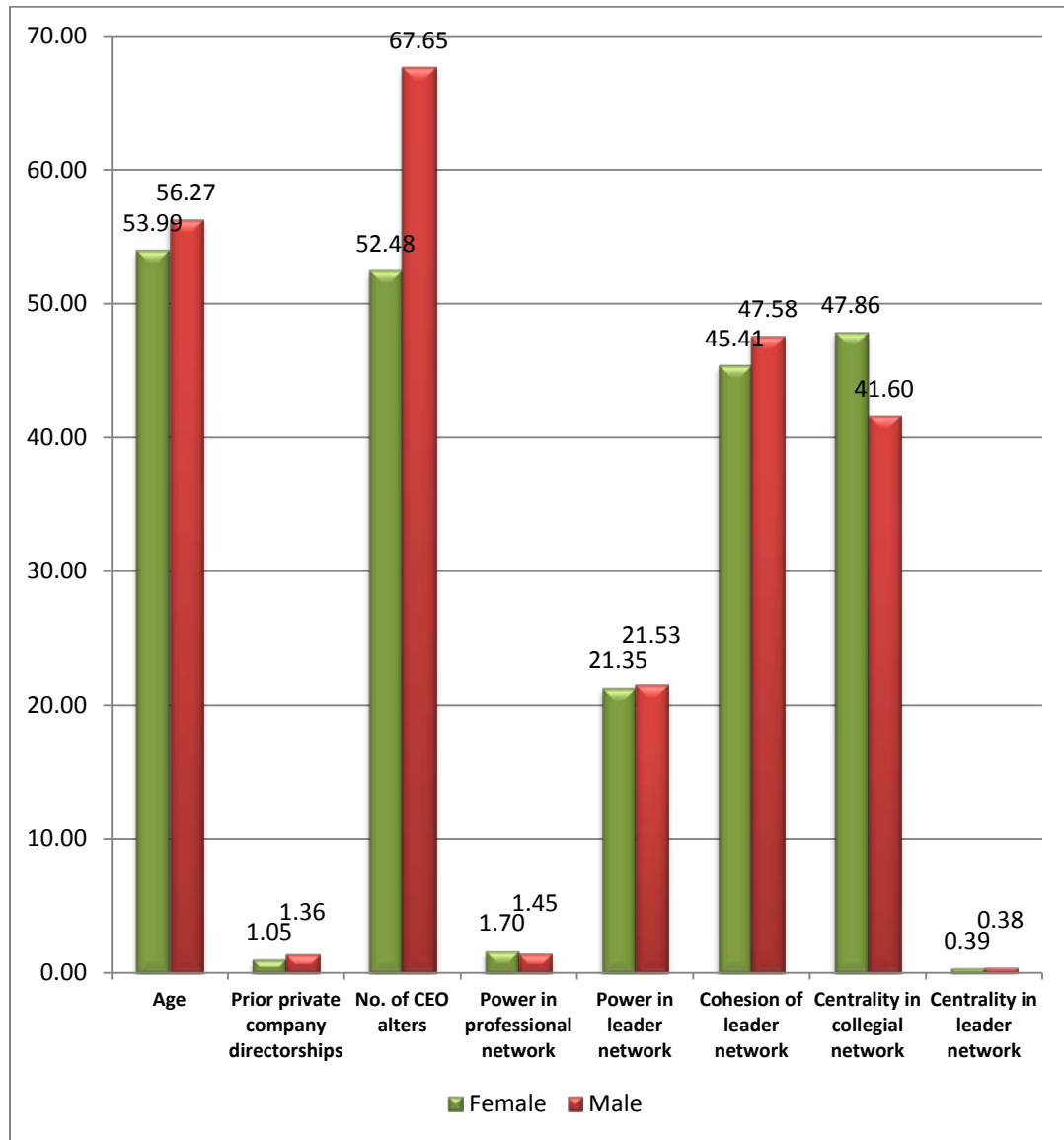
5.1.1.2 Test of differences between groups of female and male directors on nominal parameters

The nominal parameters on which female and male directors were hypothesized to be different or similar are educational qualification, role in their current organization and profession. Since this is a test of differences or similarity in the sample distribution on categorical variables, I used the Chi-square test. The results are shown in Table 3a for educational qualification, Table 3b for professional affiliation and 3c for role occupations.

Table 3a

Chi-Square test for the homogeneity of populations of female and male directors on educational qualification

Education Category	Undergraduate	Graduate	Postgraduate
Women	39	89	19
Men	58	144	17
N	97	233	36
Chi-Square	3.722	12.983	0.111
df	1	1	1
Asymp. Sig.	0.054	0.000	0.739

Hypothesis 7a: Educational qualification of female directors will be significantly different from that of male directors

Women were differentiated from men on both undergraduate and graduate education. Though women who had a postgraduate degree were present in greater numbers, it is not a statistically significant increment. The difference in proportion of women who had undergraduate degrees was less than the difference in proportion of women with graduate degrees. Therefore, the hypothesized difference in educational

qualification of female and male directors was found for undergraduate and graduate

degrees but not postgraduate degrees

Table 3b

Chi-Square test for the homogeneity of populations of female and male directors on profession

Profession Category	Finance	HRM	Law	Operations	Education & Research	Marketing & Sales	Government	Engineering & Technology
Women	31	11	7	45	15	18	14	6
Men	64	5	8	94	15	18	7	8
N	95	16	15	139	30	36	21	14
Chi-Square	11.463	2.250	0.067	17.273	0.000	0.000	2.333	0.286
df	1	1	1	1	1	1	1	1
Asymp. Sig.	0.001	0.134	0.796	0.000	1.000	1.000	0.127	0.593

Hypothesis 8a: Type of professional experience of female directors will be significantly different from that of male directors

On the nominal parameter of profession, the population distribution of female

directors was different from that of male directors in the categories of finance and

operations. Female and male representation is near equal in the fields of Education &

Research and Marketing & Sales. Female representation exceeds that of men in the areas

of Human Resource Management and Government. However, the magnitude of

difference in fields where female representation exceeds than of men is dwarfed by the

proportion of difference in the fields where male representation exceeds that of women.

This is highlighted by the difference in distribution in the professions of Finance and

Operations. Therefore, the hypothesis is partially supported in that there distribution of

women is different from that of men in two of the eight categories professional categories

represented.

Figure 9a

Representation of public company directors by profession
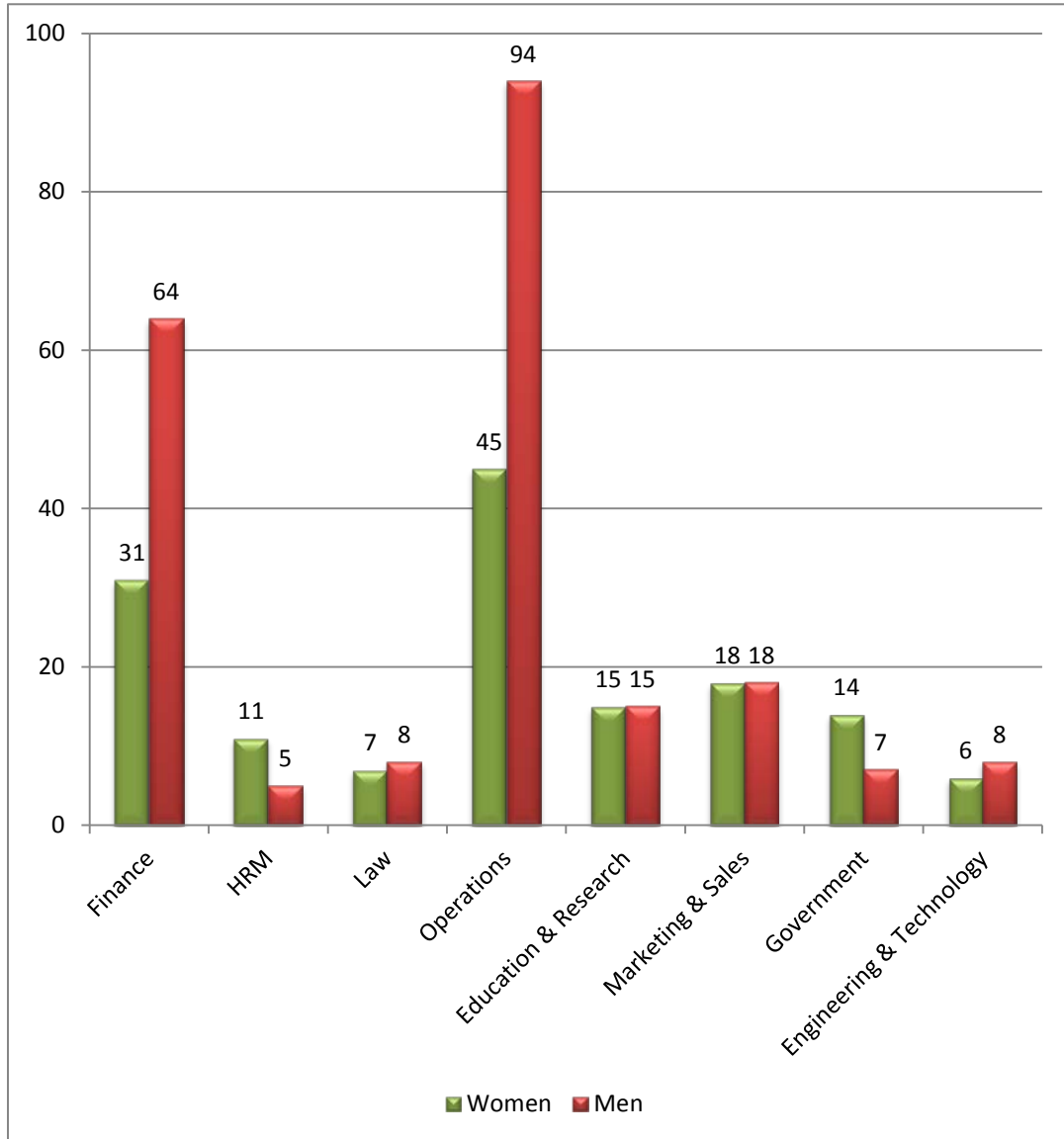
Table 3c

Chi-Square test for the homogeneity of populations of female and male directors on role

Role Category	Public company CEO	Private company CEO	Entrepreneur	Non-board CXO	Professional Director/Advisor
Women	8	25	12	57	45
Men	45	43	13	45	73
N	53	68	25	102	118
Chi-Square	25.830	4.765	0.040	1.412	6.644
df	1	1	1	1	1
Asymp. Sig.	0.000	0.029	0.841	0.235	0.010

Hypothesis 9a: Female directors will tend to occupy non-CEO roles in greater numbers than male directors

On the nominal parameter of role, the distribution of female directors was different from that of male directors in the roles of public company CEO, private company CEO and professional director/advisor. It is common knowledge that women are acutely under-represented in organizational leadership positions of public companies. That this feature is common to private companies also was not known. In fact, according to the business press women turn to the private companies in order to get to the kind of leadership positions that they are unable to in the public companies. Yet, from the data in the Table 3c, it appears that from the role of non-board CXO, women appear to diminish in numbers at all the next levels. The summary conclusion to be drawn is that women directors are drawn from a much narrower field than men.

Figure 9b

Representation of public company directors by role
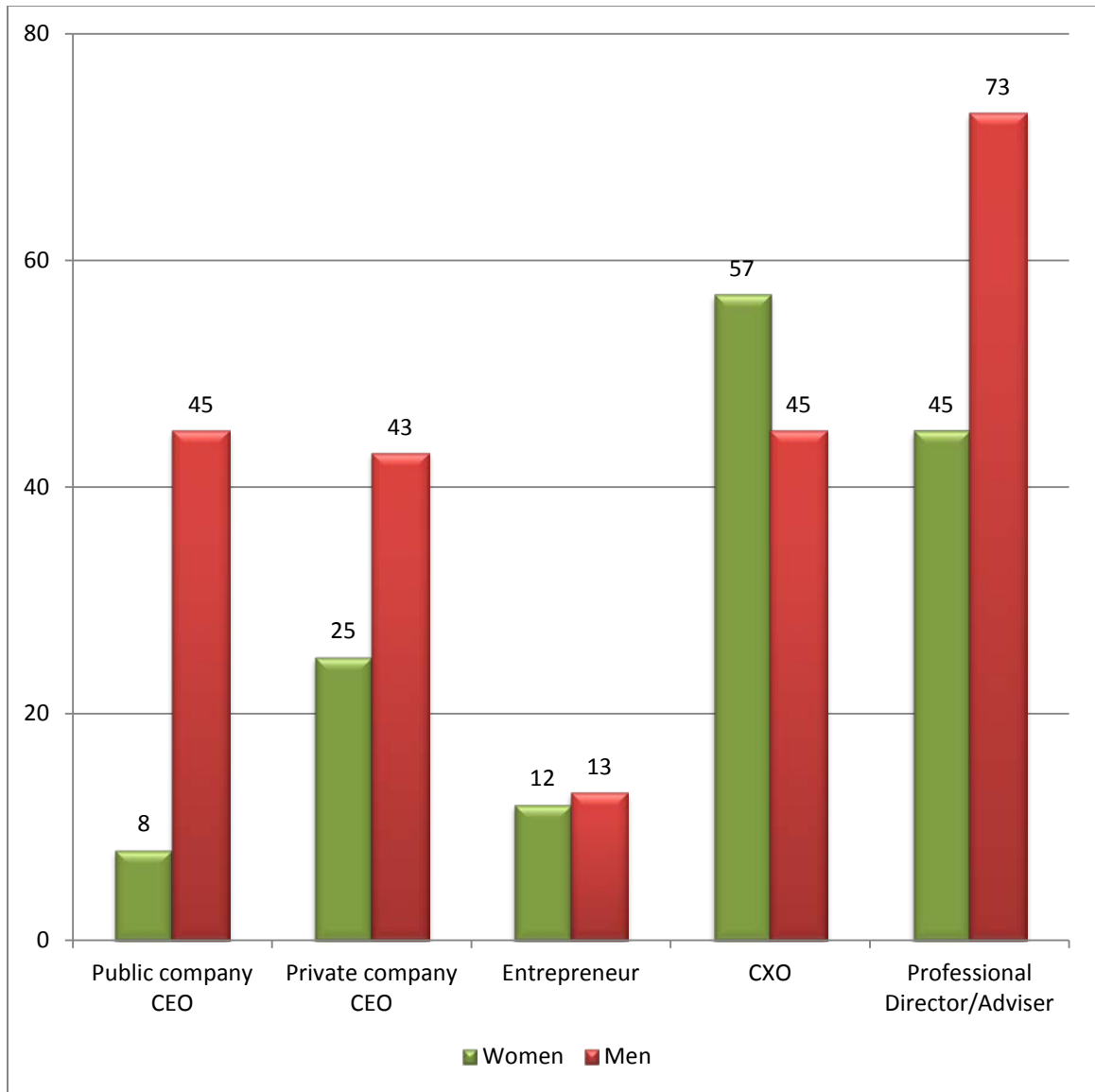
Figure 9c

Representation of public company directors by profession and role

	Public company CEO	Private company CEO	Entrepreneur	Non-board CXO	Professional director
■ Finance	5	11	9	25	45
■ HRM	0	2	1	9	4
■ Law	1	3	1	5	5
■ Operations	39	28	8	25	39
■ Education & Research	0	14	3	9	4
■ Marketing & Sales	7	3	3	14	9
■ Government	0	6	0	8	7
■ Engineering & Technology	1	1	0	7	5

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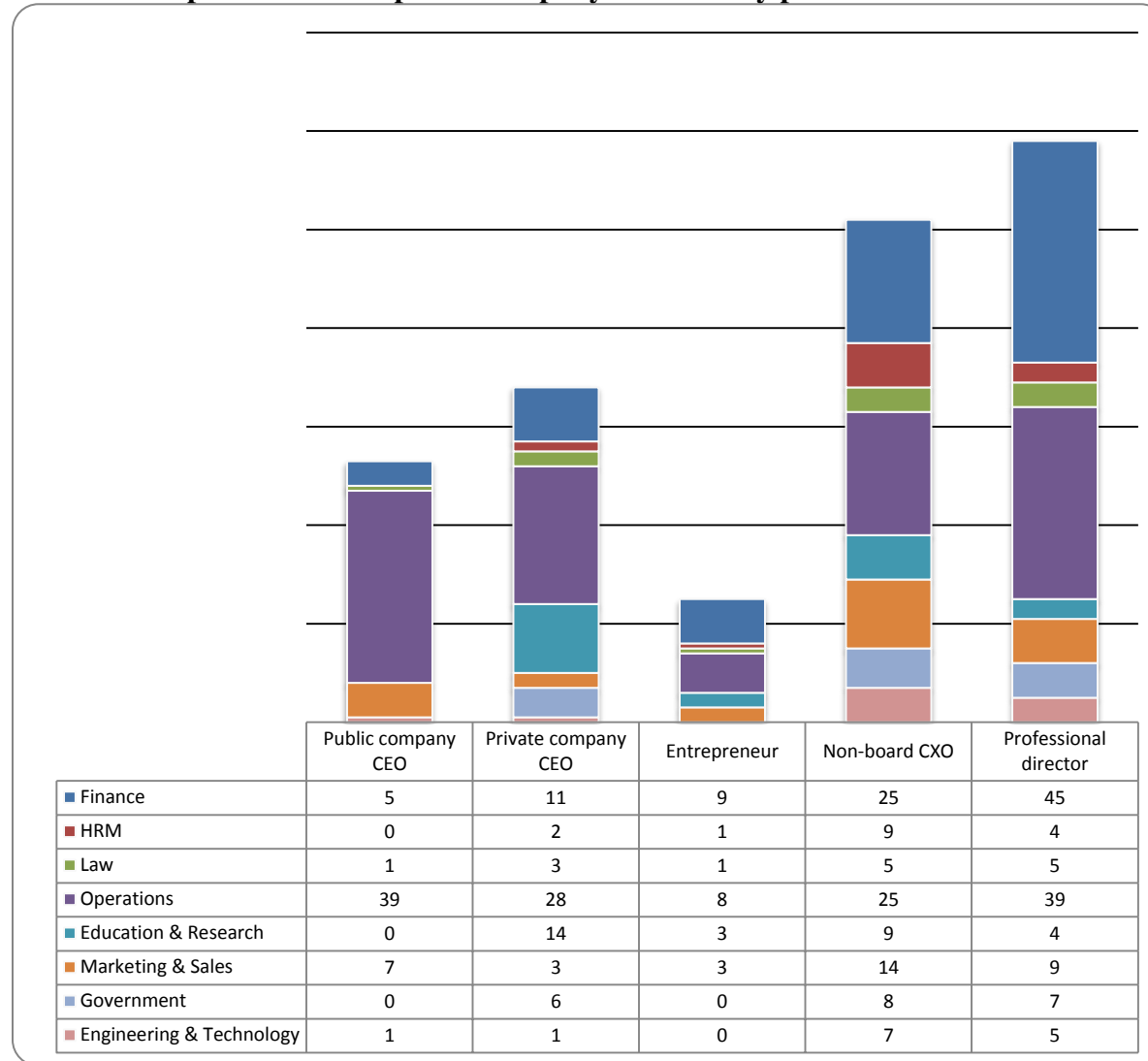
5.1.1.3 Summary of the results of hypothesized differences in characteristics of female and male directors

In this section, I presented a summary of the results of tests of hypotheses pertaining to the differences between female and male independent directors of public companies. I found that the hypothesized differences held true for differences in graduated parameters age, power in professional network and centrality in the collegial network. Differences that were hypothesized on nominal parameters (categorical variables) were also found to be true for professions and roles held by men and women on the boards of public companies. These results are presented in Table 4.

On graduated parameters, hypothesized differences that were not found to hold good were for greater number of CEO alters in the professional networks of women, lower coefficient of power for women in their leader network, lower coefficient of centrality for women in their leader network. On nominal parameters, hypothesized difference between female and male directors on educational qualification was not found to be true.

To sum the differences between men and women serving on the board of public companies, women were younger, held different roles than did men, were from different professions than were men. In terms of their professional networks, on average women had more well-connected alters or were more connected to well-connected alters in their professional networks and were more central in their collegial networks than were men. But, men had a greater number of CEO alters in their professional network than did women, were more powerful and central in their leader networks as well as their networks being more cohesive than those of female directors.

Table 4

Summary of hypotheses tested for differences in characteristics of female and male directors of public companies

Hypotheses	Finding	Statistics
Hypothesis 1a: Age of female directors will be significantly less than that of male directors	Supported	$\overline{x}_f = 53.99$ $\overline{x}_m = 56.27$ MD = -2.28***
Hypothesis 2a: Female directors will have significantly more prior private company board experience than male directors	Unsupported	$\overline{x}_f = 1.05$ $\overline{x}_m = 1.36$ MD = -0.31*
Hypothesis 3a: Professional networks of female directors will comprise significantly more CEO alters than those of male directors	Unsupported	$\overline{x}_f = 52.48$ $\overline{x}_m = 67.65$ MD = -15.17
Hypothesis 4.1a: Female directors will have a higher coefficient of power in their professional network than male directors	Supported	$\overline{x}_f = 1.70$ $\overline{x}_m = 1.45$ MD = 0.35**
Hypothesis 4.2a: Female directors will have a lower coefficient of power in their leader network than male directors	Unsupported	$\overline{x}_f = 21.35$ $\overline{x}_m = 21.53$ MD = -0.18
Hypothesis 5a: Leader networks of female directors will be less cohesive than those of male directors	Unsupported	$\overline{x}_f = 45.41$ $\overline{x}_m = 47.58$ MD = -2.17
Hypothesis 6.1a: Female directors will occupy a more central position in their collegial network than male directors	Supported	$\overline{x}_f = 47.86$ $\overline{x}_m = 41.60$ MD = 6.26**
Hypothesis 6.2a: Female directors will occupy a less central position in their leader network than male directors	Supported	$\overline{x}_f = 0.74$ $\overline{x}_m = 0.76$ MD = -0.02
Hypothesis 7a: Educational qualification of female directors will be significantly different from that of male directors	Partially Supported	**Undergraduate** $\chi^2 = 3.72$* **Graduate** $\chi^2 = 12.98$*** Postgraduate $\chi^2 = 0.11$ p = 0.74
Hypothesis 8a: Type of professional experience of female directors will be significantly different from that of male directors	Partially supported	**Finance** $\chi^2 = 11.46$*** HRM $\chi^2 = 2.25$ p = 0.13 Law $\chi^2 = 0.07$ p = 0.80 Education & Research

		$\chi^2 = 0.00$ p = 1.00 Government $\chi^2 = 2.33$ p = 0.13 Engineering & Technology $\chi^2 = 0.29$ p = 0.59 **Operations** $\chi^2 = 17.27$*** Marketing & Sales $\chi^2 = 0.00$ p = 1.00
Hypothesis 9a: Type of role occupied by female directors will be significantly different from that of male directors	Partially Supported	**Public company CEO** $\chi^2 = 25.83$*** **Private company CEO** $\chi^2 = 4.77$* Entrepreneur $\chi^2 = 0.04$ p = 0.84 Non-board CXO $\chi^2 = 1.41$ p = 0.24 **Professional director/Advisor** $\chi^2 = 6.64$**

MD = Mean difference
Significance indicated is for difference in rank distribution for graduated parameters and Chi square difference for nominal parameters
*** $p < 0.001$
** $p < 0.01$
* $p < 0.05$
† $0.05 < p < 0.1$

Graduated parameters are a proxy for the hierarchical levels in a population; therefore they are markers of inequality. In this situation, graduated parameters indicate the axes along with women are found unequal to men. Being younger puts women at a disadvantage in a boardroom where others hold an advantage in years; similarly, for the effects of network variables.

Professional network attributes of women indicate that not only are they more resourceful in terms of lower levels of hierarchy, which is indicative of having less useful resources but they are also less resourceful in leader networks. Taken together, women are disadvantaged by both being more connected to lower levels and less connected to higher levels on the organizational population. Two professional networks variables on which women are significantly different from men are power in the professional network and centrality in the collegial network. Comparing the differences in average values on other network variables, it is evident that though women are only very little lower than men, on average values of network variables; they hold higher average values for the two variables that correspond with networks of colleagues and subordinates. Given that the networks in this study are purely positional, not relational, the statistics are a manifestation of the relatively longer periods of time that women spend in the middle tiers of organizations relative to men (See description of the design of networks in Chapter 4, pg. 57)

Among nominal variables, women were significantly differently represented in categories of all nominal variables. In education, there were relatively fewer women with undergraduate and graduate degrees, whereas women with postgraduate degrees

exceeded men. As far as the professions they are affiliated to and roles they occupy in organizations, I find that women are represented in disproportionately larger numbers in the professions of human resource management and government; whereas men are most likely to be found in greater numbers on finance and operations. Among role categories, women were found in greater numbers than men only in the category of non-board CXO. Taking the two results on profession and role together, it becomes clear that if women who are CXOs in the fields of human resource management or in equivalent roles in government are more likely to be able to access board positions. Based on the fact that these professions are mostly "support" and not "line" in the organizational structure; such professions are unlikely to equalize women in the board structure. To add to that, the role of a non-board CXO, while being that of a leader, is still a more narrowly defined leader role than that of a COO or CEO. CXO refers to a well-defined, therefore restricted functional expertise, in a particular aspect of the organization. By default, this expertise then limits the extent to which a board member who is a CXO can contribute or participate in governance proceedings. As such, these preliminary results indicate that inequality, more than heterogeneity is evident in corporate boardrooms, with respect to the characteristics of female and male directors.

5.1.2 Tests of hypothesized differences in effects for female directors, relative to male directors

In the previous section, I highlighted the different dimensions on which female and male directors are different. The objective of studying the differences was to understand how the differences get manifested as inequality in opportunity for the different groups. I will begin with analysis of the logistic regression of the appointment of women, relative to men, conducted on the entire sample, while controlling for whether it is a first appointment. Next I will analyze odds of a first appointment, relative to that of an experienced appointee, while controlling for the sex of the appointee. Both of these analyses are done on the complete sample of 366 directors. In the next set, I examine effects of human capital and professional network variables on sub samples of men and women in one set and first-time and experienced appointees in the other set.

The regression model is that predicting the odds of appointment of a woman, relative to the odds of the appointee being a man. In this model, apart from the control variables – board size, proportion of women on the board, sex of the CEO and the structure of board leadership i.e. chairman-CEO duality, odds of female board appointment was tested for the effect of human capital and professional network variables. The results, given in Table 5 below, show the effect of the independent variables on the likelihood of women being appointed to the board of a public company.

To begin with, the model is well specified resulting in a Chi-Square statistic of 80.35 with 25 degrees of freedom and p value less than 0.001. Minus two log likelihood test statistic decreased from 493.13 for the null model to 490.36 for the model with only control variables to 412.78 for the final model. A decreasing minus two log likelihood is

indicative of the increasing improvement model from inclusion of independent variables. Appropriate model specification is also indicated by the Chi-Square statistic from Hosmer-Lemeshow Test Chi-Square value, 10.91 which is non-significant at a p value of 0.21. Therefore, all indicators of good model specification are evident. However, good model specification is not necessarily adequate for predictive ability of the model. Predictive accuracy of a model is dependent on the cut-off percentage chosen for a model. Common norm for cutoff value is 0.5. The implication of a cutoff point of 0.5 is that cases with the predicted probability of values that can be approximated to 0.5 are just as likely to be classified as occurring or non-occurring as cases with higher or lower predicted probabilities. Therefore, accuracy in prediction is a less powerful indicator of model specification than the Chi-Square measures based on standard error. Another measure of model specification is Nagelkerke R-square, which is analogous to R-square calculated during linear regression to measure the extent to which independent variable explain variance in the values of the dependent variable. In the model presented in Table 5, the Nagelkerke R-square is 0.27 which can be read to indicate that 28 percent of the variance in the predicted probability of women being appointed to a public company board is explained by the set of independent variables. In other words, there are other factors beyond human capital and professional network variables that have a far greater impact on the prediction of probability of women being appointed to public company boards.

Table 5
Logistic regression of appointment of women, relative to men

Independent Variables	Female		
	B	**S.E.**	**Exp(B)**
Statistical Control Variables			
Board Size	0.02	0.03	1.02
Proportion of women on the board	-1.40	1.70	0.25
Separated CEO/Chairperson role	-0.17	0.27	0.84
Female CEO	0.51	0.50	1.66
Predictor Variables			
Age	-0.06**	0.02	0.94
Undergraduate	0.09	0.23	1.10
Graduate	-0.17	0.19	0.84
Postgraduate	0.08	0.31	1.09
Public company CEO	-1.23***	0.36	0.29
Private company CEO	-0.23	0.27	0.79
Entrepreneur	0.59	0.38	1.80
Non-board CXO	0.68**	0.23	1.97
Professional director	0.19	0.23	1.21
Finance	-0.67*	0.28	0.61
Human Resource Management	0.50	0.56	1.65
Law	-0.28	0.53	0.76
Operations	-0.46†	0.25	0.63
Education & Research	0.04	0.43	1.04
Marketing & Sales	0.15	0.39	1.16
Government	0.95*	0.49	2.57
Engineering & Technology	-0.22	0.59	0.80
Prior private company directorships	-0.10†	0.06	0.91
No. of CEOs in the network	-0.01*	0.00	0.99
Power in professional network	0.27†	0.16	1.31
Power in leader network	0.00	0.01	1.00
Cohesion in leader network	-0.00	0.01	1.00
Centrality in collegial network	0.03***	0.01	1.03
Centrality in leader network	-0.29	0.87	0.75

Goodness-of-fit Measures	Value	df	Sig.
Model Chi-square	80.35	25	0.00
Hosmer-Lemeshow Chi-square	10.91	8	0.21
Nagelkerke R Square	0.27		
	Female	Male	Overall
Prediction Accuracy %	52.3	80.8	68.6

N = 366
*** p < 0.001
** p < 0.01
* p < 0.05
† 0.05 < p < 0.1

Given that the dependent variable is binary – the odds of appointment of women or the odds of appointment of men; the values of the logistic regression for the two outcomes mirror the other. Therefore, a variable that has a negative effect on one outcome has a positive effect on the prediction of the other and it is inverse in value. For instance, as a woman grows a year older, her odds of appointment to a public company board reduces by 0.06 times, whereas as men grow older their odds of appointment increase 0.07 times.

From the model indicated above, primarily it is obvious that human capital variables contribute negatively and professional network variables contribute positively to the prediction of appointment of women to public company boards. Among human capital variables, age, organizational roles – public company CEO and non-board CXO, profession of finance are significant in their effect. Among professional network variables, centrality in collegial network and power in professional network both significantly impact the prediction of appointment of women as independent directors.

I will now discuss each of the hypothesized effects individually. Then, the effects will be analyzed in terms of graduated and nominal parameters of a social system rather than human capital and professional network variables of individuals. The objective being not only to consider the social system as a collective of individuals but also the patterns of distribution of various characteristics that will bring to light underlying structural properties that enable or bar the evolution of the social system. After discussing the results of the logistic regression shown in Table 5, I will revisit the previous section on the differences between female and male directors and summarize the results from

differences tests along with the results of the effects test to draw a singular image of the social system consisting of public company directors.

5.1.2.1 Effects of graduated parameters on the odds for female directors, relative to male directors

Hypothesis 1b: Likelihood of board membership for women will be negatively impacted by their age, relative to the likelihood for men

As hypothesized, age does negatively impact the likelihood of directorship for women relative to the odds for men (B = -0.06, p < 0.001, Exp(B) = 0.94). Though there is a significant negative effect, the size of the effect is quite small, reducing the odds for women by less than ten percent.

Hypothesis 2b: Likelihood of board membership for female directors will be negatively impacted by prior private company board experience, relative to the likelihood for men

Prior private company board experience was found to be marginally significant in predicting the odds of female board appointment (B = -0.10, p = 0.09, Exp(B) = 0.91). From the statistics, it is evident that the effect is negative but the magnitude of the effect is very small. This could possibly be due to the small difference in the mean value of the variables (See table 2), though the rank distribution of the number of prior private company directorships held was significantly different for women than for men.

Hypothesis 3b: Likelihood of board membership for women will be positively impacted by the number of CEO alters in their professional network, relative to the likelihood for men

The number of CEOs in their professional network did have a significant positive effect on the odds for women to obtain directorship (B = -0.01, p < 0.05, Exp(B) = 0.99).

But, as evident from the value of standardized coefficient and odds ratio [Exp(B)], the effect is neutral and therefore equally non-substantial for both groups.

Hypothesis 4.1b: Likelihood of board membership for women will be positively impacted by the coefficient of power in their professional network, relative to the likelihood for men

Power in professional network was only marginally significant (B = 0.27, p = 0.08, Exp(B) = 1.31). Odds of board appointment for women are found to increase with their power in the professional network. For every unit increase in power, which means increasing connections with people who are well-connected, the odds of board membership for women increased by nearly half that for men.

Hypothesis 4.2b: Likelihood of board membership for women will be negatively impacted by the coefficient of power in their leader network, relative to the likelihood for men

The effect was not found to be significant for the relative odds of board membership for women (B = -0.0004, p < 0.97, Exp(B) = 1.00). Not only was the variable not significant, it was also non-substantial with an equal null effect for both men and women. It is not surprising considering not only the difference in mean value but also the dispersion of values on this variable is very similar for men and women (See Table 2).

Hypothesis 5b: Likelihood of board membership for women will be negatively impacted by the cohesion of their leader network, relative to the likelihood for men

Cohesion in leader network (B = -0.004, p = 0.64, Exp(B) = 1.004), both had non-significant and non-substantial effects for odds of female board membership. Though non-significant and non-substantial, it is interesting to see that the effects are in opposite

directions. Therefore, the hypothesized relation between cohesion in the leader network and odds for board membership were not founded for effect and but found support for direction, though not definitively.

> *Hypothesis 6.1b: Likelihood of board membership for women will be positively impacted by their centrality in the collegial network, relative to the likelihood for men*

> *Hypothesis 6.2b: Likelihood of board membership for women will be negatively impacted by their centrality in the leader network, relative to the likelihood for men*

Centrality in the collegial network (B = 0.03, p < 0.001, Exp(B) = 1.03) has a small but significant effect. This is unexpected given the difference in mean values and the significant difference in dispersion. Centrality in the leader network, as expected given the non-significant difference in mean value as well as dispersion; has a more pronounced effect in terms of size of the effect and in the direction hypothesized but it is a non-significant factor (B = -0.29, p = 0.83, Exp(B) = 0.75).

5.1.2.2 Effects of nominal parameters on the odds for female directors, relative to male directors

Hypothesis 7b: Likelihood of board membership for women will not be significantly impacted by their educational qualification alone, relative to the likelihood for men

I did not find support for the hypothesized relationship between educational qualification and odds of board membership. Educational qualification was tested by creating dummy variables indicating each of the three levels – undergraduate, graduate and postgraduate education. Neither of the levels had a significant effect.

Hypothesis 8b: Likelihood of board membership for women will be positively impacted by their experience in non-line functions, relative to the likelihood for men

Among the eight categories of professional affiliation that were tested for effects on odds of directorship for women, finance and government had a statistically significant effect. Of the two, finance had a negative effect on women's odds of board appointment while government had a positive effect. Other non-line professions like human resource management, law and engineering and technology were not significant in their effect on odds of board membership for women. Among the two line professions – operations and marketing & sales; operations was marginally significant but the effect was negative for women.

Being a finance professional (B = -0.67, p < 0.05, Exp(B) = 0.61) had a statistically significant effect but not in the direction hypothesized. A female finance professional's odds of board membership were reduced by half to be about one-third times as likely to be a director of a public company as a male finance professional. Being

a government professional (B = 0.95, p = 0.05, Exp(B) = 2.57) has a positive effect on the odds of appointment to a public company board by almost one and half times.

Being an operations professional, which most CEOs were found to emerge from (See Figure 6c), was found to be the only significant line profession but, it was only marginally significant (B = -0.46, p = 0.07, Exp(B) = 0.63). It had the negative effect of reducing the odds for board appointment for women to nearly a third that for men.

Hypothesis 9b: Likelihood of board membership for women will be negatively impacted by their occupation of non-CEO roles, relative to the likelihood for men

From table 5, it is evident that role categories contributed more towards the effects on likelihood of board membership for women, than did profession. Among the five role categories tested for, it was found that being a public company CEO had a significant but negative factor (B = -1.28, p < 0.001, Exp(B) = 0.28). For a woman, the odds of being appointed a director of another company while in the role of a public company CEO is reduced by nearly 0.7. In terms of likelihood, becoming a public company CEO makes a woman ten times less likely to be appointed to the board of another company, than a male public company CEO. However, being a non-CEO head for a functional area, commonly referred to as non-board CXO to include chiefs of finance, technology, marketing to name a few, increases the odds of being appointed a director for women to nearly twice that is they were not. Therefore, female CXOs (B = 0.69, p < 0.01, Exp(B) = 1.99) are four times as likely as male non-board CXO to be appointed to public company boards.

5.1.2.3 Summary of hypothesized effects on the odds for female directors, relative to male directors

In the preceding section, I described the results of the test for effects of graduated and nominal parameters on the odds for women of board membership in public companies, relative to men. In summary, the test indicated that nominal parameters, in terms of profession and role had the biggest effect on the odds for women. While more graduated parameters were significant, the effect size was marginal compared to nominal parameters. The summary of hypothesized results is presented in Table 6.

Nominal parameters are those that create heterogeneity in a social system. If the parameters that are intended to create heterogeneity are all mostly non-significant, the implication is that structuring mechanisms in the social system favor homogeneity in terms of such nominal parameters. Similarly, in terms of graduated parameters, it is clear that in terms of size, their effect is very small. As such, graduated parameters are defined as those that create inequality are also seen as failing to do so in the social system of corporate directors.

To conclude, in the process of board composition, nominal parameters are found to be promoting homogeneity and graduated parameters are seen to be creating equality, between men and women, within corporate boardrooms. The big picture therefore appears to imply that men and women of only a particular kind will find a place on a corporate board and they will be mostly equal. The other side of the picture is that the social system is closed to anyone who does not conform to the norms set by the nominal and the systems offers no room for growth, indicated by equalized graduated parameters.

Table 6

Summary of hypothesized effects on the odds for female directors, relative to male directors

Hypothesis	Finding	Statistic
Hypothesis 1b: Likelihood of board membership for women will be negatively impacted by their age, relative to the likelihood for men	Supported	B = -0.06*** Exp(B) = 0.94
Hypothesis 2b: Likelihood of board membership for female directors will be negatively impacted by prior private company board experience, relative to the likelihood for men	Marginally Supported	B = -0.10† Exp(B) = 0.90
Hypothesis 3b: Likelihood of board membership for women will be positively impacted by the number of CEO alters in their professional network, relative to the likelihood for men	Significant; Null effect	B = 0.00* Exp(B) = 1.00
Hypothesis 4.1b: Likelihood of board membership for women will be positively impacted by the coefficient of power in their professional network, relative to the likelihood for men	Marginally Supported	B = 0.31† Exp(B) = 1.37
Hypothesis 4.2b: Likelihood of board membership for women will be negatively impacted by the coefficient of power in their leader network, relative to the likelihood for men	Unsupported	B = 0.00 Exp(B) = 1.00
Hypothesis 5b: Likelihood of board membership for women will be negatively impacted by the cohesion of their leader network, relative to the likelihood for men	Unsupported	B = -0.01 Exp(B) = 0.99
Hypothesis 6.1b: Likelihood of board membership for women will be positively impacted by their centrality in the collegial network, relative to the likelihood for men	Supported	B = 0.03*** Exp(B) = 1.03
Hypothesis 6.2b: Likelihood of board membership for women will be negatively impacted by their centrality in the leader network, relative to the likelihood for men	Unsupported	B = -0.19 Exp(B) = 0.83
Hypothesis 7b: Educational qualification of women will have a positive impact on the likelihood of board membership for women	Unsupported	Undergraduate B = 0.12 p = 0.61 Graduate B = -0.17 p = 0.36 Undergraduate B = 0.06 p = 0.85
Hypothesis 8b: Being affiliated to non-line professions, will increase the likelihood of board membership for women	Partially supported	**Finance** **B = -0.67*** **Exp(B) = 0.51** HRM B = 0.51

		p = 0.36
		Law B = -0.25 p = 0.64
		Education & Research B = -0.01 p = 0.98
		Government B = 0.87* Exp(B) = 2.39
		Engineering & Technology B = -0.21 p = 0.72
		Operations B = -0.41† p = 0.11
		Marketing & Sales B = 0.17 p = 0.66
Hypothesis 9b: Likelihood of board membership for women will be negatively impacted by their occupation of non-CEO roles, relative to the likelihood for men	Partially supported	**Public company CEO B = -1.27*** Exp(B) = 0.28**
		Private company CEO B = -0.25 p = 0.36
		Entrepreneur B = 0.61 p = 0.11
		Non-board CXO B = 0.69** Exp(B) = 1.99
		Professional director/Advisor B = 0.23 p = 0.34

*** p < 0.001
** p < 0.01
* p < 0.05
† 0.05 < p < 0.1

5.1.3 Summary of tests of differences in characteristics and effects for its impact on the composition of corporate boards

Naturally, the factors on which female and male directors are differentiated are also the factors that create differential effects for them. Therefore, the differences in characteristics and effects have to be congruent with each other. From the Mann Whitney U test results (Table 2), where the mean values for both groups were also indicated, we know that female directors are different from male directors on age, private company board appointments, power in professional network and centrality in collegial networks. They are also unequally distributed among the categories of profession and role.

From the logistic regression results (Table 5), it is seen that these same set of variables significantly affect odds of female appointment relative to male board appointment. The only variable that is different in terms of distribution but not effect is previously held private company directorships. The explanation for this lies in the different scales that underlie measurement in MWU test and logistic regression. MWU tests difference in distribution based on ranking on cases in terms of the dimension being tested, whereas logistic regression is based on mean differences. Hence, the variable 'prior private company board appointments' being significant in MWU test and not in logistic regression indicates that while there is not much difference in the average number of prior private company board appointments (Tables 2 and 4), there is difference in the frequency distribution of the variable (See Appendices 1a and b for frequency distribution tables). On the other hand, for 'number of CEO alters' while there is not much difference in the dispersion, there is a large difference in the average. Hence, while 'number of CEO alters' is a significant variable in terms of odds of appointment; its

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effect is actually null. After taking into consideration the statistical features of the results, the differences between female and male directors, in terms of graduated and nominal parameters are shown in Table 7.

On graduated parameters therefore, women are found to be significantly younger and that has a negative effect on the odds of appointment for women. The implication of the negative effect is that as for every year's increase in their age, women's odds of a board appointment decrease. Women have fewer private company board appointments than men and effect is marginally significant factor at a p value of 0.09. Therefore, it can be inferred that though marginally significant, prior experience on private boards does negatively impact their odds of appointment to public company boards. The average number of CEO alters in the network of male directors is quite larger than that in the professional network of female directors. Yet, due to a more equalized dispersion, the effect on odds of public company board appointment is equal for men and women. On the coefficients of power and centrality, women are better positioned than men in the networks that are not comprised solely of leaders. In other words, women are more central and powerful in the networks that include not only leaders but also colleagues and subordinates. Hence, the effect of these variables on their odds of public company board appointment is also positive.

In terms of nominal parameters, female and male directors were differentiated significantly in categories of education, profession and role. From Tables 3a, 3b and 3c, it is evident that the distribution of men and women in certain categories of education, profession and role is unequal. From the results of logistic regression, it is evident that

the odds of board appointment for women are significantly affected by the profession of finance and roles of Public company CEO and non-board CXO. It is common knowledge that there are very few women who head public companies; hence the negative effect of being a public company CEO is expected. It was not that commonly known that there are more women on the board of public companies who are non-board CXOs than other roles like entrepreneurs or professional advisors[4]. Nonetheless, being a non-board CXO, albeit without board membership in their company of primary employment, increases women's odds of being appointed to the board of another public company to nearly twice that of a man in a similar position.

Among professions, finance, government and operations emerged as significant differentiators; although significance of operations was only marginal. This was also unexpected as it is generally assumed that with more women on boards come from support functions while men rise from line functions. Apart from finance and government, none of the professions that can be classified as support functions in organizations like human resource management, law, research, or technology emerged as significant differentiators or factors. Of the two line professions – operations and marketing & sales, only operations emerged marginally significant. As expected, effect of being operations professional for women was negative; given the scarcity of women in line functions in organizations.

To conclude, from the tests of differences and effects, it is evident that the social system of corporate directors is fairly homogenous with men and women being differently distributed only on six of the fifteen categories defined in all for education,

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[4] Survey of women directors on boards of Fortune 1000 companies, 2012, by CT Patrners.

professions and roles. Similarly, on graduated parameters, it is found that men and women are fairly equivalent being significantly different in average value of only four of the eight graduated parameters. In post-hoc analysis, whether this result holds well on deeper analysis will be seen in the following sections.

Table 7
Differences between female and male directors on graduated and nominal parameters

Significant differences in characteristics	Value of difference $(\overline{x}_f - \overline{x}_m)$ (Chi sq. coefficient of $N_f - N_m$)
Graduated Parameters	
Age	(-) 2.28***
Prior private company directorships	(-) 0.31*
Power in professional network	(+) 0.35**
Centrality in collegial network	(+) 6.26**
Nominal Parameters	
Undergraduate	(-) 3.72*
Graduate	(-) 12.98***
Finance	(-) 11.46***
Operations	(-) 17.27***
Public company CEO	(-) 25.83***
Private company CEO	(-) 4.77*
Professional director/Advisor	(-) 6.64**
Significant differences in effects (for women compared to men)	**Effect on odds ratio** (increase/decrease in odds ratio)
Graduated Parameters	
Age	(-) 0.06**
Prior private company directorships	(-) 0. 09†
Number of CEO alters	(-) 0.01*
Power in professional network	(+) 0.31†
Centrality in the collegial network	(+) 0.03***
Nominal Parameters	
Finance	(-) 0.39*
Government	(+) 1.57*
Operations	(-) 0.37†
Public company CEO	(-) 0.71***
Non-board CXO	(+) 0.97**

*** $p < 0.001$
** $p < 0.01$
* $p < 0.05$
† $0.05 < p < 0.1$

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5.2 POST-HOC ANALYSIS WITHIN AND BETWEEN GROUPS OF FEMALE AND MALE DIRECTORS

In the previous sections, differences between men and women were brought to light and discussed with reference to the experiences of women on boards. But, the differences found and discussed in the previous sections pertained to the population of men and women as a homogeneous groups. I found that perhaps, the differences are not as equally prevalent within the groups of men and women, if they were differentiated internally. To this purpose, I then segregated the groups of men and women into two further categories based on their level of experience on boards of public companies to perform post-hoc analysis on differences within groups and between the sub-divided groups.

Having four groups now, first-time and experienced, female and male directors, I was able to use one-way analysis of variance to explore for differences in graduated parameters among these four groups. To test for differences along nominal parameters and such that more information than mere existence of difference could be obtained, I continued to use Chi square tests.

For both graduated and nominal parameters, I first present the data for differences on all parameters tested, both graduated and nominal for all sub-groups. Then between-group differences - first the differences between first-time male and female directors, then that between experienced female and male directors and finally between incongruent pairs of first-time female and experienced male as well as experienced female and first-time male directors - are presented and discussed. Finally, the differences within the

groups of female and male directors i.e. first-time and experienced female and male directors are described.

5.2.1 Post-hoc Analysis of differences in characteristics within and between groups of female and male directors

In section 5.1, I showed the differences in characteristics and effects between male and female directors. According to those results, the corporate director social system is fairly homogenous on nominal parameters and equalized with regard to graduated parameters. However, there is an underlying assumption to those tests that the two groups of female and male directors are within themselves fairly homogenous, in other words not differentiated in any specific pattern.

The groups, however, are differentiated in a specific pattern by their experience on public company boards. The sample can be divided into sub-samples of first-time and experienced directors. The sample can be divided into four distinct groups differentiated by sex and experience – first-time, female and male directors; experienced, female and male directors. For any given organizational position, the criteria that define a first-time worker is quite distinct from that an experienced worker. A first-time worker is evaluated on the potential to perform the defined task, whereas an experienced worked is evaluated on the evidence of previous performance. I expect similar patterns in the case of directors as well based on the findings in literature regarding various factors like socialization, ingratiation, and professional credentials being important factor in director appointment.

Due to smaller size of the sub-samples, I used modified versions of the categorical variables – role and profession. The five role categories were compressed into four. That

was the maximum extent of compression possible without losing important information. Role has emerged as a very significant factor and I did not want to lose any information. Yet, I had to build a sparser model, given the truncated samples of much smaller size. Therefore, I combined the role categories of private company CEOs and entrepreneurs. Going back to the raw data, it emerged that most of the entrepreneurs were operational in the private sector and as such, by combining the categories, I was not losing any of the integrity of the variable. In the case of profession which originally has eight categories, it was more difficult to maintain the information capability of the variable while keeping the model sparse. With the exception of finance and operations, the difference between the men and women, in comparable groups (based on experience), in terms of professional affiliation is not significant (See Table 3b). Secondly, the two categories are heavily populated, possibly resulting in an undue influence on the effect of the variable. Therefore, I combined all categories except finance and operations to form one category that referred to professions that were not finance and operations. The re-categorized variable had three categories of size 95, 132 and 139.

In the following sections, I will describe the results of tests of differences in characteristics (Games-Howell Post-hoc test) and effects (logistic regression) on each of the four sub-samples. Each of the sub-groups will be tests as pairs due to the nature of logistic regression. Four pairs will be analyzed – First-time female and male directors, experienced female and male directors, first-time female and experienced male directors and finally experienced female and first-time male directors. The hope is that every possible scenario is analyzed for odds of opportunities for women to obtain a position on

a public company board. The objective is to unpack the effects seen in the regression model built and analyzed in the preceding section.

Considering that I was unable to find studies that differentiated between first-time and experienced directors, the results of this differentiation can be expected to contribute to a substantial gap in the literature.

5.2.1.1 Test of differences between first-time and experienced, female and male directors, on graduated parameters

For differences on graduated parameters for the four groups of first-time and experienced, female and male directors, I used a one-way analysis of variance with a post-hoc Games-Howell test as the groups are of varying size and variance. One-way analysis of variance is in itself unsuitable for analysis for samples that do not meet the assumptions of normality. But, the Games-Howell post-hoc test of analysis of variance, which is the statistic of evaluation in this section, was developed in order to test for differences among more than two groups taking into consideration both unequal group size and variance. The results of the analysis are given in Table 8 appended below. This analysis unpacks the analysis conducted in section 5.1 where groups of female and male directors were compared as unitary sets. In this section, I describe the characteristics of each of the sub-groups in relation to each other. As such it still throws light on the bigger picture without going into finer detail; albeit it is the big picture with finer granulation than the analysis in the previous section. Detailed differences between groups of female and male directors is presented in section 5.2.2, 5.2.3 and 5.2.4 and 5.2.5; while within-group differences are presented in section 5.3.

The data in Table 8 is presented as graphs in Figure 10 below. From the graph, it becomes clear that directors across experiences levels are differentiated more on professional network variables than on human capital variables, among graduated parameters. Greater differentiation on graduated parameters of human capital means that the four groups based on sex and experience are made unequal by their human capital characteristics more than the characteristics of their professional network.

Table 8

One-way Analysis of Variance to indicate the differences among first-time and experienced, female and male directors, on graduated parameters

Variable	Category	N	Mean	Games-Howell Multiple Comparison		Mean Difference	SE
	First-time Female Director	59	52.34	FFD	FMD	-0.78	1.12
	First-time Male Director	81	53.12	FFD	EFD	-2.75*	1.02
Age	Experienced Female Director	88	55.09	FMD	EMD	-4.99***	1.03
	Experienced Male Director	138	58.12	EFD	EMD	-3.03**	0.92
	First-time Female Director	59	0.56	FFD	FMD	0.04	0.33
Prior private company directorships	First-time Male Director	81	0.52	FFD	EFD	-0.82	0.39
	Experienced Female Director	88	1.38	FMD	EMD	-1.33***	0.24
	Experienced Male Director	138	1.85	EFD	EMD	-0.47	0.32
	First-time Female Director	59	57.00	FFD	FMD	-4.73	8.99
No. of CEO alters	First-time Male Director	81	61.73	FFD	EFD	7.55	7.83
	Experienced Female Director	88	49.45	FMD	EMD	-9.39	8.40
	Experienced Male Director	138	71.12	EFD	EMD	-21.67**	7.14

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Variable	Director Type	N	Mean			Coef.	SE
Power in Professional network	First-time Female Director	59	1.69	FFD	FMD	0.25	0.12
	First-time Male Director	81	1.44	FFD	EFD	-0.01	0.15
	Experienced Female Director	88	1.70	FMD	EMD	-0.01	0.10
	Experienced Male Director	138	1.45	EFD	EMD	0.25	0.14
Power in Leader network	First-time Female Director	59	14.80	FFD	FMD	0.92	1.52
	First-time Male Director	81	13.88	FFD	EFD	-10.94***	2.31
	Experienced Female Director	88	25.74	FMD	EMD	-12.14***	1.70
	Experienced Male Director	138	26.02	EFD	EMD	-0.29	2.44
Cohesion of Leader network	First-time Female Director	59	48.69	FFD	FMD	-6.81	3.26
	First-time Male Director	81	55.50	FFD	EFD	5.49	2.81
	Experienced Female Director	88	43.21	FMD	EMD	12.57***	2.46
	Experienced Male Director	138	42.93	EFD	EMD	0.28	1.82
Centrality in collegial network	First-time Female Director	59	42.23	FFD	FMD	11.97***	3.28
	First-time Male Director	81	30.26	FFD	EFD	-9.40*	3.12
	Experienced Female Director	88	51.63	FMD	EMD	-17.99***	2.58
	Experienced Male Director	138	48.25	EFD	EMD	3.38	2.37
Centrality in leader network	First-time Female Director	59	0.71	FFD	FMD	-0.06	0.03
	First-time Male Director	81	0.77	FFD	EFD	-0.06	0.03
	Experienced Female Director	88	0.77	FMD	EMD	0.02	0.02
	Experienced Male Director	138	0.75	EFD	EMD	0.01	0.02

*** $p < 0.001$
** $p < 0.01$
* $p < 0.05$
† $0.05 < p < 0.1$

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As seen in Table 8 above, on none of the parameters are all four groups significantly different from each other. Age is a significant differentiator only between experienced female and male directors as well as within groups of female and male directors. First-time female directors, it is evident, are not significantly different from each other with regard to age. The implication is that age is a greater penalty for those who have gained the necessary skills from previous experience on the board of public companies, than those seeking a board appointment for the first time.

In the previous section, we saw that prior private company board experience was not significantly different in terms of average value but in terms of dispersion between the groups. Resultant effect was also only marginally significant. The reason we can see now is that the groups actually significantly differentiated by the number of previously held private company directorships are first-time and experienced male directors. The difference between first-time and experienced female directors is also relatively large but not statistically significant.

Among network variables number of CEO alters in the professional network is significantly different only between the groups of experienced female and male directors. In the previous section, it was seen that power in professional network was a significant differentiator but non-substantial in terms of effect. From Table 8, it is evident that power in professional network was not a significant differentiator among any of the groups; hence its significance with respect to effect on the odds of female board appointment can be attributed to the difference in dispersion of the value between the groups of female and male directors. That the differentiator was the dispersion and not the man value is

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supported here. Though power in the leader network was not significant either in dispersion or effect in the previous section; now we see that it is actually significantly different within the groups of female and male directors. Being that the focus in the previous section was on between group differences, this was not at all seen in the previous section.

Cohesion in the leader network, on the other hand, is seen to differentiate within the group of male directors. We can see that the leader network of first-time male directors is significantly more cohesive than that of experienced male directors.

Coefficient of centrality in the collegial network differentiates within both female and male groups and only between the female and male groups of first-time directors. All four groups are homogenous in terms of coefficient of centrality in the leader network.

In conclusion, through post-hoc analysis using the Games-Howell test, it is clear that the there is some gradation within the groups of female and male directors. This contributes to greater variations in both between men and women as well as within their groups. By considering each pair separately, I will be able to show how each pair of groups is varied and the effects of this variation on their odds of public company board membership. But, first I will test for differences among the groups in terms of nominal parameters.

Figure 10

Graph depicting the difference between female and male public company board members, on graduated parameters
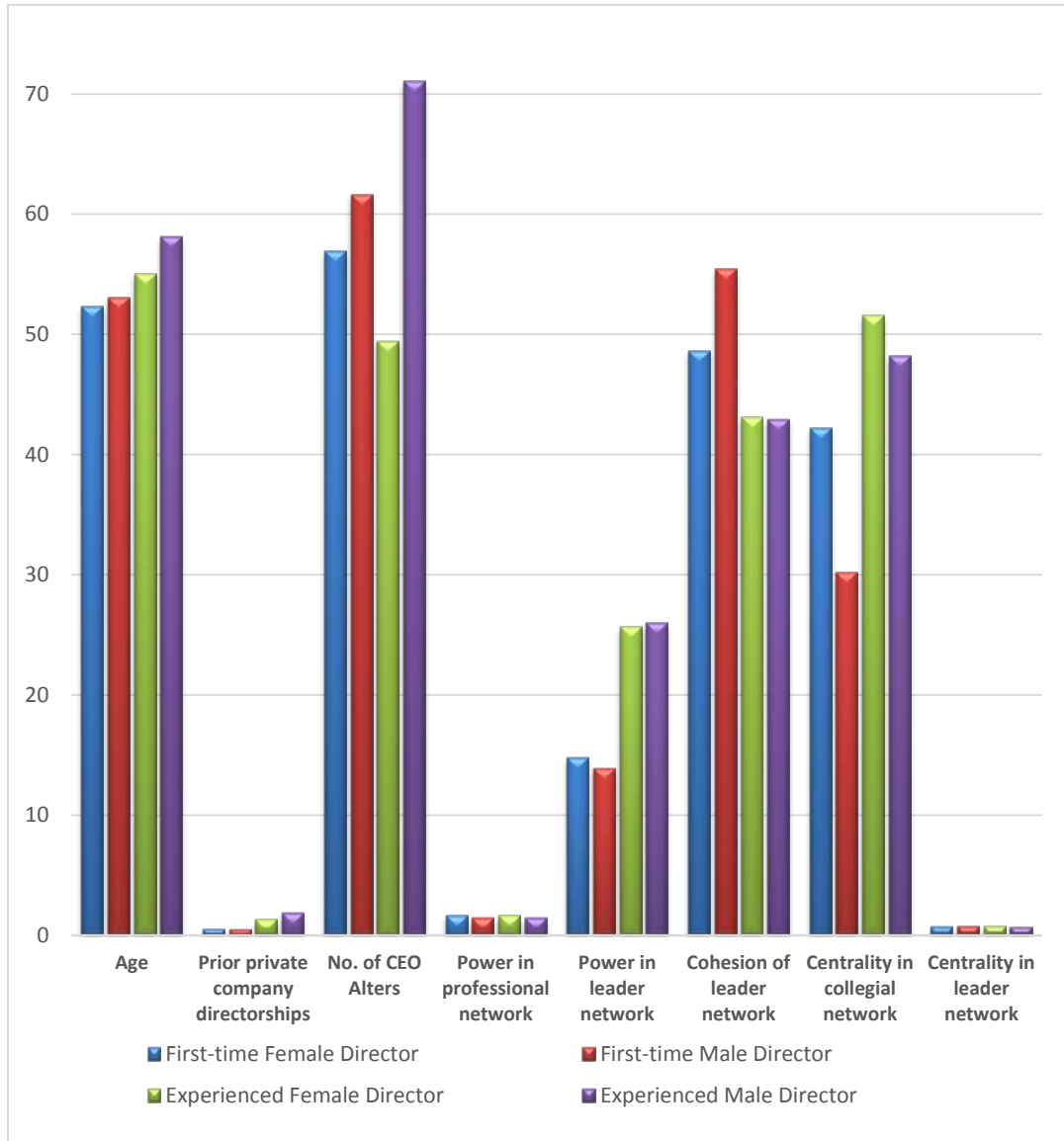
5.2.1.2 Test of differences between first-time and experienced, female and male directors, on nominal parameters

Using Chi-square I tested for homogeneity in the distribution of first-time and experienced, female and male directors in public companies. I used the four sub-samples in order to obtain a comprehensive view of the overall distribution men and women but also the distribution within and between the four groups. In order to do this, I conducted the same Chi-square test on the four sub-samples of first-time and experienced directors and female as well as female and male directors. Within the sub-sample based on experience, I tested for homogeneity in the distribution of men and women. Conversely, within the sub-samples of men and women, I tested for homogeneity of distribution between first-time and experienced directors.

I used the significance levels indicated by both asymptotic and exact methods because of the variance in cell counts. Asymptotic significance, as implied by the name is less accurate for small cell sizes. Hence, for cell size with frequency of less than 5, I will use the exact significance value.

On the nominal parameter of educational qualification, any difference in distribution was observed only in the category of graduate education. The differences that were significant existed between the equivalent groups of experienced female and male directors as well as within the two groups of female and male directors. From Table 5, it is evident that though groups of men and women may be differentiated in terms of educational qualification; the parameter does not have a significant effect on predicting the odds of appointment to public company boards.

Table 9a

Chi-Square tests of homogeneity of distribution of first-time and experienced, male and female directors in each of the education categories

Education Category	Undergraduate	Graduate	Postgraduate
FFD	17	35	7
FMD	28	48	5
Chi-Square	2.689	2.036	0.333
EFD	22	54	12
EMD	30	96	12
Chi-Square	1.231	11.760***	0.000
FFD	17	35	7
EFD	22	54	12
Chi-Square	0.641	4.056*	1.316
FMD	28	48	5
EMD	30	96	12
Chi-Square	0.069	16.000***	2.882

*** $p < 0.001$
** $p < 0.01$
* $p < 0.05$
† $0.05 < p < 0.1$

From the data presented in Table 9b below, it is evident that the distribution of first-time and experienced female and male directors is homogeneous in almost all categories of profession. The exceptions are the categories of finance ($\chi2=4.333$, df = 1, p < 0.05) and operations ($\chi2=4.900$, df = 1, p < 0.05). Experienced female and male directors are similarly differentiated. Within group, both for female and male directors, the only differentiator is the profession of operations. This data belies the common understanding that most women directors belong to professions that are different from those of male directors. The data in table indicates that directors are differentiated on the parameter of profession by experience rather than sex.

Table 9b

Chi-Square tests of homogeneity of distribution of first-time and experienced, male and female directors in each of the profession categories

Profession Category	Finance	HRM	Law	Operations	Education & Research	Marketing & Sales	Government	Engineering & Technology
FFD	13	6	5	13	5	8	6	3
FMD	26	3	2	27	6	10	3	4
Chi-Square	4.333*	1.000	1.290	4.900*	0.091	0.222	1.000	0.143
EFD	18	5	2	32	10	10	8	3
EMD	38	2	6	67	9	8	4	4
Chi-Square	7.143**	1.286	2	12.374***	0.053	0.222	1.333	0.143
FFD	13	6	5	13	5	8	6	3
EFD	18	5	2	32	10	10	8	3
Chi-Square	0.806	0.091	1.286	8.022**	1.667	0.222	0.286	0.000
FMD	26	3	2	27	6	10	3	4
EMD	38	2	6	67	9	8	4	4
Chi-Square	2.250	0.200	2.000	17.021***	0.600	0.222	0.143	0.000

***   p < 0.001
**   p < 0.01
*   p < 0.05
†   0.05 < p < 0.1

Figure 11a

Graph depicting the difference in distribution of the four groups of directors in profession categories
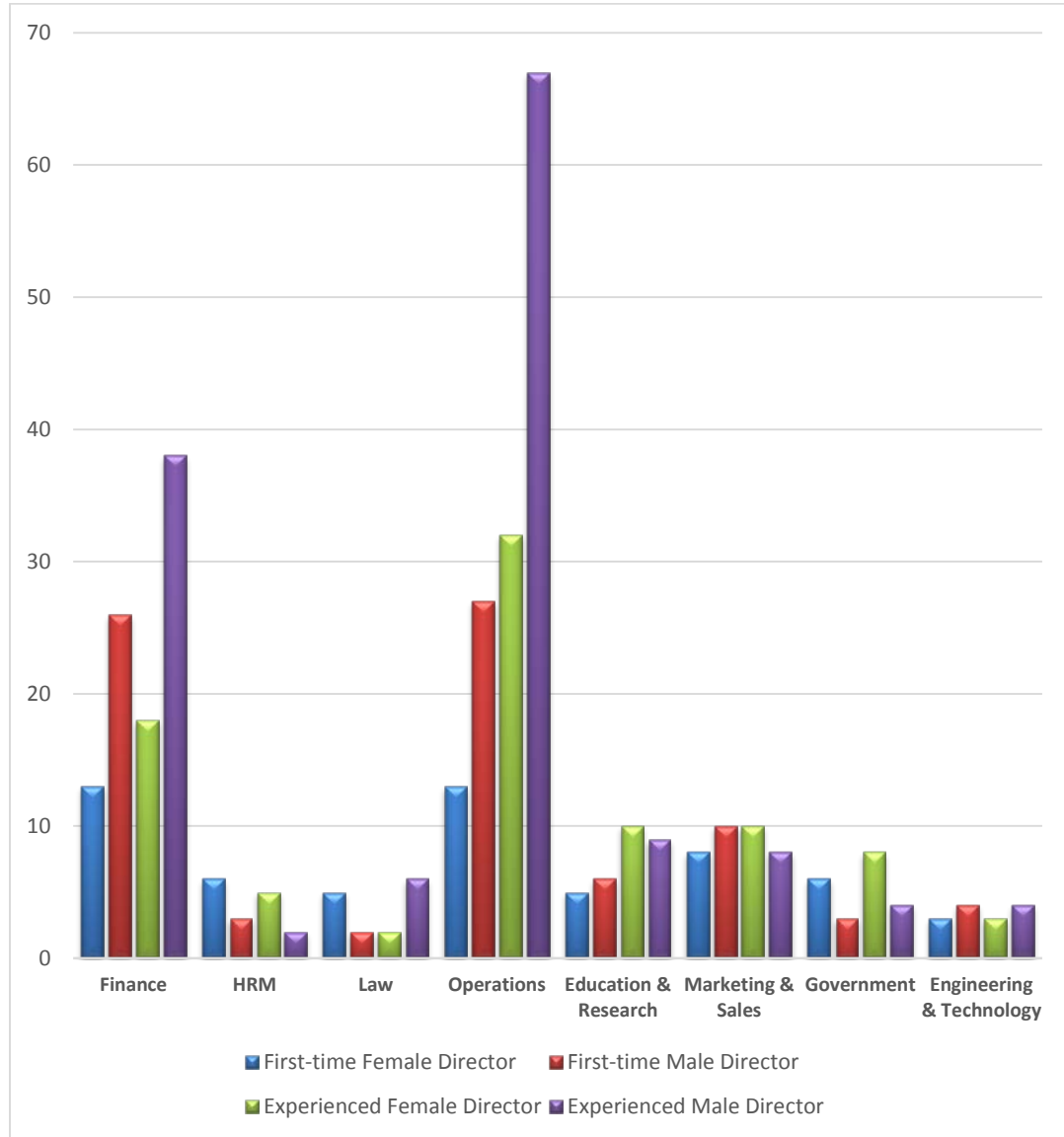
The results of the Chi-Square test on the complete sample which comprises all four groups of first-time and experienced, female and male directors are shown in Table 9c above. Female and male directors are unequally distributed in the category of public company CEO for both groups of first-time and experienced directors. The role of professional director/advisor, naturally differentiates within the groups of men and women. The difference between first-time female and male directors in that category is unexpected. Upon consideration with the other significant factor – age, it appears that the constraint applied through age results in greater number of experienced men obtaining their first board position upon relinquishing active organizational leadership than women.

Table 9c
Chi-Square tests of homogeneity of distribution of first-time and experienced, male and female directors in each of the role categories

Role Category	Public company CEO	Private company CEO	Entrepreneur	Non-board CXO	Professional Director/Advisor
FFD	4	9	6	35	5
FMD	17	16	8	25	15
Chi-Square	8.048**	1.960	0.286	1.667	5.000*
EFD	4	16	6	22	40
EMD	28	27	5	20	58
Chi-Square	18.000***	2.814	0.091	0.095	3.306
FFD	4	9	6	35	5
EFD	4	16	6	22	40
Chi-Square	0.000	1.960	0	2.965	27.222***
FMD	17	16	8	25	15
EMD	28	27	5	20	58
Chi-Square	2.689	2.814	0.692	0.556	25.329***

*** $p < 0.001$
** $p < 0.01$
* $p < 0.05$
† $0.05 < p < 0.1$

Figure 11b
Graph depicting the difference in distribution of the four groups of directors in role categories
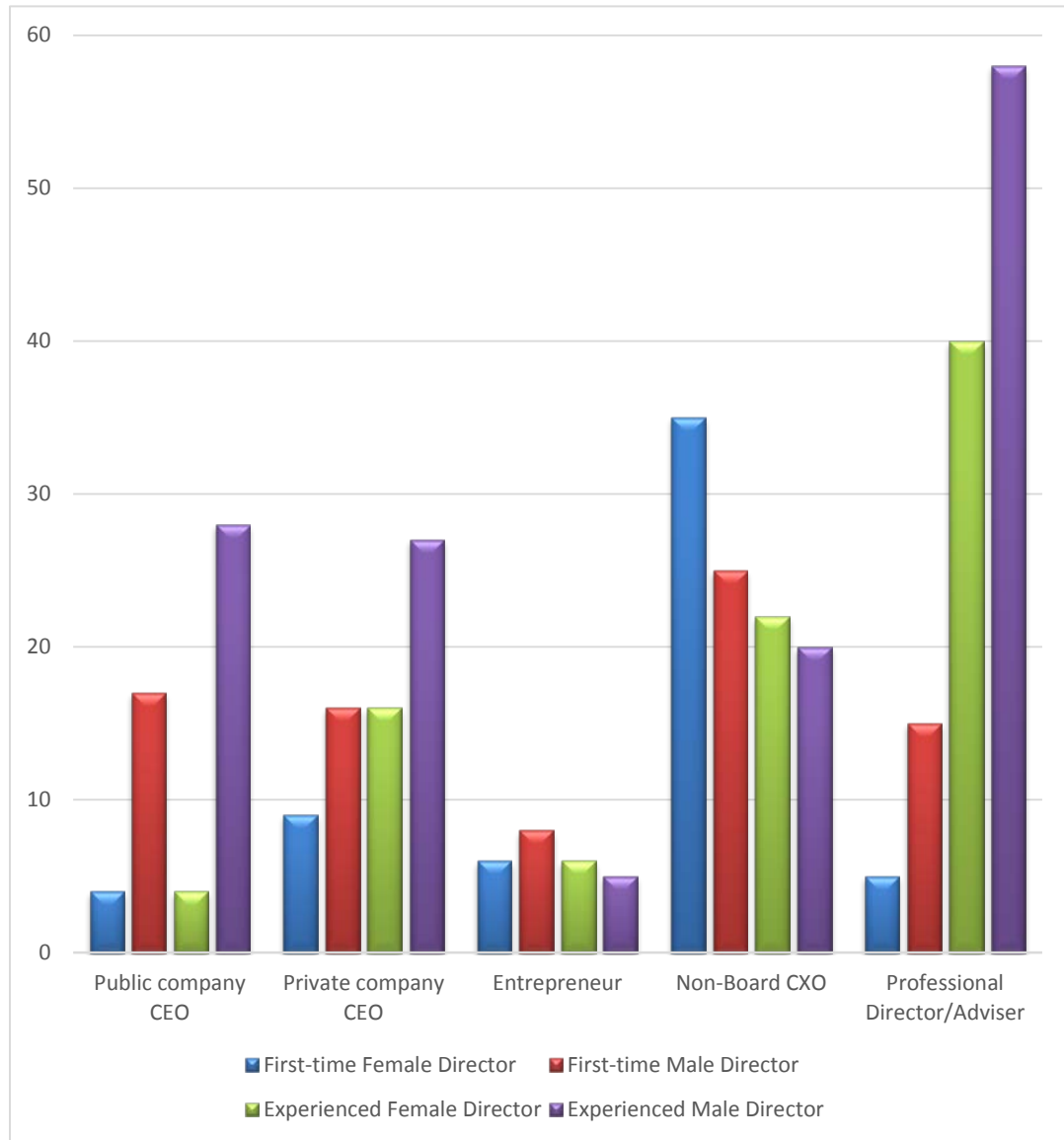
5.2.1.3 Summary of differences between first-time and experienced, female and male directors

A comparison of the summary of differences among the four sub-samples and those between the groups of female and male directors is presented in table 10. Values for difference in effects are not given because each pair will be separately tested for difference in effects in subsequent sections. At this point, I would merely like to point out the value of evaluation of the split samples to show that the criteria differ according to experience levels; not just between the sexes. It is my contention that differences within the group of female directors will be greater than differences within the groups of male directors. Not only will there be greater number of parameters on which women are varied but also the value of differences will vary between groups of female and male directors.

My supposition in this respect is based on the notion that the in-group of male directors is more homogenous than the group of female directors. The implication of homogeneity is that the boundaries of this group are less permeable. Consequently it is more difficult for out-group members like women to gain access. Conversely, in terms of graduated parameters, there will be greater variation within the group of male directors than within that of female directors. Graduated parameters being manifestation of aspirational value of attaining group membership; the lack of variation within the group of female directors will indicate to women that obtaining the board position itself is the highest value that one can attain. Taken in conjunction with the narrow window of age within which a directorship can be obtained, its value may not seem commensurate with the effort. I will consider each pair along the dimensions of sex and experience separately

to explore whether my suppositions hold good upon examination of group characteristics and effects on odds of board membership relative to the comparison group.

5.2.2 Post-hoc analysis of differences in characteristics and effects between first-time, female and male directors

In this section, I compare first-time female and male directors along graduated parameters. The data presented is a subset of that presented in Table 8, comparing the average values for only first-time female and male directors.

The sub-sample contains 59 female directors and 81 male directors, who were all appointed to their first board position. Consequently, on the role category of Professional director/Advisor, only the Advisor sub-class is applicable; as they have no previous experience on public company boards.

5.2.2.1 Test of differences in characteristics between first-time female and male directors on graduated parameters

As seen from the test results (Table 10 below), on graduated parameters first-time female directors differ from first-time male directors only in terms of centrality in the collegial network. First-time female directors hold a more central position in their collegial network. In the collegial network, the difference in mean between the two groups is 11.97 with a p-value of less than 0.001. The inference is that first-time women are more efficient in their network penetration, lying on average in the paths of 12 percent more alters than do first-time men. These differences, however, are not reflected in the difference between the two groups on centrality in the leader network. Given that the leader network comprises only of board member and CEO level supervisors, whereas the more inclusive supervisor and collegial networks comprise even those supervisors who may not be CEOs or Board members, it has implications for the types of organizational milieu in which women hold more central positions.

The professional network being a positional, rather than relational network, the implication is that women, who become public company directors, tend to work in either large organizations or more densely populated functions or in more organizations in their career tenure.

Table 10
Differences between first-time female and male directors, on graduated parameters

Variable	Category	N	Mean	Games-Howell Multiple Comparison		Mean Difference	SE
Age	First-time Female Director	59	52.34	FFD	FMD	-0.78	1.12
	First-time Male Director	81	53.12				
Prior private-company board appointments	First-time Female Director	59	0.56	FFD	FMD	0.04	0.33
	First-time Male Director	81	0.52				
No. of CEO alters	First-time Female Director	59	57.00	FFD	FMD	-4.73	8.99
	First-time Male Director	81	61.73				
Power in professional network	First-time Female Director	59	1.69	FFD	FMD	0.25	0.12
	First-time Male Director	81	1.44				
Power in leader network	First-time Female Director	59	14.80	FFD	FMD	0.92	1.52
	First-time Male Director	81	13.88				
Cohesion of leader network	First-time Female Director	59	48.69	FFD	FMD	-6.81	3.26
	First-time Male Director	81	55.50				
Centrality in collegial network	First-time Female Director	59	42.23	FFD	FMD	11.97***	3.28
	First-time Male Director	81	30.26				
Centrality in leader network	First-time Female Director	59	0.71	FFD	FMD	-0.06	0.03
	First-time Male Director	81	0.77				

*** $p < 0.001$
** $p < 0.01$
* $p < 0.05$
† $0.05 < p < 0.1$

5.2.2.2 Test of differences between first-time female and male directors, on nominal parameters

From Table 11a below, it is clear that first time directors are not differentiated on any of the categories of educational qualification. Though there are more women than men in the category of the highest educational qualification, the difference is not significant. In Table 3a it was seen that in the larger sample of all female and male directors, men and women were significantly differently distributed on both undergraduate and graduate educational qualification. Compared the two, it is evident that the difference is not contributed to by first-time directors.

Table 11a

Chi-Square tests of homogeneity of distribution of first-time, male and female directors in each of the education categories

Education Category	Undergraduate	Graduate	Postgraduate
FFD	17	35	7
FMD	28	48	5
N	45	83	12
Chi-Square	2.689	2.036	0.333
df	1	1	1
Asymp. Sig.	0.101	0.154	0.564
Exact Sig.	0.135	0.187	0.774

On the dimension of professional category, distribution of first-time female and male directors is homogeneous except in the category of finance and operations. The null hypothesis that the distributions are homogeneous is rejected for the professional category of finance ($\chi2$=4.333, df = 1, p < 0.05) and finance ($\chi2$=4.900, df = 1, p < 0.05). There are twice as many men as women from the finance profession who got their first board appointment in the given time period; likewise for operations. Though twice as many women as men featured in the categories of human resource management, law and government; given the total numbers in the category, they were not statistically significant differences.

Table 11b

Chi-Square tests of homogeneity of distribution of first-time, male and female directors in each of the profession categories

Profession Category	Finance	HRM	Law	Operations	Education & Research	Marketing & Sales	Government	Engineering & Technology
FFD	13	6	5	13	5	8	6	3
FMD	26	3	2	27	6	10	3	4
N	39	9	7	40	11	18	9	7
Chi-Square	4.333	1.000	1.286	4.900	0.091	0.222	1.000	0.143
df	1	1	1	1	1	1	1	1
Asymp. Sig.	0.037	0.317	0.257	0.027	0.763	0.637	0.317	0.705
Exact Sig.	0.053	0.508	0.453	0.038	1.000	0.815	0.508	1.000

The distribution of first-time female and male directors is significantly different in the role categories of public company CEO ($\chi2=8.048$, df = 1, Exact p < 0.01) and Professional Advisor ($\chi2=5.000$, df = 1, Exact p < 0.05). Women were also present in lower numbers than men in every professional category except that of CXOs. However, the difference in distribution was not statistically significant.

Table 11c

Chi-Square tests of homogeneity of distribution of first-time, male and female directors in each of the role categories

Role Category	Public company CEO	Private company CEO	Entrepreneur	Non-Board CXO	Professional Director/Advisor
FFD	4	9	6	35	5
FMD	17	16	8	25	15
N	21	25	14	60	20
Chi-Square	8.048	1.960	0.286	1.667	5.000
df	1	1	1	1	1
Asymp. Sig.	0.005	0.162	0.593	0.197	0.025
Exact Sig.	0.007	0.230	0.791	0.245	0.041

5.2.2.3 Tests of differences in effects between the groups of first-time female and male directors

Results of logistic regression of the first-time appointment of a female director, relative to the first-time appointment of a male director are given in Table 12 shown below. The model is well-specified with the minus 2 log likelihood reducing from 190.61 for the null model to 142.95 in the final model. The overall model Chi-Square value is 47.66 with a p value less than 0.001. Prediction accuracy of this model also supports the evaluation of model suitability with better than fifty percent accuracy in prediction of female and male first-time appointments to the board of a public company. Chi-Square coefficient of the Hosmer-Lemeshow test is non-significant indicating good degree of model specification. However, it has to be noted that this test is not very stable for smaller sample sizes, hence cannot be relied on completely to assess the goodness-of-fit of the model in such cases. The Nagelkerke R^2 of 0.39 indicates that the model is able to explain the outcome fairly well.

To begin, proportion of women already on the board has a very large effect on the odds, though not statistically significant, on the appointment of a female director with no previous experience on the board of public companies. The proportion of women on a board can be increased by either reducing the size of the board or increasing the number of women on the board. In either situation, the appointment of another woman, who has no previous experience on the board of a public company, is reduced to almost zero. Statistically, the appointment of an additional woman, particularly one with no similar experience is impossible, as predicted from the current state of the social structure.

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To test for multicollinearity as the cause of the very large effect attributed to the variable - proportion of women on the incumbent board, I tested for tolerance and variance inflation factors for the model. The results of this test are available in Appendix 2. From the collinearity statistics, it is clear that the cause of very large effect of proportion of women on board is not multicollinearity with another variable. I also ran an alternative model without the variable to test if removal caused any significant changes in the model effects. The alternative model is presented in Appendix 3 where it is evident that removal of the variable only reduces coefficients of goodness-of-fit measures and the Nagelkerke R^2 but not the model effects.

Being a non-board CXO, functional head in an organization, improved the odds for first-time female directors by more than three times (B= 1.41, $p < 0.001$, Exp(B) = 4. 10). Among the professional network factors, only centrality in the collegial network was significant but non-substantial (B= 0.04, $p < 0.001$, Exp(B) = 1.04) in terms of effect. Power in the professional network was marginally significant (B= 0.70, $p < 0.07$, Exp(B) = 2.01) but increased the odds of first-time female directors to twice that of first-time male directors.

Table 12

Logistic regression of appointment first-time female directors, relative to first-time male directors

Independent Variables	First-time Female Director		
	B	SE	Exp(B)
Statistical Control Variables			
Board Size	0.07	0.06	1.08
Proportion of women on the board	-4.97	3.17	0.01
Separated CEO/Chairperson role	-0.40	0.25	0.67
Female CEO	-0.20	0.51	0.82
Predictor Variables			
Age	-0.01	0.03	0.99
Undergraduate	-0.10	0.39	0.90
Graduate	-0.36	0.34	0.70
Postgraduate	0.46	0.55	1.58
Public company CEO	-0.82	0.58	0.44
Private company CEO/Entrepreneur	-0.06	0.39	0.94
Non-Board CXO	1.41***	0.37	4.10
Professional Director/Advisor	-0.53	0.53	0.59
Finance	-0.26	0.33	0.77
Operations	-0.18	0.32	0.83
Non-Finance/Operations Professions	0.44	0.30	1.55
Prior private company directorships	0.07	0.15	1.08
Number of CEO alters	0.00	0.00	1.00
Power in professional network	0.70†	0.39	2.01
Power in leader network	0.01	0.03	1.01
Cohesion of leader network	-0.004	0.01	1.00
Centrality in collegial network	0.04**	0.01	1.04
Centrality in leader network	-1.51	1.36	0.22
Goodness-of-fit Measures	**Value**	**df**	**p-value**
Model Chi-square	47.66	19	0.000
Hosmer-Lemeshow Chi-square	4.64	8	0.796
Nagelkerke R Square	0.388		
	FFD	FMD	Overall
Prediction Accuracy %	62.7	81.5	73.6

N (First appointments sub-sample) = 140
*** p < 0.001
** p < 0.01
* p < 0.05
† 0.05 < p < 0.1

5.2.2.4 Summary of differences between first-time female and male directors

To sum the differences on graduated parameters, between first-time female and male directors, women are more centrally positioned in their collegial networks than are men. In terms of effects though, in addition to the significant and positive effect of centrality in collegial network, their power in the professional network also positively affects their odds for appointment to the board of a public company. The extent to which women are connected to others who are also well connected increases their odds for board membership to nearly four times that of first-time male directors. The effect, however, is only marginally significant with a p value of 0.07.

The most substantial impact though came from the only nominal parameter to have a significant effect of the odds of women becoming public company directors. Being a non-board CXO increased the odds of board membership for women by more than thrice. Relative to men, the odds of a non-board CXO being made a first-time director are sixteen times greater.

From the summarization, it can be inferred that there are few statistically significant differences between first-time female and male directors. In terms of graduated parameters, on the basis of which a value can be put on the difference, first-time women have a presumably more advantageous position. However, in terms of nominal parameters, the effects of which are more subjective, women were found to not occupy advantageous positions or in beneficial professions; beneficial from the perspective of board appointments. The beneficence of a nominal parameter is based on the numbers of people with such parameters for whom the event of interest has occurred.

Therefore, the finding is that between the groups of female and male directors of public company boards, there is homogeneity of more parameters than there is heterogeneity. From examining the value of the dimensions on which there is homogeneity, it is also clear that the mean differences on the variables that do not indicate heterogeneity is very small. Hence, it can be said that the two groups are very similar on the dimensions in which they exhibit homogeneity. Since the dimensions on which they exhibit heterogeneity are so few, it can be said that there is greater homogeneity between the two groups than heterogeneity.

From the perspective of constituents of a social system, the analyses in this section demonstrate the narrow criteria for membership into the system. The popular press for women from diverse backgrounds, when they are appointed to corporate boards, creates the illusion that women from any professional background will be invited to boards, if they meet the requirement of leadership experience. More visible companies like those listed in the Fortune lists of companies are perhaps required to do this in order to face public scrutiny. The sample in this study being drawn from a wider range of companies indicates that membership into the corporate director society if far more restricted than is made to appear, particularly for first-time appointees. I will consider the group of experienced female and male directors next.

Table 13
Summary of differences between first-time female and male directors

Significant differences in characteristics	Value of difference $(\overline{x}_f - \overline{x}_m)$ (Chi sq. coefficient of $N_f - N_m$)
Graduated Parameter(s)	
Centrality in collegial network	(+) 11.97***
Nominal Parameter(s)	
Finance	(-) 4.33*
Operations	(-) 4.90*
Public company CEO	(-) 8.05**
Professional director/Advisor	(-) 5.00*
Significant differences in effects (for women, compared to men)	**Effect on odds ratio** (increase/decrease in odds ratio)
Graduated Parameter(s)	
Centrality in collegial network	(+) 0.04***
Power in professional network	(+) 1.01†
Nominal Parameter(s)	
Non-board CXO	(+) 3.10***

*** $p < 0.001$
** $p < 0.01$
* $p < 0.05$
† $0.05 < p < 0.1$

5.2.3 Tests of differences in characteristics and effects between experienced, female and male directors

In this section, I compare experienced female and male directors along graduated parameters and nominal parameter. Then I test for effects of graduated and nominal parameters on the odds of board membership for experienced female directors relative to the odds for experienced male directors. The data presented is a subset of that presented in Table 8, comparing the average values for only first-time female and male directors.

The sub-sample contains 88 female directors and 138 male directors, who all have previous experience on the boards of public companies.

5.2.3.1 Test of differences between experienced female and male directors, on graduated parameters

Graduated parameters are indicators of inequality in the social system. From the data in Table 14 below, it is clear that experienced women on public company boards are different from their male counterparts in terms of age and the number of CEO to whom they are connected through their professional network. From literature on the subject of board activity, it is known that being connected to the CEO is an important factor in not only board appointment but also influence on the board.

Between the groups of experienced female and male directors, differences were found in terms of age and number of CEO alters in their network. Experienced female directors were younger than experienced male directors by an average of 3 years which was significant at a probability of less than 0.01. They also had, on average, 21 fewer CEOs in their network than experienced male directors, also significant at a probability of occurring less than 0.01. The two variables varying significantly together is not unexpected. Being younger also has an implication of less experience, which has implications for the fewer CEOs in their network.

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Table 14

Differences between experienced female and male directors, on graduated parameters

Variable	Category	N	Mean	Games-Howell Multiple Comparison		Mean Difference	SE
Age	Experienced Female Director	88	55.09	EFD	EMD	-3.03**	0.92
	Experienced Male Director	138	58.12				
Prior private company directorships	Experienced Female Director	88	1.38	EFD	EMD	-0.47	0.32
	Experienced Male Director	138	1.85				
No. of CEO alters	Experienced Female Director	88	49.45	EFD	EMD	-21.67**	7.14
	Experienced Male Director	138	71.12				
Power in professional network	Experienced Female Director	88	1.70	EFD	EMD	0.25	0.14
	Experienced Male Director	138	1.45				
Power in leader network	Experienced Female Director	88	25.74	EFD	EMD	-0.29	2.44
	Experienced Male Director	138	26.02				
Cohesion of leader network	Experienced Female Director	88	43.21	EFD	EMD	0.28	1.82
	Experienced Male Director	138	42.93				
Centrality in collegial network	Experienced Female Director	88	51.63	EFD	EMD	3.38	2.37
	Experienced Male Director	138	48.25				
Centrality in leader sub-network	Experienced Female Director	88	0.77	EFD	EMD	0.01	0.02
	Experienced Male Director	138	0.75				

*** $p < 0.001$
** $p < 0.01$
* $p < 0.05$
† $0.05 < p < 0.1$

5.2.3.2 Test of differences between experienced female and male directors, on nominal parameters

From Table 15a below, it is seen that experienced female directors are found to be in significantly fewer numbers than male directors only in the category of graduate-level qualification. Though there were fewer women with undergraduate and graduate degrees on the boards of public companies, they are in equal numbers in the highest category of educational qualification.

Table 15a

Chi-Square tests of homogeneity of distribution of experienced, male and female directors in each of the education categories

Education Category	Undergraduate	Graduate	Postgraduate
EFD	22	54	12
EMD	30	96	12
N	52	150	24
Chi-Square	1.231	11.760	0.000
df	1	1	1
Asymp. Sig.	0.267	0.001	1.000
Exact Sig.	0.332	0.001	1.000

Between the distribution of experienced female and male directors, there is homogeneity on all categories of profession except finance ($\chi2=7.143$, df = 1, p < 0.01) and operations ($\chi2=12.374$, df = 1, p < 0.001). This is the same as the characteristic of the differences in distribution of first-time directors in the professional categories.

Compared to the distribution of first-time female and male directors, the distribution of experienced female and male directors was not very different. Women were still found in number greater than men in the professions of human resource management and government; and in nearly equal proportions in education & research and marketing & sales. Only in the profession of law, there were fewer experienced women than first-time female directors. None of these variances were significant but it is important to note that the distribution is maintained across both categories of experience.

Table 15b

Chi-Square tests of homogeneity of distribution of experienced, male and female directors in each of the profession categories

Profession Category	Finance	HRM	Law	Operations	Education & Research	Marketing & Sales	Government	Engineering & Technology
EFD	18	5	2	32	10	10	8	3
EMD	38	2	6	67	9	8	4	4
N	56	7	8	99	19	18	12	7
Chi-Square	7.143	1.286	2.000	12.374	0.053	0.222	1.333	0.143
df	1	1	1	1	1	1	1	1
Asymp. Sig.	0.008	0.257	0.157	0.000	0.819	0.637	0.248	0.705
Exact Sig.	0.010	0.453	0.289	0.001	1.000	0.815	0.388	1.000

Table 15c below shows the difference or lack of between the distribution of experienced female and male directors on the dimension of role categories. The distribution of the two groups is homogeneous in all the role categories except public company CEOs. The null hypothesis that the distributions are homogeneous is rejected for the role category of public company CEO ($\chi2$=18.000, df = 1, p < 0.001). This is consistent with the distribution of first-time directors in the public company CEOs category. Logically, there would be fewer numbers of both men and women in the professional director/advisor category among first-time directors. The category of professional director/advisor is significant for difference in distribution of female and male directors, but only marginally so. The difference in distribution of men and women in the category of professional director/advisor is expected given the number of first-time appointees who occupy non-board CXO roles.

Table 15c

Chi-Square tests of homogeneity of distribution of experienced, male and female directors in each of the role categories

Role Category	Public company CEO	Private company CEO	Entrepreneur	Non-Board CXO	Professional Director/Advisor
EFD	4	16	6	22	40
EMD	28	27	5	20	58
N	32	43	11	42	98
Chi-Square	18.000	2.814	0.091	0.095	3.306
df	1	1	1	1	1
Asymp. Sig.	0.000	0.093	0.763	0.758	0.069
Exact Sig.	0.000	0.126	1.000	0.878	0.085

5.2.3.3 Tests of differences in effects between the groups of experienced female and male directors

In contrast to the sparseness of effects in the previous model, the model for appointment of experienced directors indicates the variance in appointment criteria for the two different types of directors.

Experienced female and male directors are differentiated on a set of criteria more comprehensive than first-time directors. Among the statistical control, it is found that sex of the CEO is a positive and significant factor in the appointment of women with similar previous experience to the boards of public companies. When the CEO of a company is a woman, the likelihood of an experienced female director being added to the board increases to four times as much as the likelihood of a similarly qualified man.

The model is well-specified, though as with all other models comparing men and women, prediction accuracy in the case of women is lower than that for men. Nonetheless, Nagelkerke R^2 of 0.30 is greater than that of the full sample model shown in Table 5 and even that for the model describing effects for first-time appointment of female directors (See Table 12). Minus two log likelihood also follows the decreasing trend from 302.15 to 245.65. Chi-Square coefficient for the overall model is 56.50, significant at a p value less than 0.001. Hosmer-Lemeshow Chi-Square coefficient is also highly non-significant at 0.53 for a value of 7.04. Therefore, all indicators suggest a model that comprises a good set of factors, even though they explain only a small proportion of the variance between the two outcomes – appointment of an experienced female director as compared to an experienced male director. The results are as shown in Table 16 below.

Table 16

Logistic regression of appointment of experienced female directors relative to experienced male directors

Independent Variables	Experienced Female Director		
	B	S.E.	Exp(B)
Statistical Control Variables			
Board Size	-0.003	0.04	1.00
Proportion of women on the board	1.35	2.44	3.85
Separated CEO/Chairperson role	0.07	0.17	1.07
Female CEO	0.69*	0.34	2.00
Predictor Variables			
Age	-0.08***	0.02	0.92
Undergraduate	0.08	0.28	1.08
Graduate	-0.19	0.24	0.82
Postgraduate	0.12	0.35	1.13
Public company CEO	-1.30**	0.48	0.27
Private company CEO/Entrepreneur	0.23	0.30	1.26
Non-Board CXO	0.46	0.33	1.58
Professional Director/Advisor	0.62*	0.28	1.86
Finance	-0.52*	0.26	0.60
Operations	-0.22	0.23	0.80
Non-Finance/Operations Professions	0.74**	0.26	2.10
Prior private company directorships	-0.15*	0.07	0.86
Number of CEO alters	-0.01**	0.00	0.99
Power in professional network	0.15	0.18	1.16
Power in leader network	0.01	0.01	1.01
Cohesion of leader network	0.01	0.01	1.01
Centrality in collegial network	0.02†	0.01	1.02
Centrality in leader network	-0.03	1.31	0.97

Goodness-of-fit Measures	Value	df	Sig.
Model Chi-square	56.50	19	0.00
Hosmer-Lemeshow Chi-square	7.04	8	0.53
Nagelkerke R Square	0.30		
	EFD	EMD	Overall
Prediction Accuracy %	59.1	81.2	72.6

N (Sub-sample of experienced directors) = 226
*** $p < 0.001$
** $p < 0.01$
* $p < 0.05$
† $0.05 < p < 0.1$

Among human capital variables, age of the director, occupations of public company CEO or professional director/advisor, both finance and professions other than finance and operations had significant impact on the likelihood of directorship for experienced directors. Professional network variables, while significant, did not have as substantial an effect. Number of CEO alters in the professional network as well as centrality in the supervisor network both had a statistically significant influence but substantially insignificant effect on the odds for experienced directors.

For experienced female directors, another appointment to the board of a public company is negatively influenced by their age. For every year's increase in age, the chances of another board appointment are reduced, albeit by a very small factor (B= -0.08, p < 0.001, Exp(B) = 0.92). Of the four occupational roles, being a public company CEO had a negative effect (B= -1.30, p < 0.001, Exp(B) = 0.27) of reducing a female experienced director's odds of another board appointment in a public company to a quarter of the likelihood if they did not occupy that role. Compared to a male public company CEO, their odds were reduced by twelve times due to occupying the role of a public company CEO. Being a professional director/advisor, however, improved their odds (B= 0.62, p < 0.05, Exp(B) = 1.86) to more than thrice that of a male professional director/advisor. In terms of professional affiliation, board-experienced women who were not in either finance or operations had statistically significant better odds (B= 0.74, p < 0.01, Exp(B) = 2.10) than similarly affiliated experienced male directors. While being in non-finance/operations professions improved their relative odds to four times that of men, being in the finance profession reduced their odds (B= -0.52, p < 0.05, Exp(B) = 0.60) to

about a third that of male finance professionals who also had prior public company board experience.

Number of CEO alters in the network have a statistically significant negative effect (B= -0.01, p < 0.01, Exp(B) = 0.99) on the odds of female experienced directors. But, the magnitude of the effect is nil. Similarly, centrality in the collegial network (B= 0.02, p < 0.001, Exp(B) = 1.02) was significant but with a null effect on influencing the odds of women with prior board experience in obtaining another board seat.

To summarize the effects of independent variables on the odds of board appointment for a female director with prior experience on the boards of public companies – age, being a public company CEO, finance professional, having prior experience on private company boards had negative effect on their odds. Being a professional director/advisor, non-finance/operations professional both had significant and substantial positive effects on the odds of board membership for female directors with similar previous experience. Two variables were significant in opposite directions but non-substantial in their effect – number of CEO alters and centrality in collegial network.

5.2.3.4 Summary of differences between experienced female and male directors

In the previous section, it was found that first-time women appointees tend to be non-board CXOs with significant professional network resources in the lower echelons of their organizations. In comparison, women with prior experience on boards of public companies were advantaged only by their previous experience and being in professions that were not finance or operations line of work. There were negatively affected by all variables i.e. age, prior private company directorships, being a public company CEO or finance professional.

From the perspective of experienced directors, the social system of corporate directors is more variegated, indicating a greater tolerance of varied professional background. Unlike first-time directors who were faced with meeting a very narrowly defined criterion (Non-board CXO) in order to gain access to public company boards, experienced directors are advantaged by both previous experience on a public company board and non-finance/operations professions. In order to test whether other professions than finance and operations had a positive effect on the odds of board appointment for experienced women, I ran an alternative model with all the categories of profession. However, none of the other professions were individually significant. Hence, significance of the combined category of all other professions than finance and operations exists only as a collective other rather than any one other profession. The implications of these characteristics and effects for the structure of the social system is discussed in detail in the next chapter.

Table 17

Summary of differences between experienced female and male directors

Significant differences in characteristics	Value of difference $(\overline{x}_f - \overline{x}_m)$ (Chi sq. coefficient of $N_f - N_m$)
Graduated Parameter(s) Age Number of CEO alters	 (-) 3.03** (-) 21.67**
Nominal Parameter(s) Graduate education Finance Operations Public company CEO Private company CEO Professional director/Advisor	 (-) 11.76*** (-) 7.14** (-) 12.37*** (-) 18.00*** (-) 2.81† (-) 3.31†
Significant differences in effects (for women, compared to men)	**Effect on odds ratio** (increase/decrease in odds ratio)
Graduated Parameter(s) Age Prior private company directorships Number of CEO alters Centrality in collegial network	 (-) 0.08*** (-) 0.14* (-) 0.01** (+) 0.02†
Nominal Parameter(s) Public company CEO Professional director/Advisor Finance Non-Finance/Operations	 (-) 0.73** (+) 0.86* (-) 0.40* (+) 1.10**

*** $p < 0.001$
** $p < 0.01$
* $p < 0.05$
† $0.05 < p < 0.1$

5.2.4 Post-hoc analysis of differences in characteristics and effects between incongruent pairs of female and male directors

In this section I will collate the data on the differences in characteristics and effects between incongruent pairs of first-time and experienced female and male directors. I will be able to show how the consolidated between-group differences seen in Section 5.1.3 (See Table 7), upon further analysis become exclusive sets of variables that affect first-time and experienced directors differently. In preceding sections (5.2.2 and 5.2.3), I analyzed congruent pairs of female and male directors; both first-time and experienced. The main findings of the two sets of analyses (Tables 13 and 17) were that female directors differ from male directors in terms of the same nominal parameters – characteristics that are found largely among male directors – the professions of finance and operations; roles of public company CEO and professional director/advisor. The difference in effects for similarly experienced men and women was along age, prior private company directorships and number of CEO alters for experienced women directors; centrality in collegial network was a positive effect for both first-time and experienced female directors, though less so for experienced women.

All these findings pertain to comparisons of equivalent men and women. However, these are not the only plausible scenarios. In fact, given the distribution of men and women in the population of corporate directors, it is far more likely that first-time female directors will be competing for a board position against experienced male directors. The converse is also not implausible, though possibly less probable. Hence, I will explore differences between incongruent pairs of directors i.e. first-time female and experienced male directors; first-time male and experienced female directors.

5.2.4.1 Post-hoc analysis of differences in characteristics between first-time, female and experienced, male directors, on graduated parameters

First-time female directors were found to be different from experienced male directors, as expected in terms of age. From Table 8, we can see that average age follows a linear increment pattern in the four categories of directors with first-time female directors being the youngest and experienced directors being oldest. Therefore, it is only natural that first-time female directors would be differentiated from experienced male directors on age. Similarly for the other significant factor that varies between the two groups – prior private company directorships. This factor was a significant differentiator between experienced women and men as well, though not in terms of average value but in terms of the effect on odds of board appointment.

For the first time, power in leader network has emerged as a significant differentiator between groups. Previously, power in the professional network was seen to be a significant factor in the prediction of odds of board appointment for first-time directors, despite not being significantly different in terms of the average value of the coefficient of power in either professional or leader network.

To sum, on graduated parameters, first-time female directors are significantly different from experienced male directors on age, previous experience on private company boards and power in leader network.

Table 18

One-way Analysis of Variance to indicate the differences among first-time and experienced, female and male directors, on graduated parameters

Variable	Category	N	Mean	Games-Howell Multiple Comparison		Mean Difference	SE
Age	First-time Female Director	59	52.34	FFD	EMD	-5.78***	1.00
	Experienced Male Director	138	58.12				
Prior private company directorships	First-time Female Director	59	0.56	FFD	EMD	-1.29***	0.38
	Experienced Male Director	138	1.85				
No. of CEO alters	First-time Female Director	59	57.00	FFD	EMD	-14.12	8.37
	Experienced Male Director	138	71.12				
Power in professional network	First-time Female Director	59	1.69	FFD	EMD	0.24	0.13
	Experienced Male Director	138	1.45				
Power in leader network	First-time Female Director	59	14.80	FFD	EMD	-11.22***	1.83
	Experienced Male Director	138	26.02				
Cohesion of leader network	First-time Female Director	59	48.69	FFD	EMD	5.77	2.66
	Experienced Male Director	138	42.93				
Centrality in collegial network	First-time Female Director	59	42.23	FFD	EMD	-6.02	2.81
	Experienced Male Director	138	48.25				
Centrality in leader network	First-time Female Director	59	0.71	FFD	EMD	-0.04	0.03
	Experienced Male Director	138	0.75				

*** $p < 0.001$
** $p < 0.01$
* $p < 0.05$
† $0.05 < p < 0.1$

5.2.4.2 Post-hoc analysis of differences in characteristics between first-time, female and experienced, male directors, on nominal parameters

Between the incongruent pair of fist-time female director and experienced male director, distribution in terms of educational qualification was significantly different for graduate education. The difference was marginally significant for undergraduate educational qualification.

Table 19a

Chi-Square tests of homogeneity of distribution of first-time, female and experienced, male directors in each of the education categories

Education Category	Undergraduate	Graduate	Postgraduate
FFD	17	35	7
EMD	30	96	12
N	47	131	19
Chi-Square	3.596	28.405	1.316
df	1	1	1
Asymp. Sig.	0.058	0.000	0.251
Exact Sig.	0.079	0.000	0.359

Like each of the pairs examined previously, the incongruent pair of first-time female director and experienced male director is also significantly heterogeneously distributed in the two profession categories of finance and operations. An unexpected observation was the nearly equal distribution in the professions of law, marketing & sales, government and technology. Number of first-time women directors exceeded that of experienced male director in the professions of human resource management and government.

Table 19b

Chi-Square tests of homogeneity of distribution of first-time female directors and experienced male in each of the profession categories

Profession Category	Finance	HRM	Law	Operations	Education & Research	Marketing & Sales	Government	Engineering & Technology
FFD	13	6	5	13	5	8	6	3
EMD	38	2	6	67	9	8	4	4
N	51	8	11	80	14	16	10	7
Chi-Square	12.255	2.000	0.091	36.450	1.143	0.000	0.400	0.143
Df	1	1	1	1	1	1	1	1
Asymp. Sig.	0.000	0.157	0.763	0.000	0.285	1.000	0.527	0.705
Exact Sig.	0.001	0.289	1.000	0.000	0.424	1.000	0.754	1.000

The distribution of first-time female directors relative to experienced male directors was heterogeneous in all categories except entrepreneurs. First-time female directors were represented in significantly fewer numbers in the categories of public company CEOs, private company CEOs and as per expectation, professional director/advisor. In keeping with the trend, women significantly exceeded the number of experienced male directors in the role category of non-board CXO.

Table 19c

Chi-Square tests of homogeneity of distribution of first-time female directors and experienced male in each of the role categories

Role Category	Public company CEO	Private company CEO	Entrepreneur	Non-board CXO	Professional Director/Advisor
FFD	4	9	6	35	5
EMD	28	27	5	20	58
N	32	36	11	55	63
Chi-Square	18.000	9.000	0.091	4.091	44.587
df	1	1	1	1	1
Asymp. Sig.	0.000	0.003	0.763	0.043	0.000
Exact Sig.	0.000	0.004	1.000	0.058	0.000

5.2.4.3 Post-hoc analysis of differences in effects for first-time, female and experienced, male directors on graduated and nominal parameters

The next regression tests for effects for a first-time female director when compared to a male director with previous experience on public company boards. The results of the regression are given in Table 20 below. Minus two log likelihood shows a substantial reduction from 238.09 for the null model to 98.35 for the final model. Nagelkerke R square value of 0.73 and Hosmer-Lemeshow Chi square value of 0.998, non-significant at a p value of 0.87 are both indicative of a well-specified model. The extremely large p value for the Hosmer-Lemeshow index can be a cause for concern. The concern, though is mitigated by two facts. The first is that the index is not stable for sample sizes of less than 400-450, increasingly so as the sample size reduces. Secondly, from the difference tests conducted thus far, we know that the sample is quite clearly separated by very low numbers of women in each category relative to the comparison category of men. Therefore, the large p value of the H-L index is an artifact of the data distribution rather than an unknown error factor. Logistic regression is fairly robust to such non-normally distributed data and we see evidence of this in the quite large reduction in minus two log likelihood from the null to final model. From the classification table too, it is evident from the pattern of prediction that the technique is as stable for this sample as any other in this study.

In comparison with male directors with previous board experience in public companies, the odds of women without similar experience are negatively affected by their age, board experience in private companies and power in leader network. These

negative effects are balanced by positive effects of their occupational role as non-board CXO and power in the larger professional network.

As seen previously in the comparison of female and male directors with previous public company board experience (see Table 16), age has a significant, negative but slight effect (B= -0.10, p < 0.05, Exp(B) = 0.91) on the odds of first-time female directors relative to experienced male directors. Being a public company CEO (B= -0.74, p < 0.01, Exp(B) = 0.48) reduced the odds for first-time female directors less than a fourth those for experienced male directors. Being in the advanced role of an advisor (because a first-time public company director cannot be a professional director) also reduced the odds for first-time female directors, which is as expected given the effect of age, though only marginally probable (B= -1.09, p = 0.09, Exp(B) = 0.34) to ten times lesser than that for an experienced male director. On the other hand, being a non-board CXO has a substantial and significant, positive effect (B= 1.90, p < 0.001, Exp(B) = 6.71) on the likelihood of directorship for a woman inexperienced on public company boards. Therefore, being a young non-board CXO are the only nominal parameters that affect the likelihood of directorship for women without previous experience on public company boards.

In terms of graduated parameters, previous experience on the boards of private companies, reduced the odds of first-time female directors to less than a third (B= -1.28, p < 0.001, Exp(B) = 0.28). Measure of power had opposite effects depending on the source of the power. Power in the larger professional network significantly increased the odds for women without prior experience on public company boards (B= 1.69, p < 0.001,

Exp(B) = 5.44) by more than four times. But power in the leader network reduced these odds slightly (B= -0.17, p < 0.001, Exp(B) = 0.84).

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Table 20

Logistic regression of appointment of first-time female directors, relative to the appointment of experienced male directors

Independent Variables	First-time Female Appointment		
	B	S.E.	Exp(B)
Statistical Control Variables			
Board Size	-0.03	0.08	0.97
Proportion of women on the board	-2.96	3.87	0.05
Separated CEO/Chairperson role	-0.39	0.32	0.68
Female CEO	-0.11	0.66	0.89
Predictor Variables			
Age	-0.10*	0.04	0.91
Undergraduate	0.29	0.50	1.34
Graduate	-0.18	0.40	0.83
Postgraduate	-0.11	0.63	0.90
Public company CEO	-0.74**	0.70	0.48
Private company CEO/Entrepreneur	-0.07	0.48	0.93
Non-board CXO	1.90***	0.52	6.71
Professional Director/Advisor	-1.09†	0.65	0.34
Finance	-0.07	0.46	0.93
Operations	-0.60	0.44	0.55
Non-Finance/Operations Professions	0.67	0.43	1.95
Prior private company directorships	-1.28***	0.35	0.28
Number of CEO Alters	-0.01†	0.01	0.99
Power in professional network	1.69***	0.51	5.44
Power in leader network	-0.17***	0.04	0.84
Cohesion of leader network	0.00	0.02	1.00
Centrality in collegial network	-0.01	0.02	0.99
Centrality in leader network	-0.52	2.09	0.59
Goodness-of-fit Measures	**Value**	**df**	**Sig.**
Model Chi-square	139.737	19	0.000
Hosmer-Lemeshow Chi-square	0.965	8	0.998
Nagelkerke R Square	0.725		
	FFD	EMD	Overall
Prediction Accuracy %	77.6	94.2	89.3

N = 196
*** p < 0.001
** p < 0.01
* p < 0.05
† 0.05 < p < 0.1

5.2.4.4 Post-hoc analysis of differences in characteristics between first-time, male and experienced, female directors, on graduated parameters

Similar to the other incongruent pair, first-time male directors had significantly fewer private company directorships prior to the current appointment, than did experienced female directors. On comparing the congruent pairs on this attribute (Tables 13 and 17), it is seen that this attribute is varied significantly only across experience levels and not within groups with equivalent experience. Similar to the other incongruent pair, experienced female directors had greater power in the leader network than did first-time male directors. Centrality in collegial network appears to be a strength of both first-time and experienced female directors. For the first time, cohesion is a significantly different attribute between groups. Leader networks of first-time male directors appear to be significantly more cohesive than those of experienced female directors.

Table 21

One-way Analysis of Variance to indicate the differences among first-time, male and experienced, female directors, on graduated parameters

Variable	Category	N	Mean	Games-Howell Multiple Comparison		Mean Difference	SE
Age	First-time Male Director	81	53.12	FMD	EFD	-1.97	1.04
	Experienced Female Director	88	55.09				
Prior private company directorships	First-time Male Director	81	0.52	FMD	EFD	-0.86**	0.26
	Experienced Female Director	88	1.38				
No. of CEO alters	First-time Male Director	81	61.73	FMD	EFD	12.27	7.86
	Experienced Female Director	88	49.45				
Power in professional network	First-time Male Director	81	1.44	FMD	EFD	-0.26	0.13
	Experienced Female Director	88	1.70				
Power in leader network	First-time Male Director	81	13.88	FMD	EFD	-11.86***	2.22
	Experienced Female Director	88	25.74				
Cohesion of leader network	First-time Male Director	81	55.50	FMD	EFD	12.30***	2.61
	Experienced Female Director	88	43.21				
Centrality in collegial network	First-time Male Director	81	30.26	FMD	EFD	-21.37***	2.91
	Experienced Female Director	88	51.63				
Centrality in leader network	First-time Male Director	81	0.77	FMD	EFD	0.00	0.02
	Experienced Female Director	88	0.77				

*** $p < 0.001$
** $p < 0.01$
* $p < 0.05$
† $0.05 < p < 0.1$

5.2.4.5 Post-hoc analysis of differences in characteristics between first-time, male and experienced, female directors, on nominal parameters

First-time, male directors were not represented in a significantly different proportion to experienced female directors on any of the educational categories. The number of first-time male directors was substantially fewer than experienced female directors in the category of highest educational qualification i.e. postgraduate education. But the cell size of first-time male directors holding a postgraduate degree is the absolute minimum required of 5, it is required that we measure probability of occurrence at the exact, rather than asymptotic p value, which is 0.143 and hence non-significant.

Table 22a

Chi-Square tests of homogeneity of distribution of first-time, male and experienced, female directors in each of the education categories

Education Category	Undergraduate	Graduate	Postgraduate
FMD	28	48	5
EFD	22	54	12
N	50	102	17
Chi-Square	0.720	0.353	2.882
df	1	1	1
Asymp. Sig.	0.396	0.552	0.090
Exact Sig.	0.480	0.621	0.143

First-time male directors and experienced female directors were homogeneously distributed in each of the profession categories. Though experienced female directors were represented in greater number in the categories of human resource management, operations, education & research and government, the difference was not statistically significant. In finance, first-time male directors were present in greater numbers than experienced female directors. This was unexpected, particularly compared to the converse situation in the category of operations.

Table 22b

Chi-Square tests of homogeneity of distribution of first-time, male and experienced, female directors in each of the profession categories

Profession Category	Finance	HRM	Law	Operations	Education & Research	Marketing & Sales	Government	Engineering & Technology
EFD	18	5	2	32	10	10	8	3
FMD	26	3	2	27	6	10	3	4
N	44	8	4	59	16	20	11	7
Chi-Square	1.455	0.500	0.000	0.424	1.000	0.000	2.273	0.143
df	1	1	1	1	1	1	1	1
Asymp. Sig.	0.228	0.480	1.000	0.515	0.317	1.000	0.132	0.705
Exact Sig.	0.291	0.727	1.000	0.603	0.454	1.000	0.227	1.000

In role categories, women despite being those with experience on public company boards were represented in significantly fewer numbers in the category of public company CEOs. This was unexpected in the sample drawn from a Standard & Poor list, which is far more diverse in terms of size and industry than the Fortune lists of companies. However, it is possible support for the notion presented in business press that women seek leadership positions in private companies, in the absence of opportunities in public companies, that the number of women in the role of private company CEO is equal to that of first-time male directors. It is still evidence of the different criteria applied to women compared to men, for leadership positions.

The other category in which first-time male directors were significantly differently distributed was that of professional director/advisor, which is as expected.

Table 22c

Chi-Square tests of homogeneity of distribution of first-time, male and experienced, female directors in each of the role categories

Role Category	Public company CEO	Private company CEO	Entrepreneur	Non-board CXO	Professional Director/Advisor
EFD	4	16	6	22	40
FMD	17	16	8	25	15
N	21	32	14	47	55
Chi-Square	8.048	0.000	0.286	0.191	11.364
df	1	1	1	1	1
Asymp. Sig.	0.005	1.000	0.593	0.662	0.001
Exact Sig.	0.007	1.000	0.791	0.771	0.001

5.2.4.6 Post-hoc analysis of differences in effects for first-time, male and experienced, female directors on graduated and nominal parameters

Results of the logistic regression of appointment of experienced female directors compared relative to the appointment of a male director without previous experience on the board of a public company are presented in Table 23. At very first glance the extremely large standardized coefficient and odds ratio signal possible multicollinearity or data separation issues in this sub-sample, though the effect is only marginally significant at a p value of 0.06. However, tests for multicollinearity reveal that the variables are not inter-correlated with the dependent variable at unacceptable levels of below 0.2 (Menard, 2002). Crosstabs reveal the source of the quasi-separation of data. On the variable of role, the two groups are almost completely separated by the incidence of low cell count for experienced female directors and first-time male directors, in the case of Public company CEO. As a result, the predictor coefficients are likely being inordinately influenced by this variable. A t-test on the variable 'proportion of women on the board' and 'board size' for difference in the mean between the two groups revealed that this variable was not contributing to separation of data. A decision was required at this point on whether to tolerate the quasi-separation of data. For two reasons, I decided to retain this set of analysis in the study as I did with the comparative analysis of odds for first appointment between female and male directors (see Table 19a). Firstly, theoretically the proportion of women is an important factor given that the largest proportion of public companies still has only a token representation of women. We also have some evidence, that it is more difficult for women to get multiple board appointments than it is for men (McDonald and Westphal, 2013). The two findings taken together make the proportion of women on boards a relevant factor in investigating the

odds for recurring public company board appointments for women. Secondly, though the distribution of women and men across the cells on the categories of role and profession contribute to the quasi-separation in data, none of the cells actually have a null value. Hence, the data is not completely separated on either of these variables. Quasi-separation of data also affects the results in terms of the standard errors and not so much regression coefficients. As a result, the goodness-of-fit measures may indicate inflated coefficients of fit. In conclusion, I decided that the given the importance of the variable to the model, the affected outcome variables (standard error and goodness-of-fit measures).

From the results of logistic regression, it is manifest that proportion of women on the board is the single most significant factor in the appointment of women in comparison to men without prior board experience in public companies (see Table 12 for comparison of odds of first-time appointment for men and women). The effect of proportion of women on the board is offset by a positive effect of board size. Though a very small effect, it is nonetheless positive and significant (B= 0.16, $p < 0.05$, Exp(B) = 1.17). Therefore, despite the proportion of women on board, appointment of another woman to the board is likely to be concurrent with an increase in the size of the board.

Table 23

Logistic regression of appointment of experienced female directors, relative to the appointment of first-time male directors

Independent Variables	Experienced Female Appointment		
	B	S.E.	Exp(B)
Statistical Control Variables			
Board Size	0.14*	0.07	1.15
Proportion of women on the board	-6.13†	3.23	0.00
Separated CEO/Chairperson role	-0.12	0.29	0.89
Female CEO	0.48	0.51	1.61
Predictor Variables			
Age	-0.02	0.04	0.98
Undergraduate	-0.36	0.43	0.70
Graduate	0.04	0.40	1.04
Postgraduate	0.31	0.64	1.37
Public company CEO	-1.90***	0.75	0.15
Private company CEO/Entrepreneur	-0.37**	0.45	0.69
Non-board CXO	0.30	0.44	1.35
Professional Director/Advisor	1.96	0.51	7.11
Finance	-0.83	0.42	0.44
Operations	0.53*	0.38	1.70
Non-Finance/Operations Professions	0.30	0.34	1.34
Prior private company directorships	0.42*	0.19	1.53
Number of CEO Alters	-0.01*	0.01	0.99
Power in professional network	-0.07	0.37	0.93
Power in leader network	0.12***	0.03	1.13
Cohesion of leader network	-0.04*	0.02	0.96
Centrality in collegial network	0.04***	0.01	1.04
Centrality in leader network	1.07	1.98	2.91
Goodness-of-fit Measures	**Value**	**df**	**Sig.**
Model Chi-square	115.218	19	0.000
Hosmer-Lemeshow Chi-square	12.791	8	0.119
Nagelkerke R Square	0.662		
	EFD	FMD	Overall
Prediction Accuracy %	87.5	83.8	85.7

N = 168
*** p < 0.001
** p < 0.01
* p < 0.05
† 0.05 < p < 0.1

Among the predictor variables, human capital influences the odds in very strong but opposite ways. Being a public company CEO or even that of a private company reduces the odds for women (B= -1.90, $p < 0.001$, Exp(B) = 0.15) to less than a fifth if they were not. Comparatively, for first-time male directors, being a public company CEO increases odds of board appointment by more than six times. Experienced female directors' odds increased by seventy percent if they were operations professionals (B= 0.53, $p < 0.05$, Exp(B) = 1.70).

Among graduated parameters, previous board experience in private companies, for the first time, improved odds for women by more than half (B= 0.45, $p < 0.05$, Exp(B) = 1.57). Professional network variables, on the other hand, had minor effects. Centrality in the collegial network (B= 0.04, $p < 0.001$, Exp(B) = 1.04) and power in the leader network (B= 0.12, $p < 0.001$, Exp(B) = 1.13). Finally, cohesion in the leader network had a small negative effect (B= -0.04, $p < 0.01$, Exp(B) = 0.96) for the likelihood of public company directorship for women with similar previous experience.

With the description of this final comparison set of incongruent pairs, the comparative analysis of effects between directors of both sexes and levels of experience is complete. I will first summarize the differences between incongruent pairs in the next section. In section 5.2.5, I will summarize the differences between the four pairs of female-male directors, both congruent and incongruent (Tables 12, 16, 20 and 23).

5.2.4.7 Summary of differences between incongruent pairs of female and male directors

On comparing the two incongruent pairs – first-time female director/experienced male director and first-time male director/experienced female director – it appeared that all differences were as expected of the difference in experience levels. Closer examination revealed that, while first-time female directors were in every way less than male experienced directors, except for the numbers of female non-board CXOs; male first-time directors were still better represented in the category of public company CEO than experienced women directors. In terms of network variables, first-time female directors were not in at advantage in any respect; first-time male directors, on the other hand, came from very cohesive leader networks when compared to experienced female directors.

In terms of graduated parameters, female first-time directors compared to experienced male directors were benefitted only by how well-connected they were in their professional network. Power in the leader network had an opposite effect albeit of a much smaller magnitude. Among the nominal parameters, being in the role of a non-board CXO was still the only conduit to a board position in a public company. For experienced female directors, though in comparison with first-time male directors, none of the role categories conferred any advantage. For women with previous board experience, only being an operations professional improved their odds of another board appointment. However, for experienced female directors, there was an additional condition of board size – primarily board appointment for experienced female directors needs to be accompanied by either an increase in board size or reduction in the existing

proportion of women on the board. This does not appear to hold true for first-time female directors. I will summarize the differences among all four pairs of female/male directors in the next section.

Table 24

Summary of differences between incongruent pairs of female and male directors

First-time Female Director/Experienced Male Director

Significant differences in characteristics	Value of difference $(\bar{x}_f - \bar{x}_m)$ (Chi sq. coefficient of $N_f - N_m$)
Graduated Parameter(s)	
Age	(-) 5.78***
Prior private company directorships	(-) 1.29***
Power in leader network	(-) 11.22***
Nominal Parameter(s)	
Undergraduate education	(-) 3.60†
Graduate education	(-) 28.40***
Finance	(-) 12.26***
Operations	(-) 36.45***
Public company CEO	(-) 18.00***
Private company CEO	(-) 9.00**
Professional director/Advisor	(-) 44.59***
Non-board CXO	(+) 4.09*

Significant differences in effects (for women, compared to men)	Effect on odds ratio (increase/decrease in odds ratio)
Graduated Parameter(s)	
Age	(-) 0.09*
Prior private company directorships	(-) 0.72***
Number of CEO alters	(-) 0.01†
Power in leader network	(-) 0.16***
Power in professional network	(+) 4.44***
Nominal Parameter(s)	
Public company CEO	(-) 0.52**
Professional director/Advisor	(-) 0.66†
Non-board CXO	(+) 5.71***

Experienced Female Director/First-time Male Director

Significant differences in characteristics	Value of difference $(\bar{x}_f - \bar{x}_m)$ (Chi sq. coefficient of $N_f - N_m$)
Graduated Parameter(s)	
Cohesion of leader network	(-) 12.30***
Prior private company directorships	(+) 0.86**
Power in leader network	(+) 11.86***
Centrality in collegial network	(+) 21.37***
Nominal Parameter(s)	
Public company CEO	(-) 8.05**
Professional director/Advisor	(+) 11.36***

Significant differences in effects (for women, compared to men)	Effect on odds ratio (increase/decrease in odds ratio)
Graduated Parameter(s)	
Number of CEO alters	(-) 0.01*
Cohesion of leader network	(-) 0.04*
Prior private company directorships	(+) 0.53*
Centrality in collegial network	(+) 0.04***
Power in leader network	(+) 0.13***
Nominal Parameter(s)	
Public company CEO	(-) 0.85***
Private company CEO/Entrepreneur	(-) 0.31**
Operations	(+) 0.70*

*** p < 0.001
** p < 0.01
* p < 0.05
† 0.05 < p < 0.1

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5.2.5 Summary of differences between female and male directors

Thus far, I have individually summarized the differences in characteristics and effects for women in each pair of female-male directors, differentiated along the dimension of experience as well as the incongruously matched pairs. The objective of this set of analyses was to obtain a comprehensive picture of the composition of the social system that comprises corporate directors in terms of graduated and nominal parameters. Composition in terms of graduated parameters will elucidate the dimensions along which directors are arranged in a valued order. In other words, dimensions along which female directors are rendered unequal to male directors will be seen in the variation (or lack of) among graduated parameters. Nominal parameters, on the other hand, indicate the degree of heterogeneity in the system as well as the specific parameters along which the system is heterogeneous.

In Table 25 appended below, I show the consolidation of characteristic differences between female and male directors from the six comparisons made in previous sections. In the first consolidation of differences for the two pairs of first-time female directors (congruent pair and incongruent pair), I marked all the parameters on which first-time directors were different from the comparison male director group. This process was repeated for the comparisons of experienced female directors with their comparison groups. In the final consolidation of differences between female and male directors, I select only those differences that are common to first-time and experienced female directors in comparison to their male comparison groups. Thus, we have the final set of parameters on which female directors differ from male directors.

Graduated parameters on which female directors differ from male directors are age, number of private company directorships held prior to the current public company board appointment, power in the leader network and centrality in the collegial network. Graduate education, profession of finance and operations, being a CEO – whether of a public company or a private company and being a professional director/advisor were the nominal parameters on which female directors were different from male directors.

In terms of age and centrality in collegial network; the difference is in the same direction for both first-time and experienced female directors, making the consolidation straight-forward. However, in terms of previous experience on private company boards and power in leader network; the difference is significant only for the incongruent comparisons; and it is negative for first-time female directors i.e. first-time female directors had fewer private company directorships and are less powerful in the leader network than experienced male directors. Experienced female directors had more private company directorships and were more powerful in the leader network compared to first-time male directors. However these differences are to be expected given the comparison is between mismatched levels of experience i.e. the differences could be the result of the differential experience levels. The differences caused by incongruent comparisons cannot be disregarded either as they indicate an inequality in the structure because the same differences do not exist in comparison of congruent pairs. That is, the higher coefficient of power in leader network and greater previous experience on private company boards do not exist when experienced female directors are compared to experienced male directors. Hence, in every difference, there is an implied inequality as well.

Table 25

Summary of significant differences in characteristics and effects between female and male directors

Graduated Parameters	Inequality				FFD	EFD	Female Directors
Female/Male Pairs	FFD/FMD	FFD/EMD	EFD/EMD	EFD/FMD			
Age		-	-		x	x	x
Prior private company directorships		-		+	x	x	x
Number of CEO alters			-			x	x
Power in professional network							
Power in leader network		-		+	x	x	x
Cohesion of leader network				-		x	x
Centrality in collegial network	+			+	x	x	x
Centrality in leader network							

Nominal Parameters	Heterogeneity				FFD	EFD	Female Directors
Female/Male Pairs	FFD/FMD	FFD/EMD	EFD/EMD	EFD/FMD			
Undergraduate		-			x		x
Graduate		-	-		x	x	x
Postgraduate							
Finance	-	-	-		x	x	x
HRM							
Law							
Operations	-	-	-		x	x	x
Education & Research							
Marketing & Sales							
Government							
Engineering & Technology							
Public company CEO	-	-	-	-	x	x	x
Private company CEO		-	-		x	x	x
Entrepreneur							
Non-board CXO		+			x		x
Professional director/Advisor	-	-	-	+	x	x	x

FFD	First-time Female Director
EFD	Experienced Female Director
FMD	First-time Male Director
EMD	Experienced Male Director
-	Negative effect
+	Positive effect
x	Aggregated effect for the two groups of first-time and experienced female directors
x	Aggregated effects for all female directors

5.3 POST-HOC ANALYSIS OF DIFFERENCES IN CHARACTERISTICS AND EFFECTS WITHIN SUB-GROUPS OF FEMALE AND MALE DIRECTORS

In the preceding section, I also regressed six different pairings drawn from the group comprising female and male, first-time and experienced directors on predictor variables comprising human capital and professional network characteristics. Among the six pairs, four are congruent pairs based on similarity of sex and level of experience i.e. first-time female and male directors (Table 12), experienced female and male directors (Tables 16). The two remaining pairings are incongruent across sex and experience levels – odds of directorship for first-time female directors relative to those for experienced male directors (Table 20), odds of directorship for experienced female directors relative to those for first-time male directors (Table 23). In the next section, I will analyze differences in characteristics and effects between first-time and experienced female directors (Table 26), first-time and experienced male directors (Table 30). This set of analyses will shed light on factors contributing to maintaining the characteristics of heterogeneity (or homogeneity) and inequality (or equality) within groups of female and male directors in the social system of corporate directors.

Comparing the full model of effects of female and male directors to those on the two sub-samples of first-time and experienced directors, is akin to unwrapping the effects seen in the larger sample. The set of variables that showed significance in the full model, are then divided into the two models testing for the experience-based sub-samples. In Sections 5.2.2 and 5.2.3, it was discovered that the set of factors that influence the first-time appointment of men and women to public company boards is exclusive of the set that influences the appointment of experienced female and male directors. In the next set

of models, we take a different perspective and examine whether criteria are similarly separated within the groups of men and women.

Upon examining for effects within groups of men and women, I discovered that some effects that were a positive in between group comparisons became negative in within group comparisons. There are also variables that had not been significant contributors to between group differences, become significant differentiators within groups. In the following section, I will examine first the model that tests of difference in effects between first-time and experienced female directors and then a similar set of male directors.

Within group models explain more variance than do models for between group differences. In Tables 12 and 16, Nagelkerke R square was 0.39 and 0.30 respectively; the same statistic for within female model presented next is 0.56. The percentage accuracy in prediction also improves for the comparison group (first-time female directors), though it does not vary much for the reference group (experienced female directors), in the case of women.

5.3.1 Post-hoc Analysis of differences in characteristics and effects within sub-groups of female directors

Female CEOs and directors have often reiterated the drawback to promoting women as a separate activity in the context of their leadership role. There is also some evidence that women develop a "queen bee" persona that prevents them from being supportive of other women seeking leadership positions. On the other hand, women are also known to acknowledge the need to be supportive of other women in a personal context. There are several organizations that promote the advancement of women in organizations through networking and mentoring. In the face of these conflicting perspectives, it is necessary to explore the structure of the group of women directors to understand the dynamics of access to the group by those outside it.

As was done for the analysis of between group differences in Section 5.2; for within group characteristics and effects, I will use the same set of tests – Games-Howell post-hoc test for graduated parameters, Chi square test for nominal parameters and logistic regression for effects of parameters on odds of appointment for, in this case, of first-time female directors relative to experienced female directors. The choice of first-time appointments as the focal category is consistent with my interest in understanding mechanisms of access to the group.

5.3.1.1 Post-hoc analysis of differences in characteristics within female directors on graduated parameters

Between first-time and experienced female directors, differences were found for age, centrality in the collegial networks, power in the leader network and centrality in the leader network. The results of G-H test is available in Table 26 below.

The difference in average age was to be given and as such is not informative. The difference between the groups on centrality in collegial networks is significant at a p value of less than 0.05. The other point of difference between first-time and experienced female directors was on their position in the leader network. First-time female directors have, on average nearly 11 units of power less than experienced female directors, which is significant with a p-value of less than 0.001. This difference can be read in two ways – that first-time female directors are less connected to more connected alters or that their alters are in general less connected themselves. These two plausible reasons connect to two different scenarios and have varied implications for future board appointments. Not being connected to well-connected people has implications for their own networking activities, but their alters not being well-connected implies an alteration of the population in which they network. Be that as it may, this difference can be taken in conjunction with the non-significant difference in the cohesion in their network. The means of cohesion in the leader network indicates that cohesion is greater, even if non-significantly, in the leader networks of first-time female directors. Thus, there is probable cause to assume that it is network population of first-time female directors and not the network structure that is a barrier to these women being in more powerful positions in their leader network.

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Table 26

Differences between first-time and experienced female directors

Variable	Category	N	Mean	Games-Howell Multiple Comparison		Mean Difference	SE
Age	First-time Female Director	59	52.34	FFD	EFD	-2.75*	1.02
	Experienced Female Director	88	55.09				
Prior private company directorships	First-time Female Director	59	0.56	FFD	EFD	-0.82	0.39
	Experienced Female Director	88	1.38				
No. of CEO alters	First-time Female Director	59	57.00	FFD	EFD	7.55	7.83
	Experienced Female Director	88	49.45				
Power in professional network	First-time Female Director	59	1.69	FFD	EFD	-0.01	0.15
	Experienced Female Director	88	1.70				
Power in leader network	First-time Female Director	59	14.80	FFD	EFD	-10.94***	2.31
	Experienced Female Director	88	25.74				
Cohesion of leader network	First-time Female Director	59	48.69	FFD	EFD	5.49	2.81
	Experienced Female Director	88	43.21				
Centrality in collegial network	First-time Female Director	59	42.23	FFD	EFD	-9.40*	3.12
	Experienced Female Director	88	51.63				
Centrality in leader network	First-time Female Director	59	0.71	FFD	EFD	-0.06	0.03
	Experienced Female Director	88	0.77				

*** $p < 0.001$
** $p < 0.01$
* $p < 0.05$
† $0.05 < p < 0.1$

5.3.1.2 Post-hoc analysis of differences in characteristics within female directors on nominal parameters

As seen in between group analyses in preceding sections, within the group of female directors too, variation exists only on graduate-level education. On the other two categories of educational qualification, undergraduate-level and postgraduate-level education, there is homogeneous distribution of first-time and experienced female directors.

Table 27a

Chi-Square tests of homogeneity of distribution of female, first-time and experienced directors in each of the education categories

Education Category	Undergraduate	Graduate	Postgraduate
FFD	17	35	7
EFD	22	54	12
N	39	89	19
Chi-Square	0.641	4.056	1.316
df	1	1	1
Asymp. Sig.	0.423	0.044	0.251
Exact Sig.	0.522	0.056	0.359

Along the dimension of professional categories, the distribution of first-time and experienced female directors varies in the category of operations. The null hypothesis that the distributions are homogeneous is rejected for the professional category of operations ($\chi2$=8.022, df = 1, p < 0.01). On all other categories, the two distributions can be said to be derived from the same population.

Table 27b

Chi-Square tests of homogeneity of distribution of female, first-time and experienced directors in each of the profession categories

Profession Category	Finance	HRM	Law	Operations	Education & Research	Marketing & Sales	Government	Engineering & Technology
FFD	13	6	5	13	5	8	6	3
EFD	18	5	2	32	10	10	8	3
N	31	11	7	45	15	18	14	6
Chi-Square	0.806	0.091	1.286	8.022	1.667	0.222	0.286	0.000
df	1	1	1	1	1	1	1	1
Asymp. Sig.	0.369	0.763	0.257	0.005	0.197	0.637	0.593	1.000
Exact Sig.	0.473	1.000	0.453	0.007	0.302	0.815	0.791	1.000

Within the group of female directors, first-time women differ from their experienced counterparts only in the category of professional Director/Advisor. The null hypothesis that the distributions are homogeneous is rejected for the role category of professional director/advisor ($\chi2=27.222$, df = 1, Exact p < 0.001). Taken in conjunction with the significant difference on age, this is not a surprising result. It is surprising however that their distribution is homogeneous in the public company CEO category.

Table 27c

Chi-Square tests of homogeneity of distribution of female, first-time and experienced directors in each of the role categories

Role Category	Public company CEO	Private company CEO	Entrepreneur	Non-Board CXO	Professional Director/Advisor
FFD	4	9	6	35	5
EFD	4	16	6	22	40
N	8	25	12	57	45
Chi-Square	0.000	1.960	0.000	2.965	27.222
df	1	1	1	1	1
Asymp. Sig.	1.000	0.162	1.000	0.085	0.000
Exact Sig.	1.000	0.230	1.000	0.111	0.000

5.3.1.3 Post-hoc analysis of differences in effects within female directors

In the comparison between first-time and experienced female directors, being a public company CEO had marginally significant but with substantial benefit (B= 1.56, p = 0.06, Exp(B) = 4.74) for first-time female directors. Women, who did not have previous experience on public company boards but were currently in the role of a CEO in a public company, the odds of appointment to a public company board was more than twenty times that of a female public company CEO who has previous experience on a public company board. The role of non-board CXO was also positively, albeit marginally significant (B= 0.70, p = 0.08, Exp(B) = 2.02). The variable 'professional director/advisor' has to be read as only 'advisor' for a first-time director because it is not possible for a first-time director to be fully occupied as a director of public companies. The significant and substantial negative effect of being an advisor (B= -2.26, p < 0.001, Exp(B) = 0.10) is attributable to the fact that very few first-time female appointees are advisors.

Of the three profession categories, being an operations professional reduced the odds of first-time appointment to a public company board to half (B= -0.65, p = 0.09, Exp(B) = 0.52), for women without previous public company board experience.

Professional network variables are found to be significant but low on effect. Coefficient of cohesion in the leader network had a small but positive effect (B= 0.03, p < 0.001, Exp(B) = 1.03) on chances of a first board appointment for women, relative to women with prior board experience.

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Table 28
Logistic regression of appointment of a first-time female director, relative to the appointment of an experienced female director

Independent Variables	First-time Appointment			Recurrent Appointment	
	B	S.E.	Exp(B)	B	Exp(B)
Statistical Control Variables					
Board Size	-0.11	0.07	0.90	0.11	1.11
Proportion of women on the board	1.51	3.47	4.54	-1.51	0.22
Separated CEO/Chairperson role	-0.07	0.52	0.93	0.07	1.07
Female CEO	-1.73	1.16	0.18	1.73	5.64
Predictor Variables					
Age	-0.03	0.04	0.97	0.03	1.03
Undergraduate	-0.02	0.40	0.98	0.02	1.02
Graduate	0.06	0.35	1.06	-0.06	0.94
Postgraduate	-0.04	0.51	0.96	0.04	1.04
Public company CEO	1.56†	0.83	4.74	-1.56†	0.21
Private company CEO/Entrepreneur	0.00	0.47	1.00	0.00	1.00
Non-Board CXO	0.70†	0.40	2.02	-0.70†	0.50
Professional Director/Advisor	-2.26***	0.57	0.10	2.26***	9.59
Finance	0.25	0.43	1.28	-0.25	0.78
Operations	-0.65†	0.39	0.52	0.65†	1.92
Non-Finance/Operations Professions	0.40	0.34	1.50	-0.40	0.67
Prior private company directorships	-0.06	0.12	0.94	0.06	1.07
Number of CEO alters	0.01	0.01	1.01	-0.01	0.99
Power in professional network	0.40	0.34	1.49	-0.40	0.67
Power in leader network	-0.09***	0.03	0.92	0.09***	1.09
Cohesion of leader network	0.03†	0.02	1.03	-0.03†	0.97
Centrality in collegial network	-0.01	0.01	0.99	0.01	1.01
Centrality in leader network	-1.84	1.78	0.16	1.84	6.30

Goodness-of-fit Measures	Value	df	Sig.		
Model Chi-square	75.09	19	0.000		
Hosmer-Lemeshow Chi-square	4.00	8	0.858		
Nagelkerke R Square	0.54				
	First-time Appointment		Recurrent Appointment		Overall
Prediction Accuracy %	74.6		84.1		80.3

N = 147
*** p < 0.001
** p < 0.01
* p < 0.05
† 0.05 < p < 0.1

5.3.1.4 Summary of differences within female directors

Differences within women occur more on graduated parameters that are indicators of inequality, than on nominal parameters which indicate heterogeneity in the group. Of all the profession categories, women were homogeneously distributed in all except that of operations. Similarly for role categories, first-time and experienced female directors were significantly disproportionately on in the role of professional director/advisor, which is to be expected given that first-time directors naturally have no previous experience on public company boards. Women were also unequally represented in the category of non-board CXO, but the difference was very marginally significant. This difference is also to be expected because it is unlikely that a woman who has multiple board memberships will still be in the role of a CXO, who is not on the board of her primary employer.

With regard to effects of the independent variables on the odds of appointment of first-time female directors, power and cohesion in the leader network, professional category of operations and the role categories of public company CEOs and advisor[5] are significant. However, the effect is positive and most substantial for the role category of public company CEO. This is an interesting effect, when compared to the consistently negative effect of being a public company CEO when the comparison is to male directors (see Table 7, Table 17 and Table 24). The implication is that when a female and male public company CEO comprises the choice set, the odds will favor appointment of the male candidate. However, when the choice set comprises a first-time female candidate who is a public company CEO and a female public company CEO with previous board

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[5] Because a first-time director cannot have previous experience on public company boards and since the focal category is first-time appointments, the category is referred to as 'advisor' rather than 'professional director/advisor'.

experience in a public company; the odds favor the candidate without previous board experience. Among the categories of profession, the category of operations was found to have a negative effect, which is consistent with between group effects.

Centrality in the leader network is a network factor, whose effect is substantially negative for first-time female directors but, the p value of the effect is only marginally significant. From Tables 7, 13, 17 and 24, it is clear that leader network centrality is a differentiating factor only within the group of women and not between men and women. Cohesion of leader network is also a largely within group effect as it is seen to be significant only in the comparison between the incongruent pair of experienced female director and first-time male director (See Table 24).

Comparing the between and with-group characteristics and effects, it is evident that among nominal parameters similar categories affect both between and with-group composition and effects on odds of membership. There is greater variance to be found in the comparison of between and within group effects on graduated parameters. The implications of this will be discussed in the next chapter.

Table 29
Summary of within-group differences between first-time and experienced female directors

Significant differences in characteristics	Value of Difference ($\overline{x}_f$ - $\overline{x}_m$) (Chi sq. coefficient of N_f - N_m)
Graduated parameters	
Age	(-) 2.75*
Power in leader network	(-) 10.94***
Centrality in collegial network	(-) 9.40*
Nominal parameters	
Graduate education	(-) 4.06*
Operations	(-) 8.02**
Professional Director/Advisor	(-) 27.22***
Significant differences in effects (for women, compared to men)	**Effect on odds ratio** (increase/decrease in odds ratio)
Graduated parameters	
Centrality in leader network	(-) 0.84†
Cohesion of leader network	(+) 0.03**
Nominal parameters	
Operations	(-) 0.48†
Public company CEO	(+) 3.74†
Non-board CXO	(+) 0.02†
Professional Director/Advisor	(-) 0.90***

*** $p < 0.001$
** $p < 0.01$
* $p < 0.05$
† $0.05 < p < 0.1$

5.3.2 Post-hoc Analysis of differences in characteristics and effects within sub-groups of male directors

Not much is known of the structure and composition of the group of male directors except that they are the much dominant in-group; not only a board members but in organizations, in general. A social system can contain more than one dominant group, for instance one group may be dominant in terms of religious affiliation while another on wealth within one social system. However, if we consider members of public company top management teams as a social system; then it appears that there is only one dominant group made up of Caucasian men. Minority groups include Caucasian women and members of racial and ethnic minority groups.

A dominant group is also characterized by homogeneity, by which it maintains its dominant status. Therefore, in order to gain membership into the dominant group, in-group members who do not yet have membership, like Caucasian male first-time directors, the categorical criteria are already present. Hence, they only have to have the valued resources that are defined as pertinent for group membership. In other words, odds of appointment of male first-time directors are more likely to be affected more by graduated parameters than nominal parameters. In the next section, I have presented the results of the tests of differences in characteristics and effects, from which a greater understanding of the structure and composition of the group of male directors can be obtained.

5.3.2.1 Post-hoc analysis of differences in characteristics within male directors on graduated parameters

Between first-time and experienced male directors, highly significant differences at p-value of less than 0.001 occur on the dimensions of age, prior board experience in private companies, centrality in the collegial, and two dimensions – power and cohesion of the leader network. Age, is in itself a non-interesting difference except when taken as a unit of difference for the whole group. A look at the mean age gradient for the four groups, it is a very linear progression with first-time female directors being the youngest and experienced male directors, the oldest. The difference between each group is significant, except that between first-time female and male directors. The interesting part lies in the opposite effects that this has on women and men, but that is a point of examination in the section on tests of inequality.

Difference in prior board experience in private companies is significant though on average experiences male directors sit on the board only one more private company than first-time male directors.

First-time male directors were found to be less powerful in the leader network and less central in the collegial network than their experienced counterparts. However, the leader network of first-time male directors was more cohesive than that of experienced male directors.

Table 30

Differences between first-time and experienced male directors, on graduated parameters

Variable	Category	N	Mean	Games-Howell Multiple Comparison		Mean Difference	SE
Age	First-time Male Director	81	53.12	FMD	EMD	-4.99***	1.03
	Experienced Male Director	138	58.12				
Prior private company directorships	First-time Male Director	81	0.52	FMD	EMD	-1.33***	0.24
	Experienced Male Director	138	1.85				
No. of CEO alters	First-time Male Director	81	61.73	FMD	EMD	-9.39	8.4
	Experienced Male Director	138	71.12				
Power in professional network	First-time Male Director	81	1.44	FMD	EMD	-0.01	0.1
	Experienced Male Director	138	1.45				
Power in leader network	First-time Male Director	81	13.88	FMD	EMD	-12.14***	1.7
	Experienced Male Director	138	26.02				
Cohesion of leader network	First-time Male Director	81	55.50	FMD	EMD	12.57***	2.46
	Experienced Male Director	138	42.93				
Centrality in collegial network	First-time Male Director	81	30.26	FMD	EMD	-17.99***	2.58
	Experienced Male Director	138	48.25				
Centrality in leader network	First-time Male Director	81	0.77	FMD	EMD	0.02	0.02
	Experienced Male Director	138	0.75				

*** $p < 0.001$
** $p < 0.01$
* $p < 0.05$
† $0.05 < p < 0.1$

5.3.2.2 Post-hoc analysis of differences in characteristics within male directors on nominal parameters

Similar to the situation with female directors, within the groups of male directors too graduate-level education is the only differentiator. In the other two categories – undergraduate and postgraduate levels – first-time and experienced male directors are homogeneously distributed.

Table 31a

Chi-Square tests of homogeneity of distribution of male, first-time and experienced directors in each of the education categories

Education Category	Undergraduate	Graduate	Postgraduate
FMD	28	48	5
EMD	30	96	12
N	58	144	17
Chi-Square	0.069	16.000	2.882
df	1	1	1
Asymp. Sig.	0.793	0.000	0.090
Exact Sig.	0.896	0.000	0.143

Again, as with the characteristic of the distributions of female first-time and experienced directors; within male directors, the distributions of experienced and first-time male directors is homogeneous on all professional categories except operations. The null hypothesis that the distributions are homogeneous is rejected for the professional category of operations ($\chi2$=17.021, df = 1, p < 0.001).

Table 31b

Chi-Square tests of homogeneity of distribution of male, first-time and experienced directors in each of the profession categories

Profession Category	Finance	HRM	Law	Operations	Education & Research	Marketing & Sales	Government	Engineering & Technology
FMD	26	3	2	27	6	10	3	4
EMD	38	2	6	67	9	8	4	4
N	64	5	8	94	15	18	7	8
Chi-Square	2.250	0.200	2.000	17.021	0.600	0.222	0.143	0.000
df	1	1	1	1	1	1	1	1
Asymp. Sig.	0.134	0.655	0.157	0.000	0.439	0.637	0.705	1.000
Exact Sig.	0.169	1.000	0.289	0.000	0.607	0.815	1.000	1.000

Similar to the within group characteristic of female directors, the distribution of first-time and experienced male directors is heterogeneous only in the category of professional director/advisor. The null hypothesis that the distributions are homogeneous is rejected for the role category of professional director/advisor ($\chi2=25.329$, df = 1, p < 0.001). In all other categories, the distribution of first-time and experienced male directors is homogeneous.

Table 31c

Chi-Square tests of homogeneity of distribution of male, first-time and experienced directors in each of the role categories

Role Category	Public company CEO	Private company CEO	Entrepreneur	Non-Board CXO	Professional Director/Advisor
FMD	17	16	8	25	15
EMD	28	27	5	20	58
N	45	43	13	45	73
Chi-Square	2.689	2.814	0.692	0.556	25.329
df	1	1	1	1	1
Asymp. Sig.	0.101	0.093	0.405	0.456	0.000
Exact Sig.	0.135	0.126	0.581	0.551	0.000

5.3.2.3 Post-hoc analysis of differences in effects within male directors

The next model describes the differential effects that human capital and professional network variables have on first-time male directors relative to men who have previous experience on public company boards.

This model, as seen in table 31 below, is also well-specified with a decreasing minus two log likelihood from 288.59 in the null model to 155.40 for the full model. Nagelkerke R square is 0.62, making this the model with highest variance explained among all the models considered thus far. The Chi square coefficient of the entire model is 133.19, significant at a p value of less than 0.001. Hosmer-Lemeshow Chi square is not statistically significant, indicating that the model is fairly well specified.

Among the nominal parameters, being an operations professional was the only significant category, with a negative effect (B= -0.56, p = 0.07, Exp(B) = 0.57) on the chances of a first board appointment for men without previous such experience, relative to those for men with such previous experience. Previous experience on the board of a private company did not have a positive impact either (B= -0.59, p < 0.001, Exp(B) = 0.56), reducing the odds for men without public company board experience by half. The strongest positive effect came from being in a position of power in the larger network (B= 1.47, p < 0.001, Exp(B) = 4.33). Power in the leader network (B= -0.11, p < 0.001, Exp(B) = 0.89) and, centrality in the collegial network (B= -0.05, p < 0.001, Exp(B) = 0.95) both reduced the odds for first-time male directors. Cohesion in the professional network increased the odds but non-substantially (B= 0.03, p < 0.05, Exp(B) = 1.04) for first-time male directors.

Table 32

Logistic regression of appointment of a first-time male director, relative to the appointment of an experienced male director

Independent Variables	First-time Appointment			Recurrent Appointment	
	B	S.E.	Exp(B)	B	Exp(B)
Statistical Control Variables					
Board Size	-0.08	0.05	0.93	0.08	1.08
Proportion of women on the board	3.05	3.06	21.02	-3.05	0.05
Separated CEO/Chairperson role	0.16	0.46	1.18	-0.16	0.85
Female CEO	0.75	0.94	2.13	-0.75	0.47
Predictor Variables					
Age	-0.04	0.03	0.96	0.04	1.04
Undergraduate	0.25	0.41	1.29	-0.25	0.78
Graduate	0.14	0.35	1.15	-0.14	0.87
Postgraduate	-0.39	0.58	0.68	0.39	1.48
Public company CEO	0.17	0.41	1.18	-0.17	0.84
Private company CEO/Entrepreneur	-0.06	0.34	0.94	0.06	1.06
Non-Board CXO	0.34	0.39	1.41	-0.34	0.71
Professional Director/Advisor	-0.45	0.39	0.64	0.45	1.57
Finance	0.24	0.33	1.27	-0.24	0.78
Operations	-0.56†	0.30	0.57	0.56†	1.74
Non-Finance/Operations Professions	0.31	0.34	1.37	-0.31	0.73
Prior private company directorships	-0.59***	0.18	0.56	0.59***	1.80
Number of CEO alters	-0.01	0.00	0.99	0.01	1.01
Power in professional network	1.47***	0.40	4.33	-1.47***	0.23
Power in leader network	-0.11***	0.03	0.89	0.11***	1.12
Cohesion of leader network	0.03*	0.01	1.04	-0.03*	0.97
Centrality in collegial network	-0.05***	0.01	0.95	0.05***	1.05
Centrality in leader network	-1.98	1.66	0.14	1.98	7.23

Goodness-of-fit Measures	Value	df	Sig.		
Model Chi-square	133.19	19	0.000		
Hosmer-Lemeshow Chi-square	11.77	8	0.162		
Nagelkerke R Square	0.622				
	First Appointment		Multiple Appointment	Overall	
Prediction Accuracy %	80.2		87.7	84.9	

N = 218
*** p < 0.001
** p < 0.01
* p < 0.05
† 0.05 < p < 0.1

5.3.2.4 Summary of differences within male directors

Consolidating the information in Tables 29, 30a and 30b, it is evident that men on boards of public companies, like women, are fairly homogeneous with only category each of differentiation in profession and role types. There is greater variation in terms of graduated parameters within the group of male directors.

The group of male directors is differentiated internally on only one of the eight professional categories – operations. In terms of role categories, there is significant difference in their distribution in the roles of professional director/advisor and private company CEO, which is only marginally significant. In terms of effects, only the professional category of operations is significant.

There is greater variation in graduated parameters within the group of male directors. First-time male directors are younger and have fewer private company directorships than experienced male directors. Significant differences in network characteristics are lower power of first-time directors in the professional network, lower centrality in the collegial network. The only network variable where first-time directors have an advantage is cohesion in the leader network.

Though first-time directors were not significantly different from experienced male directors on average coefficient of power in the professional network, it did have a significant and substantial positive effect on the likelihood of their appointment in comparison to the appointment of an experienced male director.

Table 33

Summary of differences within-group between first-time and experienced male directors

Significant differences in characteristics	Value of Difference $(\overline{x}_f - \overline{x}_m)$ (Chi sq. coefficient of $N_f - N_m$)
Graduated parameters	
Age	(-) 4.99***
Prior private company directorships	(-) 1.33***
Power in leader network	(-) 12.14***
Centrality in collegial network	(-) 17.99***
Cohesion of leader network	(+) 12.57***
Nominal parameters	
Graduate education	(-) 16.00***
Operations	(-) 17.02**
Professional Director/Advisor	(-) 25.33***
Private company CEO	(-) 2.81†
Significant differences in effects (for women, compared to men)	**Effect on odds ratio** (increase/decrease in odds ratio)
Graduated parameters	
Prior private company directorships	(-) 0.44***
Power in leader network	(-) 0.11**
Centrality in collegial network	(-) 0.05***
Cohesion of leader network	(+) 0.04*
Power in professional network	(+) 3.33***
Nominal parameters	
Operations	(-) 0.43†

*** $p < 0.001$
** $p < 0.01$
* $p < 0.05$
† $0.05 < p < 0.1$

5.4 FINAL SUMMARY OF BETWEEN-GROUP AND WITHIN-GROUP DIFFERENCES

After separate analysis of differences between the three between-group pairs and one within-group pair, I will now consolidate the data points to present a structural perspective of the composition of corporate directors as a social system. The differences both between-group and within group differences for men and women is presented in Table 34 below. It is a summary of the information presented in Tables 25, 29 and 33 above.

From the markers in the column showing between group differences, it can be seen that men and women on public company boards are different from each other on almost all parameters. The only parameters on which the two groups do not differ are power in professional network, centrality in collegial network, educational qualification – postgraduate, role – entrepreneur. The most differences were seen in the categories of profession – men and women are almost equally distributed in all categories of profession except finance and operations, wherein women are substantially under-represented.

Comparing within group differences between men and women, it is evident that they are similarly distributed even within groups with variation within the group on few parameters. There is slightly more variation within the group of men on public company boards than women. Within the group of women, first-time directors had lower values than experienced directors on every parameter. However, within male directors, on one parameter – cohesion of leader network – first-time directors' leader networks were more cohesive than those of experienced directors.

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CHAPTER 6

6.1 DISCUSSION OF RESULTS

The context in which this study is situated is the under-representation of women at the top rungs of public companies. The reasons for the importance of this issue are (a) the representation of women in lower ranks is fairly homogeneous with increasing attrition on ascent, and (b) there is evidence that there is a systematic bias attributable to the attrition. Most of literature on this issue has focused on the socio-psychological aspects of bias – that is, discrimination that is cognizant and intentional. It is not my intention to refute or prove that finding; rather the objective of this study was to explore where there is a structural basis to this bias. The basis for this examination is Peter Blau's (1977) theory of societal composition and structure and the resulting consequences on the manner in which bias evolves. His theory, which he called primitive perhaps because it is profoundly simple, proposed that the extent to which heterogeneous groups comprise a social system predicts the extent to which the various groups will be able to participate in the system; conversely, a homogeneously composed social system is likely to accept and evolve into an inclusive system far more slowly than the former. Naturally, the composition and structure of a social system is dependent on the purpose of the system. As such its composition and structure is defined in those terms; for instance if the purpose of a monastic sect is to maintain the knowledge contained in its order; it is important that the sect comprise only those who are dedicated to maintaining the sanctity of that knowledge. In such a situation, heterogeneity and inequality in the system may be counter to its purpose. If the purpose of the monastic sect is to spread the knowledge contained in its belief system, then it is important that its composition and

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structure reflect its ability to create such dispersion, i.e., its ability to reach different constituents of society and translate the belief system into those acceptable to such constituents. A monastic order makes for a good example because its identity is very distinct and purpose well-defined. However, most social systems are not as well-defined nor is their purpose as clarified. In this study, I consider the collective of independent directors on the boards of public companies a social system with distinct boundaries and definitive purpose.

The purpose and conduct of boards of directors is outside the purview of this study, being a vast and complicated subject it itself. Yet, in order to evaluate the composition and structure of any social system, it is imperative to know the objective of the system as its end goal. To this purpose, among the various definitions of board outcomes, I choose a simple and recent outline provided by Palepu (2012) – *overseeing strategy and resource allocation, overseeing, hiring and evaluating the company's CEO and overseeing financial reporting* (Lorsch, 2012, Pg. 38). I consider the composition and structure of the social system comprising corporate directors against achievement of these objectives. On the face of it, none of these objectives indicate the salience of the sex of the director for achieving the purpose of the board. Yet, women have been consistently under-represented on boards and remain a minority. In order to understand the ways in which these barriers are operationalized beyond individual biases and prejudices, in this study I explored the composition of the social system of corporate directors. It has been proposed and to some extent shown—though never in this context—that the composition of a social system indicates the extent to which it is accessible to various constituents, and its structure impacts the manner in which the social system is likely to evolve. By

understanding these two factors it may be possible to propose the ways in which composition and structure need to be modified to improve its ability to achieve its objectives or even to declare it optimal.

6.1.1 Parameters of a social system

A social system can be said to be composed of people who can be categorized along several dimensions like age, sex, education, race, religion, income, wealth and so on. These characteristics are usually represented in varying degrees and strengths. For instance, a society may include several religions whose strength is generally equal; no one group has a dominant status or one religion may be over-represented in numbers but another may be wealthier in terms of resources. Therefore, a society can be described and evaluated in as many exponential terms as there are ways to define it. This makes the study of social structures complex and at times rife with paradoxical outcomes. One such example is the correlation between the sex composition of a profession and its value in terms of income in that profession. It has been found that once the proportion of women in a profession increases; the income derived from that profession falls (Baron and Newman, 1990; Jacobs, 1992; Tomaskovic-Devey and Skaggs, 2002). Superficially, it seems to be a nonsensical relationship as income in a profession is a correlate of the value of the profession in the organization structure and the market dynamics of demand and supply. However, from a sociological perspective, women being late entrants to employment, with a previously strongly established social role that is antithetical to that of workers, results in pay discrimination against women. Thus, as the proportion of women increase in a profession, the median income in that profession falls. This is one

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way in which the different parameters intersect to characterize a system; with salience not always being awarded to the most pertinent parameter.

Two types of characteristics of a social system serve to define its boundaries. Characteristics that segregate constituents of a system into distinct groups that cannot be arranged in an absolute order in value are called nominal parameters. Examples of nominal parameters include sex, religion, race/ethnicity, and such like. While it is true that they do not inherently possess a value based on which they can be hierarchically arranged, social and psychological processes of categorizations can apply a value to even nominal parameters. Having said that, such values are context-specific and person-driven; a Christian may place the highest value on Christianity while a Hindu may do the same for Hinduism, though both are placed in the same social system. Therefore, while it is possible to rank order nominal parameters, such valuation does not signify the actual value of the parameter. In fact, nominal parameters are those that cannot be assigned an absolute value.

Graduated parameters form the other axis along which a social system is defined. Unlike nominal parameters, as the name suggest, graduated parameters are those characteristics that can be assigned values that signify their place in a hierarchical order. Examples of graduated parameters are age, income, and years of experience, among others. Depending on the social system being evaluated, these parameters can be assigned high and low values. For instance, in the context of knowledge creation being older may be more valuable than being younger, whereas in the context of manual labor being younger may be valued higher than being older. Either way, age has a specific value that

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does not change depending on the context but can be arranged in a hierarchy that is suitable to the situation.

In this study, the graduated parameters were age, the number of previously held private company directorships, the number of CEO alters in the professional network, power in professional and leader networks, cohesion of the leader network, and centrality in professional and leader networks. The nominal parameters that define the social system comprising corporate directors in this study were the educational qualification, profession, and the role occupied by directors.

6.1.2 Evaluation of social systems

Evaluation of any social system has to be done against the backdrop of the purpose for which such a society exists. Boards of public companies are created to monitor and support the leadership team, mainly the CEO, in ensuring that the organizations meets the needs and demands of various stakeholders (e.g., dividends for shareholders, sustained growth of the organizations for organizational constituents, and regulatory requirements). Directors are presumably appointed based on the belief that they possess the qualities necessary to fulfill these objectives. Therefore, the characteristics of the directors in the sample were defined in terms of nominal and graduated parameters as described above and used to evaluate the society of corporate directors. The purpose of my examination of the social system of corporate directors was to understand the under-representation of women in it. As such, we begin with the assumption that those who are present in the system already possess the required qualities to fulfill the objectives of the system. Beyond that, it is my contention that the dominance

of men in the system makes certain criteria more salient than others, which in turn serves to maintain the low representation of women in the system.

To evaluate the extent to which the composition and structure of the social system of corporate directors is conducive to the inclusion of women, I first used the between-group results of the distribution of men and women on nominal and graduated parameters to understand the extent to which the system is heterogeneous. Heterogeneity of a system is based not only on the number of different nominal groups present in the system but also the size of each nominal group relative to the other groups. If a social system contains five nominal groups with ninety percent membership in one group, such a system is not heterogeneous. A heterogeneous social system affords opportunities for interaction among constituents of various groups, which promotes collective action. A heterogeneous system also signals that its boundaries are permeable and promotes membership of different types of people. Hence, if the corporate director system is heterogeneous along a single parameter, it signals to those who possess that characteristic that they can aspire for membership in the system. But, no social system is characterized by only one parameter; therefore heterogeneity takes on multiple forms and its effects often taken on a combinatorial quality. In order to assess the separate and combined effects of the various parameters on membership into the social system for women, I used the results of logistic regression. From a regression equation we can see the effects of the individual categories in which men and women are not similarly distributed or equivalent in mean value. Thus, the effects of finer variations which are not evident in examination of mean values or group distribution as well as the effects of parameters acting in combination are evident in the results of a regression equation.

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6.1.3.1 Structural composition and effects of graduated and nominal parameters for the group comprising first-time female directors

Among the nominal parameters, to assess relative heterogeneity and homogeneity between female and male directors, I return first to the summary differences between the congruent pairs of female and male directors. Then I will assess the incongruent pairs. Finally, I will use the consolidated differences and similarities to evaluate the extent and dimensions of heterogeneity in the system.

From Table 13, it is seen that female and male first-time directors are different in the profession categories of finance and operations as well as the role categories of public company CEO and Professional director/Advisor. The implication is that they are equally distributed on the remaining categories of education, profession and role. In terms of heterogeneity or similar distribution of the two different types of constituents across maximum categories of nominal parameters, this indicates a high degree of heterogeneity on nominal parameters among first-time directors. The meaning of this heterogeneous characteristic of the social system of corporate directors on the dimension of nominal parameters is that there is similar opportunity of men and women of all indicated professions to gain membership into the social system. However, it should be kept in mind that this is the characteristic of individual parameters.

In terms of mean values of graduated parameters, only on centrality in collegial networks are first-time female and male directors different from each other. On all other graduated parameters, on average, first-time female and male directors are equivalent. In assessing nominal parameters, the scale is the distribution of constituents. For evaluation of graduated parameters, the scale is the mean value of the attribute. Therefore, being

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equivalent on the mean value of all but one graduated parameter indicates clustering within a small range of values on graduated parameters, signifying homogeneity of values between the two groups. The implication of the distribution of average values of graduated parameters for membership into the society of corporate directors is that there is a minimum value of resources, which is required. Therefore, unless a person has the certain minimum value in graduated resources—like being well-known (central) and well-connected in their network, being part of a network that is cohesive, and having previous experience on private company boards—he or she is unlikely to be able to obtain membership into the system. Once again, it is imperative to keep in mind that this is the meaning of merely the distribution of graduated parameters by themselves.

The individual and combined effect of the sets of both nominal and graduated parameters on membership to public company boards for first-time female directors relative to their male counterparts can be seen in the results of logistic regression. Among nominal parameters, being a non-board employee in the position of a CXO increased the relative likelihood of membership for women without previous board experience. Going back to the data on distribution in role categories, the numbers show that while for the groups that women were significantly differently distributed than men, their numbers were fewer than of men. But, only for the category of non-board CXO, were women greater in number than men. Therefore, among the effects, belonging to the CXO category has a significant positive effect. The implication of the distribution and effects of nominal parameters is that while the society appears to be equally accessible to both men and women without previous board experience in public companies, it is more so for women who are currently occupied in the role of non-board CXO. On the effects of

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graduated parameters it appears that centrality in the collegial network and power in the professional network both improve the odds of board membership for first-time female directors. Taken together, it is clear that women who are in non-board CXO roles, centrally situated in the network of their colleagues and well-connected in the professional network are most likely to obtain membership into the society of corporate directors as compared to first-time male directors (See Table 13).

The next comparison of first-time female directors is to experienced male directors. Given the proportions of experienced male directors and women who have no previous board experience, it is a very plausible comparison set. Naturally, relative to the group of female directors without board experience, the group comprising experienced male directors is a homogeneous (significantly different in distribution in every category except entrepreneur), thus not very accessible in terms of role and education. The group is heterogeneous on the parameter of profession. There is also equality on more graduated parameters than inequality, hence along the dimension of graduated parameters too, the groups is fairly homogeneous; indicating inaccessibility on most parameters to first-time female directors, unless a threshold value of resources is met. All three graduated parameters on which they are different can plausibly co-occur with being more experienced – greater age, greater number of private company board appointments and power in the leader network (which is contingent on being connected to more CEOs and board members, which is highly correlated with being on more boards). But, the difference between the groups on the nominal parameter of role is not contingent on either longer career tenure or precluded by previous public company board experience. Hence, the homogeneity of the two groups caused by the difference in distribution in role

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categories is evidence of the inaccessibility of membership into the companies whose board is populated by experienced male directors.

This inaccessibility is also evident from the results of the logistic regression equation comparing the odds of first-time female directors to those of experienced male directors. As in the comparison to first-time male directors, women without previous board experience were likely to get on a public company board only by being a CXO and being well-connected themselves and to well-connected others in the professional network. On the three graduated parameters, which were significantly unequally constituted indicating tolerance of a wider range of values; all had a significant negative effect on odds of public company board appointment and consequent membership into the social system of corporate directors, for first-time female directors.

To summarize, compared to a male director without previous public company board experience, a female director is advantaged by being a CXO, central in the collegial network and well-connected in the professional network. It is interesting to note that none of the parameters disadvantage a first-time female director in comparison to a first-time male director; all the significant parameters in the regression equation benefit the first-time female director. The implication is that the first-time male director is in a weak position, relative to a first-time female director, in their odds for public company board appointment. This advantage that first-time female directors have extends to scenarios of comparison to experienced male directors as well, except for the benefit from centrality in the collegial network. Not centrality (by inference direct access to resources) but power i.e. being well-connected to other well-connected people. There is

however a paradoxical effect in terms of power in networks – while power in the professional network (which is the larger network comprising subordinates, colleagues and supervisors) confers an advantage; power in the leader network (which comprises only supervisor alters, who are also CEOs and board members) reduces the odds for first-time female directors. The decrement is substantially less than the increment due to power in the professional network. The explanation for this is tied with the way that direction of ties is defined for the networks. For a person who is in a lower position, as a CXO is relative to CEOs and board members, the direction of ties is from her/him to those in higher positions i.e. CEOs and board members. As such, in the calculation of power in the leader network, the CXO becomes more a recipient of power than a giver of power to others; by virtue of having more ties going out than coming in (For the description of how the power variable is calculated see Appendix 4). Being a recipient of power, makes a person less powerful despite being well-connected due to the factor of dependence rather than reciprocity. Therefore, coefficient of power in the leader network confers a disadvantage of a person who is of lower status like a CXO. Conversely, the professional network that comprises all connections – lower, equal and higher – having a high coefficient of power indicates not only being a recipient of power from well-connected alters but also being a source of power for others. Contrary to the stronger position of first-time female directors relative to first-time male directors, being compared to experienced male directors puts first-time female directors, naturally, in a relatively much weaker place. The benefits of being a CXO and having power from her position in the professional network remain but all other significant parameters work to her disadvantage – age, previous experience on private company boards, number of CEO

alters in her professional network, power in the leader network, being a public company CEO or an advisor. Therefore, factors that improve the odds for first-time directors against both first-time and experienced male directors, are being a CXO and well-connected in the professional network. From this conclusion, it becomes evidence that while the social system may seem accessible to everyone based on the heterogeneity of its population, the finer details of distribution on individual parameters make mechanisms that maintain inequality apparent.

6.1.3.2 Structural composition and effects of graduated and nominal parameters for experienced female directors

On the nominal parameter of education, experienced female directors were significantly fewer in number in the category of graduate education; in the other two categories – undergraduate and postgraduate education, they were similarly distributed. Like in the case of first-time directors, the group of experienced directors is also significantly differently distributed on only two profession categories – finance and operations. On the remaining six categories, they are similarly distributed. Hence, in terms of the nominal parameters, there is heterogeneity i.e. similar distribution, on education and profession in the group of experienced directors. In role categories, only one role is significantly differentiated – public company CEO. Men and women are marginally differentiated in the category of private company CEO and professional director/advisor. Based on the significant differentiation on only one role category, marginally significant differentiation and similar distribution in two categories each, it can be that in terms of nominal parameter of role, the distribution is marginally heterogeneous. In other words, there is equal accessibility into the group of experienced

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directors for people in as many role categories as there is not. On graduated parameters too, both experienced men and women are equivalent in the mean value of their resources. The mean value of variables is significantly unequal only on age and number of CEO alters in the professional network. Number of CEO alters in the network is the outcome of number of companies that the ego is associated with in the career tenure. From raw data, it was found that women, just as they were marginally younger, had worked in marginally fewer companies; they also had directorships in fewer private and public companies. As a result, it is natural that the number of CEO alters in the network of experienced female directors will also be lesser than in the network of experienced male directors. Therefore, regarding the composition of the social system of corporate directors, with respect to experienced director, is fairly heterogeneous, equally accessible to both men and women of most educational qualification, profession and roles. The system is also without much variation in terms of graduated parameters, making it a homogeneous system in terms of valued parameters. According to the current composition, experienced directors of nearly any of the eight professions indicated, qualified up to any of the three levels of education, either a private company CEO, professional director/advisor or CXO with a minimum value in resources like previous private company board experience, knows a minimum number of CEOs, is known and connected to a minimum number of people in the professional network can again access to the group of experienced directors. Thus, though access may be granted on nominal criteria, it is likely to be denied on graduated parameters.

Effects of graduated and nominal parameters on the odds of board appointment for experienced female directors relative to those for experienced male directors were

both positive and negative (Table 17). Women benefitted but not very substantially from being central in their collegial network, in the role of professional director/advisor and in professions other than finance and operations. On the other hand, the odds of appointment of experienced women directors relative to experienced male directors are reduced by age, previous experience on private company boards, number of CEO alters in the professional network, being the CEO of a public company and in the profession of finance.

Comparing experienced female directors to first-time male directors, it was found that this group is one of the more differentiated in terms of graduated parameters. On four of the eight graduated parameters, the average value for experienced female directors was significantly different from that of first-time male directors. On nominal parameters, the two groups are similarly distributed on all categories of education and profession. The only differentiated categories are in the roles of public company CEO and professional director/advisor. The difference can be accounted for by the fact that there are likely to be more professional director/advisor role occupants who are serving on multiple boards than among those seeking their first board appointment. Secondly, considering that more than ninety percent of CEO of public companies are men, it is reasonable to expect a male director—whether experienced or not—to be the CEO of a public company. To sum, the group comprising first-time male and experienced female directors is heterogeneous; thus tolerant of directors with varying levels of resources, in terms of graduated parameters but homogeneous on nominal parameters; only public company CEOs and professional directors/advisors can gain membership to this group.

In terms of effects of parameters on the odds of experienced female directors relative to first-time male directors, a few parameters that reduced the odds for experienced female directors when compared to experienced male directors; had a similar effect on their odds relative to first-time male directors too. Regardless of the comparison category, being a public company CEO, and number of CEO alters in the professional network had a negative impact on the odds of board membership for experienced female directors. The negative effect of being a public company CEO can be attributed to the fact there are very few women CEOs of public companies. It is expected that experienced female directors will have more CEOs in their professional network given the longer career tenure, during which they have more experience on public and private company boards. Yet, from the GH test results (Table 8), it is seen that experienced women have fewer CEO alters in the professional network than first-time male directors. Going back to the raw data for the source of CEO alters in the professional networks, it was found that the increase in number of CEOs in the networks of both first-time female and male directors was due to greater involvement in professional associations. Presumably, this is a lesson learned by first-time female directors from the experiences of women with previous board experience. As it is, experienced women directors are negatively affected by having fewer CEOs in their professional network relative.

6.1.3.3 Structural composition and effects of graduated and nominal parameters within the group of female directors

From the results of comparison within the group of female directors (Table 29), it was found that there is greater heterogeneity within the group of women board members than within the whole social system comprising both men and women. Within women

directors, first-time directors were different from experienced directors on only one category each of profession and role – Operations and Professional director/advisor. On graduated parameters, first-time directors had significantly less resources than experienced directors in terms of power in the leader network and centrality in the collegial network. They were also younger in age. Keeping in mind that the distinguishing factor within groups of the same sex is the variable of previous experience on public company boards; it is natural to see them differently distributed in the role of Professional director/Advisor. Although there are a few first-time female directors who are currently occupied as advisor, rather than in active leadership roles; it is not a common occurrence (See Table 27c). Similarly for age, it is to be expected that more experienced directors will be older than those seeking their first board appointment. Thus, fist-time and experienced female directors have significantly different average values on three of the eight graduated parameters, making the group fairly homogeneous on that dimension. To sum, the group of women directors is also heterogeneously composed along nominal parameters and fairly homogeneously structured in terms of equality in graduated parameters.

Despite being fairly accessible to women of all professions and roles with varying levels of graduated parameters; some aspects benefitted first-time women directors. Despite experienced female directors being naturally preferred due to their experience, being a public company CEO or even a non-board CXO conferred an advantage on women who have no previous experience on a public company board. This advantage can be interpreted as a particularistic requirement of women seeking their first public company board appointment; as it is not a significant factor for men in any congruent

comparison pairs. For men, being a public company CEO is a significant factor only in comparison to experienced female directors. The other interpretation is that given the attention in literature on the fact that women directors tend to be selected from non-business professions (Hillman, Cannella, Jr. and Harris, 2002), there is now greater inclination to appointment women with leadership experience in business organizations. This would be an encouraging finding except for two related factors. Firstly, the number of women CEO in public companies is growing at a rate lower than that at which women directors is growing. Therefore, it seems to be more a means to keeping women from the traditional sources out. Secondly, compared to the number of women in the role of public company CEOs, there are relatively more women in CXO roles in public companies. Yet, the benefit of being a CXO is far lower than that of being a CEO (See Table 29).

6.1.3.4 Structural composition and effects of graduated and nominal parameters within the group of male directors

Composition of the group of male directors, categorized into two groups based on experience on public company boards, is heterogeneous with similar access in terms of almost all categories of the three nominal parameters – education, profession and role. First-time male directors were significantly differently distributed on only one category each of education – graduate education and profession – operations. In terms of role categories, they were unequally distributed on private company CEO and professional director/advisor. The latter category is expected as an artefact of the variable on which the group is divided – experience on public company boards. It is more likely that men who have or had multiple board appointments are at the stage of their career when they are retired from an active leadership role in public companies. Contrary to the

homogeneous composition of the group of male directors on nominal parameters; on graduated parameters, there is greater inequality signifying heterogeneity on the dimension of graduated parameters. First-time male directors have fewer resources than experienced male directors in five of the eight graduated parameters; being equally resourceful only on the number of CEO alters and power in professional networks and centrality in the leader network. Lower resource in terms of CEO alters and power in the professional network is likely to hand-in-hand with the lower tenure career expected in first-time directors.

Homogeneity in nominal parameters and heterogeneity in graduated parameters within the group of male directors is evidenced in the results of the logistic regression. As may be expected, first-time male directors were negatively affected by power in the leader network and positively by power in the professional network. Firstly, experienced directors can be expected to and do have a higher coefficient of power in the leader network, given the access of experienced directors to more CEOs and board members, who in turn tend to be well-connected. Secondly, the leader network is a truncated sub-network of the larger professional network. As a result, the non-CEO and non-board member connections which give power to the ego in the professional network of first-time directors are no longer a part of the network when the leader networks are created. Hence, the power of the professional networks has a positive effect while power in the leader network is be default lower and has a consequent negative effect when compared to the effect for experienced directors.

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6.1.4 Characteristics of incongruent pairs

Comparing the characteristics of the incongruent group of experienced female director and first-time male directors to the other incongruent pair (first-time female and experienced male directors described above); it is clear that the congruent pairs are homogeneous on graduated parameters and heterogeneous on nominal parameters. This result is reversed for the incongruent pairs. Incongruent pairs are naturally diverse, due to the difference in levels of experience; making it inevitable that values of resources will be at different levels, commensurate with experience. Perhaps due to this default variation, in order to maintain dominance, the homogeneous group imposes the conditional nominal parameter criteria to limit the dilution of homogeneity. In contrast, congruent pairs, are at the same level in terms of the resources that they have access to, based on similar career tenure; making it a suitable selection threshold for new entrant. After the pressure in the external environment made in impossible to keep female independent directors outside the boardroom, women of every suitable profession was given a seat on the board. At the same time though, men in such professions also began to be included; while earlier male directors may have also come from homogeneous stock on nominal parameters. Thus, the dominant group is able to maintain its dominance while keeping up appearances of heterogeneity and equal access for all who have merit.

6.1.5 Contextual factors affecting odds for incongruent pairs

The interesting factor in the case of experienced directors is the significant factor of sex of the CEO (Table 16) for the appointment of experienced female directors to the board of public companies. Literature on director selection has shown that for minority

group members, impression management and characteristic similarity with the CEO can inordinately influence appointment (Westphal and Zajac, 1995). There is suggestion in the literature on impression management that women tend to use less aggressive methods of impression management than men (Bolino and Turnley, 2003). Thus, it is plausible that women CEOs would promote appointment of women to public company boards than male CEOs. The effect being significant only for experienced directors is also rational in the face of women in leadership positions being aware of the backlash to promoting women overtly.

Likewise for the odds of appointment of experienced female directors, relative to first-time male directors; board size and proportion of women already on the board are significant factors (Table 23). There is evidence in the literature that appointment of women to the board is concurrent with an increase in the board size and also for the fact that women are appointed to board as replacement for other women, rather than men on the board (Farrell and Hersch, 2005). This is proved again by the significance and positive effect of board size and negative effect of proportion of women on the board, for the odds of appointment of experienced female directors relative to the odds of appointment of first-time male directors. It is important to note that it is for this incongruent pair that these parameters are significant and not for the congruent pair of experienced female and male directors. The implication of this differential effect for experienced women is that between first-time and experienced male directors, there is greater preference for first-time male directors compared to experienced female directors. The finding for this preference for first-time male directors is based on the fact that relative to experienced male directors, the only requirement for improving the relative

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odds for experienced female directors is the ratification of a female CEO; whereas for the first-time director, there mere existence of other women on the board is sufficient condition for almost guaranteeing the appointment of a first-time male director rather than an experienced female director.

Table 34

Summary of between- and within-group characteristics on graduated and nominal parameters

	Between Groups				Within Groups		
	First-time Female Director		Experienced Female Director		Female		Male
Graduated Parameters	FFD/FMD	FFD/EMD	EFD/EMD	EFD/FMD	FFD/EFD	FMD/EMD	FMD/EMD
Age	NS	-	-	NS	-	-	-
Prior private company directorships	NS	-	NS	+	NS	NS	-
No. of CEOs in the network	NS	NS	-	NS	NS	NS	NS
Power in professional network	NS	NS	NS	NS	NS	NS	NS
Power in leader network	NS	-	NS	+	-	-	-
Cohesion in leader network	NS	NS	NS	-	NS	+	+
Centrality in collegial network	+	NS	NS	+	-	-	-
Centrality in leader network	NS	NS	NS	NS	NS	NS	NS
(overall)	**Homogeneous**	**Fairly Homogeneous**	**Homogeneous**	**Fairly Homogeneous**	**Fairly Homogeneous**	**Heterogeneous**	**Heterogeneous**
Nominal Parameters							
Education							
Undergraduate	NS	-	NS	NS	NS	NS	NS
Graduate	NS	-	-	-	-	-	-
Postgraduate	NS	NS	NS	NS	NS	NS	NS
(overall)	**Heterogeneous**	**Fairly Homogeneous**	**Fairly Heterogeneous**	**Heterogeneous**	**Fairly Heterogeneous**	**Heterogeneous**	**Fairly Heterogeneous**
Profession							
Finance	-	-	-	-	NS	NS	NS
Human Resource Management	NS	NS	NS	NS	NS	NS	NS
Law	NS	NS	NS	NS	NS	NS	NS
Operations	-	-	-	-	-	-	-
Education & Research	NS	NS	NS	NS	NS	NS	NS
Marketing & Sales	NS	NS	NS	NS	NS	NS	NS
Government	NS	NS	NS	NS	NS	NS	NS
Engineering & Technology	NS	NS	NS	NS	NS	NS	NS
(overall)	**Heterogeneous**	**Heterogeneous**	**Heterogeneous**	**Heterogeneous**	**Heterogeneous**	**Heterogeneous**	**Heterogeneous**
Role							
Public company CEO	-	-	-	-	NS	NS	NS
Private company CEO	NS	-	NS	NS	NS	NS	-
Entrepreneur	NS	NS	NS	NS	NS	NS	NS
Non-board CXO	NS	+	+	+	NS	NS	NS
Professional director/Advisor	-	-	-	-	-	-	-
(overall)	**Heterogeneous**	**Homogeneous**	**Homogeneous**	**Heterogeneous**	**Heterogeneous**	**Heterogeneous**	**Heterogeneous**

NS: Non-significant G-H or Chi Square test statistic

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Table 35

Summary of effects on graduated and nominal parameters

Effects for:	Between Groups				Within Groups	
	First-time Female Director		Experienced Female Director		First-time Female Director	First-time Male Director
Graduated Parameters	FFD/FMD	FFD/EMD	EFD/EMD	EFD/FMD	FFD/EFD	FMD/EMD
Age	NS	-	-	NS	NS	NS
Prior private company directorships	NS	-	-	+	NS	-
No. of CEOs in the network	NS	-	-	-	NS	NS
Power in professional network	+	+	NS	NS	NS	+
Power in leader network	NS	-	NS	+	NS	-
Cohesion in leader network	NS	NS	NS	-	+	+
Centrality in collegial network	+	NS	+	+	NS	-
Centrality in leader network	NS	NS	NS	NS	-	NS
Nominal Parameters						
Education						
Undergraduate	NS	NS	NS	NS	NS	NS
Graduate	NS	NS	NS	NS	NS	NS
Postgraduate	NS	NS	NS	NS	NS	NS
Profession						
Finance	NS	NS	-	NS	NS	NS
Operations	NS	NS	NS	+	-	-
Non-Finance/Operations	NS	NS	+	NS	NS	NS
Role						
Public company CEO	NS	-	-	-	+	NS
Private company CEO/Entrepreneur	NS	NS	NS	-	NS	NS
Non-board CXO	+	+	NS	NS	+	NS
Professional director/Advisor	NS	-	+	NS	-	NS

NS: Non-significant

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6.2 SUMMARY OF CHARACTERISTICS AND EFFECTS OF PAIRS OF FEMALE AND MALE DIRECTORS

The composition of the social system of corporate directors can be characterized as heterogeneous on nominal parameters and homogeneous on graduated parameters. Heterogeneity on nominal parameters means that female and male directors are distributed evenly across the various categories defined within each of the nominal parameters. Summary of the characteristic of each of the pairs of groups on both sets of parameters is shown in Table 35 below. The implication of an even distribution is that membership into the system is fairly evenly accessible to everyone who can be defined in terms of such nominal parameters. To illustrate, on the parameter of profession, female and male directors are evenly distributed in all categories; this signals that opportunity for board membership is equally accessible to professionals of all kinds. A parameter, in the categories of which distribution is skewed in favor of a particular type of persons, is homogeneously composed. This is evident in the case of the group consisting first-time female and experienced male directors on the nominal parameter of role. Experienced male directors are represented in significantly greater numbers in three of the five categories i.e. public company CEO, private company CEO and professional director; whereas female directors are found in significantly greater numbers in the category of non-board CXO. This indicates that in comparison to experienced male directors, only entrepreneurs of either sex have unrestricted access. To put it in context, if a board comprises all experienced male directors, the only woman likely to be appointed to such a board is one who is in the role of a non-board CXO or an entrepreneur, whereas experienced men in any of the roles will be acceptable.

Homogeneity on graduated parameters is indicated by the equality of average value of parameters for the groups that are contained in the system. If the groups contained in a system all have resources whose value lies within a specified range, it can be inferred that those with fewer or resources of lesser value than that will most likely not be acceptable for membership. The implication of a non-significant difference between average values of resources defined under graduated parameters is a threshold minimum of resources required for membership into the system. As seen in table 35, men and women in each different pair are homogeneous in terms of graduated parameters except for the group consisting of experienced and first-time male directors. That the only group that is heterogeneous on graduated parameters is indicative of the fact that membership into the social system of corporate directors is contingent on the availability of a certain threshold level in resources; this requirement being waived for only one particular group, in this case first-time male directors.

Composition of a social system also indicates the mechanisms of selection that engender such composition. Mechanisms of selection, in structural terms, are the parameters that differentially affect the various groups contained in the system. These differential effects were evident in the results of the logistic regression comparing pairs of the two groups. From the summary in Table 36, it is evident that different criteria are applied to different group members. Even for members of one group, criteria vary according to the comparison group. Though for some pairs there may be certain parameters that have a common effect; usually when the focal group is the same. This is evident in the case of first-time female directors whose odds of board membership are improved how well-connected they are in their professional network, in comparison to

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both first-time and experienced male directors. The positive effect of being well connected was also documented by Fernandez and Weinberg (1997) and Burt (2000) in the context of recruitment and career advancement respectively. Another example is the negative effect of previous board experience in private companies on both first-time and experienced female directors in comparison to experienced male directors.

Not all effects are similar for different pairs with the same focal group; some parameters have opposite effects. An example of opposite effects of a parameter on two pairs, where the focal group is the same, is centrality in collegial network. Centrality in collegial network has a negative effect on the odds of board membership for experienced male directors when compared to experienced female directors but positive effect on the odds when the comparison group is first-time male directors. This can be interpreted in terms of differences in status and group membership of the three groups in question – experienced female directors, first-time male directors and experienced male directors. In the comparison between experienced female and male directors, women being in the minority are of lower status. Centrality in the collegial network is also a resource of lower status than say centrality in the leader network. Hence, in comparison to a minority group member, a resource of lower value has a negative effect. On the other hand, first-time male directors are of the same status but with lower resources (see Table 35), in which case the value of the source possibly takes precedence in terms of salience over the status type of the resource.

To conclude, structural analysis of a social system can shed light on not only its composition but also the mechanisms by which the system has reached its current

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composition. A heterogeneously composed system is open to membership by constituents that differ from incumbents on any of the parameters of its current composition. Conversely, a homogeneously composed system is accessible only to those who conform to the parameters of its existing constituents. Mechanisms, the outcome of which is the extant composition of the system, can be identified by analyzing the effects that composition parameters have on membership outcomes. In this case, by exploring the composition of a system containing corporate directors, I was able to shed some light on the reasons for the same, one aspect of which is the under-representation of women on corporate boards.

From the data presented in Tables 35 and 36, it is evident that for women, as outsiders, the social system of corporate directors is fairly homogeneous (to their disadvantage) with very few parameters on which they benefit compared to men. That women are disadvantaged in organizations is well-known. The additional information obtained from this study is the specific parameters that affect women's odds of corporate board membership—in positive and negative ways. For example, it is now clear that for women, being well-connected to a diverse variety of people and not just those in leadership positions benefits them in comparison to both first-time and experienced male directors. This is a significant finding that can help reduce some of the stress created by having to go against their preferred ways of networking (i.e., non-aggressive and for social support) on the assumption that only ties to men in leadership positions will benefit the career advancement of women. The effect of the number of CEO alters in the network also supports this effect; it is either non-significant or negative for both experienced and first-time female directors in comparison to either category of male directors. Another

interesting finding had to do with the previous experience of women on the boards of private companies; it did not improve their odds of board membership on public companies. Therefore the insight for women seeking board appointments in public companies is that they may improve their odds by joining charitable or professional associations rather than the boards of private companies. On the other hand, being the CEO of a private company had a non-significant but positive (Table 16) effect on the odds for experienced female directors and a negative but non-substantial effect for first-time female directors. Hence, perhaps that is the route to public company board membership that women can take.

CHAPTER 7

7.1 CONCLUSIONS AND IMPLICATIONS

The purpose of this study was to understand the structural aspects of the under-representation of women on the boards of public companies and the mechanisms that have sustained this low percentage over the past decade. I was spurred to consider the structural aspects of under-representation rather than the more common socio-psychological aspects by a quote by Herman Kahn, a futurist, who said that it would take two thousand years for women to hold twenty five percent of CEO positions in companies on the Fortune 500 list but twenty years for ten percent (Zweigenhaft and Domhoff, 2006). The subtext of this quote is that the dominant group (men) at the top of the largest corporations may accept out-group members (women) but only up to a threshold proportion beyond which restrictions will be put in place to maintain the dominance of the in-group. While it is beyond the scope of this study to reach that point of proof, this study has provided evidence of a narrower range of criteria used in the appointment of women (as compared with men) to corporate boards, potentially perpetuating women's under-representation and inequality at the governance apex of corporations.

Through a variety of analyses, I studied the composition and social system of the corporate directorate and the implications for the appointment of women directors. To summarize the results of the analyses, the corporate directorate is characterized by a narrow range of values in terms of characteristics that can be assigned an absolute value. In this study, those characteristics were age, number of private company directorships, number of CEO alters on the professional network, coefficient of power in the

professional and leader networks, cohesion in the leader network and centrality in the collegial and leader networks— defined as graduated parameters in this study. On further analysis, I found that this range was greater for men than it was for women. That is, men holding both greater and lesser quantities of valued resources had access to the corporate directorate, but women had to achieve a higher minimum threshold of valued resources than did men to be appointed to corporate boards. The composition of the corporate directorate is therefore clearly skewed, and the indication is that the standard for membership varies between majority group (men) and minority group (women) members.

Blau's (1977) theory that greater heterogeneity will lead to greater access to the social system was proven to the extent that the norms for group membership changed with increasing numbers of minority group members as in the cases of director age and role as board membership criteria. The findings of this study also supported the corollary to Blau's (1977) theorem regarding the effect of heterogeneity on membership—that it is contingent on other factors like status, which was not measured directly in this study but is evident in the differences seen within-group (within the groups of women and men) as compared to between-groups (between the groups of women and men). There was far greater heterogeneity within the groups of men and women than between them. Similarly, in terms of graduated parameters also, the results showed greater ranges in the group of male directors than in the group of female directors. Therefore, again we see greater heterogeneity in terms of graduated parameters among men than among women, indicating access to board membership to a larger group of men than women in the directorate.

In terms of inequality, the second measure of social composition that Blau (1977) postulated would affect the evolution of a social system; we see distinct variation both between and within the groups of men and women in the corporate directorate. In terms of graduated parameters, not only is there inequality in the range of values, as discussed in the previous paragraph, but also in the type of resources. Women's networks among their colleagues and subordinates were more beneficially structured for their board memberships than women's networks among their superiors. This naturally renders their network resources as being of lower value than those of men, particularly in their role as board members. In terms of nominal parameters, the results of the study showed that the groups were equivalently distributed between women and men in almost all categories of education and profession. Having said that, the two categories of profession on which there were far more men than women (i.e., operations and finance) were the two categories that can be said to be strategically more important in corporate governance matters. Therefore, though equal on almost all nominal parameters, women are deprived of equality by being unequally represented in the two categories that are of the greatest importance to organizational matters at the board level. Results on the last nominal parameter—director role—were indicative of changing norms; among experienced directors there were far fewer women in organizational leadership roles than there were among first-time female directors. Yet, once again, unfortunately this is indication of change but not necessarily towards greater equality. Compared with men, being a public company CEO is still unlikely to gain admittance to a board for a woman; only being a private company CEO is beneficial for women.

To summarize, as Blau (1977) postulated, greater heterogeneity does eventually lead to greater access. However, this greater heterogeneity may be organized in such a way that access is differently afforded to different groups. Inequality, according to Blau, creates space for movement and the motivation to work towards equality. But, as I discuss in the next section, inequality can also be applied in a manner as to maintain status differences within a social system, such as with the corporate directorate. Therefore, although at first glance the corporate directorate appears heterogeneous and equal, it is in fact differently so for men and women who inhabit the system. I will elaborate upon the specific results of the study and their implications in the next section.

Specific conclusions that can be drawn from this study are:

(1)   *Being a public company CEO is not an advantage for women seeking board appointments*. It is possible that in comparison with men CEOs, women CEOs may be more selective in accepting board appointments, prevented from accepting such appointments, or not offered board appointments.

(2)   *Women who are not in the professions of finance and operations have better odds of being appointed as public company directors than women in these professions.*

(3)   *Either women in lower organizational leadership roles (e.g. CXO) or those retired from active leadership positions (i.e., professional directors/advisors) get appointed to the boards of public corporations, not women active in the most senior organizational leadership positions (CEO/COO) in corporations.* The argument that there are simply fewer women who hold CEO/COO roles available in search pools does not hold true because even in this small sample of 133 companies there were twice as

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many women CEOs as reported to be found among Fortune 500 companies. Therefore, the inference is that either the search population is very small or that there is active exclusion of women CEOs from the search population.

(4)   *Age is significant factor only for experienced women directors, not first-time women directors, which could be indicative of changing norms.* Age was found to have a significant negative effect for experienced female directors relative to experienced male directors, and first-time female directors relative to experienced male directors. The effect is expected for first-time female directors in the incongruent pair as first-time directors are naturally younger in age than experienced directors. However, the fact that age has a significant and negative effect for experienced female directors relative to experienced male directors but not for first-time female directors relative to first-time male directors is plausibly indicative of the fact that age increasingly is less of a significant factor in the appointment of female directors. However, first-time female directors are still on average younger than first-time male directors, just not significantly so.

(5)   *Organizational factors (such as the replacement effect or the effect of a female CEO) were found only for experienced female directors; not for first-time female directors.* The replacement effect refers to the finding in previous research that women are appointed to public company boards mostly in replacement of another retiring female director. As a result, the actual number of women to be found on the boards of public corporations remains stagnant or grows at a very slow pace. The present study's finding that this effect occurred only for experienced female directors indicates that there is a preference for first-time female directors as additions to rather than replacements on the

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board. It is possible that the norms regarding the appointment of women to boards are changing as a result of the increasing presence of women on boards. However, it is also plausible that since first-time female directors tend to be in the role of CXO, they are preferred for their lower status in terms of the organizational hierarchy.

(6)   *Women had greater quantum of resources that were of lower quality—power in the professional rather than leader network, and centrality in the collegial rather than leader network—than did men.* Therefore, though women had a higher threshold of a minimum quantum of valued resources; such resources were found to be of lower status than the resources held by men in greater quantum. This finding can be construed in two ways – women tend to have resources of lower status as also found by Brass (1985) and Ibarra (1992) or that women of lower status resources have greater odds of membership into the corporate directors. I will return to this conclusion after discussing the conclusions on nominal characteristics.

(7)   *Among the three qualitative characteristics—educational qualification, role and profession—defined as nominal parameters, women of all educational qualifications and professions were found to have equivalent access to the corporate directorate as men except in the following cases. Two professions—operations and finance—found to be excessively dominated by men, did not provide as much access to women as men.* In terms of roles occupied, the results showed that only female entrepreneurs had equivalent access to the corporate directorate as men entrepreneurs. First-time female directors were advantaged by being in function-specific roles while experienced female directors were advantaged by having prior experience on public company boards. The result for first-time female directors could be due to change in the norms of membership to the

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corporate directorate either to include more women in the roles that they can be found in greater numbers or to maintain the lower status of women directors even if they should increase in numbers. From within group effects, the results showed that first-time female directors had an advantage over experienced female directors with regard to the roles occupied by them. That is, first-time female directors in the role of CEO of a public company had better odds relative to an experienced female director in the same role. This effect was not found in the comparison with their male counterparts; in fact the odds of experienced female directors gaining another board appointment are significantly reduced if they are also the CEO of a public company. Therefore, the implication is that the only time a female public company CEO is likely to gain board membership in another public company is when she has no other board appointment.

In conclusion, taking together all the findings of this study, it is clear that women who are appointed to the boards of public corporations are not equivalent to the men who are appointed to them. Women appointed to corporate boards have resources of lower status, are from professions of lower status and from roles that are of a lower status than men who are appointed to corporate boards. The reasons for this can be sought both from sociological and psychological perspectives. As per the postulates of Blau's (1977) theory, given the distribution on nominal categories, women will continue to be a lower status group, even if they increase in numbers, unless they increase in numbers in the two professions that are considered to be high status—operations and finance. They will also continue to maintain their out-group status as long as men remain in fewer numbers in the professions in which women have equivalent representation—human resources, law, education, technology, marketing and technology.

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Along the axis of graduated parameters, the implications of the distribution are more complex. Primarily, women need a higher level of resources than men for board appointment, but this could be attributed to the fact that the resources that they bring are of lower quality. The network connections of women tend to be situated within their networks of colleagues and subordinates rather than leaders. Therefore, the requirement of a greater quantum of resources may be justified. However, the fact that there are narrower ranges of valued resources for women than men directors could also signify the absence of movement, i.e., women may not increase their resources from gaining membership on corporate boards. From this it may be inferred that corporate board positions are frequently terminal to the careers of women, unlike for men where corporate board positions may be a step towards the C-suite. If women gain board membership at earlier stages of their career (i.e., while in a CXO role) and are then unable to gain CEO/COO roles subsequently, this may be an indication of another mechanism limiting women's access to top leadership positions (e.g., CEO/COO roles).

From the sociological perspective, it may be inferred that the numbers of women in the fields and roles from which corporate directors are sought are fewer than men. It is plausible that women opt for professions that are more conducive to their performance in the multiple roles at home and in the workplace. Similarly, by reason of domination by males and their relatively diminutive roles at home, organizations may be normatively more suited to the long hours and competitive behaviors ascribed to men. Women, by reason of their still predominant roles in the home environment and socialization from childhood may be normatively inclined to maintaining a balance in the hours dedicated to work and home, as well as cooperative behaviors. Thus, as described by Bourdieu (1977),

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the field and habits of the occupants of the field define the composition and structure of the field. As such, the corporate directorate is dominated by the norms set by Caucasian males and evolves accordingly.

From a psychological perspective, applying the principles of group behavior, it is to be expected that the dominant group will act in ways that maintain their dominant status in the power structure. Norms such as homologous recruitment practices and after-work socialization as conduits of information enable the dominant group to maintain their status in the hierarchy. Given that these are norms that have evolved over a long period of dominance, it is myopic to label all norms as discriminatory. On the other hand, there are more overtly discriminatory practices such as possibly that of providing women access to corporate boards but not to the CEO/COO role or the more obvious glass ceiling effect. In either case, it is essential that such practices be recognized by both the dominant and minority groups before change can be advocated.

Having discussed the situation from both perspectives, it is also imperative to acknowledge that the under-representation of women in leadership positions in organizations is undeniable. Therefore, the resolution lies in changing both the field and the norms, neither is which has primacy. Both have to be changed in tandem, which requires the efforts of both the dominant and the minority groups (Giddens, 1984). As the dominant group, the Caucasian male population in organizations has to realize the importance of the presence of the group that represents half the global population with great influence over discretionary income of the consumer base (i.e., women). Similarly, minority group members also have to realize the importance of becoming part of the field

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in order to change the norms. Women must become active in the evolution of norms through persistent advocacy and example-setting in organizations. As with all minority groups, women have to walk the fine line of adopting the norms of the dominant group and advocating for change.

Psychologically, dominant groups have to acknowledge their role in establishing the norms and the need for change. One such example was set by the consulting company Deloitte when the company undertook to understand the reason behind the high turnover of women (McCracken, 2000). They found that change was needed both in systems of recruitment and advancement as well as the attitudes of those who controlled these systems. Similarly, minority group members also need to begin to acknowledge the situation and advocate change. For instance, many women who have ascended to leadership positions deny the existence of discriminatory practices or even facing bias. Many female directors have acknowledged that they do not advocate the hiring of more women to the board in order to not be perceived as feminist. Women directors need to correct erroneous and damaging perceptions and stereotypes by educating the dominant group that it is not about feminism but equality of access and opportunity for all minority professionals.

From the larger sociological perspective, as we have laws on equal opportunity at the societal level, at the individual level women and minority groups should also be supported to make choices guided more by their aptitude and interest rather than extant norms and socialization. It is important that students be supported, in the presence of aptitude and ability, to pursue professions that may be contrary to their social roles as in

the case of women in the fields of science. Likewise in management too, both men and women should be encouraged to pursue those professions that are best aligned with their interest rather than be limited by their social roles. In conclusion, change has to be reflexive in order to be sustained and maintained.

CHAPTER 8

LIMITATIONS, CONTRIBUTIONS AND FUTURE DIRECTIONS

8.1 LIMITATIONS

The study is limited to a comparison of female and male board appointments in the absence of information regarding those candidates who were considered but not appointed. There is evidence that board nominations are unduly influenced by CEOs, which may be guided more by homologous preferences than merit. If this is true, then it also calls to question the validity and relevance of nomination committees on boards of public corporations. Yet, board appointments are a completely closed process and no information other than the final slate of candidates, who it is also anecdotally known generally accept invitations tendered, is released as public information. As a result, it is impossible to prove or disprove with certainty that gender bias is the cause of the persistent under-representation of women on the boards of public corporations.

Corporate directors are as a population excessively inaccessible, particularly to students. As such, this study is restricted to analyzing archival, secondary data. It is due to this limitation that the networks are purely positional; I had no way to qualify the network connections in terms of relationships. Since the study was a structural analysis, it was not as great a limitation as it has been to the growth of research and literature on corporate directors. Without access, researchers can only conjecture and make inferences about relationships from secondary data that can never be as reliable as primary data.

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8.2 CONTRIBUTIONS

Through this study, I have attempted to contribute to the research and literature on women on boards of public companies, structural analysis and network analysis. We are aware of the characteristics of female directors, to some extent the type of organizations that are likely to have women on their boards, some of the reasons for women being on public boards (antecedents) and some for having them there (outcomes). But, there remain large gaps, to a great extent due to the unavailability of so much data pertaining to board composition and activity. Despite issues pertaining to data access, there is a continuous effort to accumulate knowledge that can be built on the foundation of information that is available. This study contributes to the body of knowledge by bringing in a different perspective—that of looking at the corporate directorate as a social system rather than as individual directors or corporate boards.

In terms of methods, the use of archival data obviated the need to collect data from a population that is extremely difficult to access. For this study, based on my interest in the membership criteria, I only collected data that were plausibly pertinent. However, for researchers interested in other aspects of boards, there is a vast bank of archival data available through several sources and in the web space, in general—information, particularly pertaining to the social and professional ties of directors, which may be at the foundation of all things related to board composition. I shed some light on one set of data—connections of directors made during their career tenure. These connections are, at this point, merely positional without any corresponding information regarding the nature of the connection. Still, based on the length and span of

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organizations across which the connection extends, I was able to attach a binary value indicating strength to the ties. But, with more time and possibly staff assistance, it may be possible to increase the informational value of these networks, and create other types of networks based on other interactions. All these possibilities are based on the career and job/positional information available through the internet. There is another vast source available through the filings mandated for companies by regulatory bodies. These sources are used relatively more in the fields of finance and accounting, possibly among others. This source also needs to be mined for a wide array of information relating to board functioning.

The final contribution is in terms of bringing the professional network variable into the equation as an individual level variable. Networks have often been studied, though not yet in the context of women on boards, as the centerpiece of the study. I have attempted to apply it as one of the resources available to professionals, among all other resources like experience, education, and so on. However, there was great value in studying the sample as a social system in this study, as a large network akin to the interlocking directorates that were of interest a couple of decades ago. We now have the wherewithal to pursue this course and explore corporate governance as a network of directors, CEOs, and organizational leaders. Given that the corporate directorate is a close knit community with dispersion effects having been shown on some outcomes (Haunschild, 1993; Hallock, 1997; Gulati & Westphal, 1999), a network approach may prove very beneficial in understanding many aspects of corporate boards of directors from composition to influence.

8.3 FUTURE DIRECTIONS

The findings of this study suggest avenues for future research in several directions. Thus far, we know a great deal about the characteristics of women on the boards of public corporations as a homogenous group. The results of this study, however, have shown that there are differences between the characteristics of and effects of first-time and experienced female directors. This is a significant finding that needs to be explored further. One way to do this is to test for these differences in larger samples of women directors. Increasing the sample size will also enable researchers to examine whether the differences are impacted by the industry, organizational size, and other organizational factors.

Increasing the sample size will necessarily mean increasing the period over which the sample is drawn. Therefore, future researchers may also be able to splice the sample into separate time periods and examine the evolution of the norms of the corporate directorate as a social system. Even with this relatively small sample drawn over a period of five years, by separating the group by experience, I have shown that there are indications of changing norms. Therefore, with a much larger sample, future researchers may be able to show changes in norms over different periods of time. Researchers are also encouraged to organize the time periods by events like major corporate debacles or introductions of new regulatory requirements. .

With respect to network data, there are several ways in which networks can be designed to provide greater insights into the corporate directorate. By designing the networks up to the time of appointment, it is possible to examine whether pre-existing

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ties to the board impact the appointment of men and women differently. Such manipulations can be done for various groups to explore whether different groups have varying effects for men and women.

It is also possible that by leveraging the information available in public forums, one may be able to draw up networks of relationships. The web space is vast and contains immense quantities of data. A web-mining program that captures associations among directors could be coded for relationships of various types which may then be used to analyze the networks themselves and also the effects of the networks on board appointments.

To conclude, the methods employed and results found in this study suggest several avenues for future research on the subjects of board composition, board appointments, and board diversity. However, limitations of data availability and accessibility to the corporate director population remain for the foreseeable future.

APPENDIX 1a

Frequency distribution of prior private company directorships

Prior private company directorships	Female	Male
0	87	104
1	30	45
2	17	30
3	3	19
4	2	8
5	2	4
6	0	2
7	0	1
8	2	3
9	2	0
10	0	1
11	1	0
12	0	0
13	0	1
14	0	0
15	0	0
16	0	0
17	0	1
18	1	0
Total	**147**	**219**

APPENDIX 1b

Frequency distribution of number of CEO alters

Number of CEO Alters	Female	Male
0-9	20	26
10-19	21	26
20-29	18	23
30-39	17	19
40-49	10	17
50-59	8	21
60-69	9	10
70-79	9	8
80-89	6	3
90-99	8	10
100-109	5	6
110-119	1	11
120-129	6	4
130-139	2	2
140-149	0	6
150-159	0	4
160-169	3	4
170-179	1	5
180-189	1	3
190-199	1	1
200-209	0	0
210-219	0	3
220-229	0	2
230-239	1	1
240-249	0	0
250-259	0	2
260-269	0	0
270-279	0	1
280-289	0	1
Total	**147**	**219**

Multicollinearity statistics for variables in the logistic regression of first-time appointment of female directors, relative to first-time male directors

Independent Variables	Collinearity Statistics	
	Tolerance	VIF
Board Size	0.775	1.291
Proportion of women on the board	0.534	1.873
Separated CEO/Chairperson role	0.734	1.362
Female CEO	0.548	1.826
Age	0.805	1.243
Undergraduate		
Graduate	0.792	1.262
Postgraduate	0.671	1.490
Public company CEO	0.600	1.668
Private company CEO/Entrepreneur		
Non-Board CXO	0.622	1.608
Professional Director/Advisor	0.682	1.467
Finance	0.745	1.341
Operations	0.691	1.448
Non-Finance/Operations Professions		
Prior private company directorships	0.829	1.206
Number of CEO Alters	0.875	1.143
Power in professional network	0.676	1.480
Centrality in collegial network	0.755	1.324
Power in leader network	0.737	1.356
Centrality in leader network	0.655	1.526
Cohesion of leader network	0.659	1.517

APPENDIX 3

Alternative logistic regression model to test for effects of multicollinearity

Independent Variables	First-time Female Director		
	B	SE	Exp(B)
Statistical Control Variables			
Board Size	0.05	0.05	1.05
Separated CEO/Chairperson role	-0.22	0.22	0.80
Female CEO	-0.63	0.43	0.53
Predictor Variables			
Age	-0.02	0.03	0.98
Undergraduate	-0.11	0.38	0.89
Graduate	-0.37	0.34	0.69
Postgraduate	0.49	0.54	1.63
Public company CEO	-0.83**	0.56	0.44
Private company CEO/Entrepreneur	-0.03	0.39	0.97
CXO	1.37***	0.36	3.93
Professional Director/Advisor	-0.51	0.52	0.60
Finance	-0.26	0.33	0.77
Operations	-0.18	0.32	0.84
Non-Finance/Operations Professions	0.44	0.29	1.55
Prior private company directorships	0.08	0.15	1.09
Number of CEO Alters	0.00	0.00	1.00
Power in professional network	0.82	0.39	2.28
Centrality in collegial network	0.03**	0.01	1.03
Power in leader network	0.00	0.03	1.00
Centrality in leader network	-1.98	1.33	0.14
Cohesion of leader network	0.00	0.01	1.00
Goodness-of-fit Measures	**Value**	**df**	**p-value**
Model Chi-square	45.095	18	0.000
Hosmer-Lemeshow Chi-square	8.160	8	0.418
Nagelkerke R Square	0.370		
	FFD	**FMD**	**Overall**
Prediction Accuracy %	62.7	81.5	73.6

*** $p < 0.001$
** $p < 0.01$
* $p < 0.05$
† $0.05 < p < 0.1$

APPENDIX 4

LIST OF MEASURES

Degree	Degree is the total numbers of ties of any particular (ith) alter. Indegree is the number of ties received by the *i*th actor and outdegree is the number of ties sent by the*i*th actor to all other alters in the network. For valued networks, degree is calculated by averaging the value of ties over the number of ties i.e. the degree of an ego with two ties of value 2 and 3 is $[(2+3)/2] = 2.5$
Betweenness Centrality	Betweenness centrality measures the extent to which an actor (*i*th) lies on the shortest distance between pairs of actors The betweenness centrality of actor *i* is calculated by: $$C_B(N_i) = \sum_{j \neq i \neq k} \frac{g_{jk}(N_i)}{g_{jk}}$$ Where g_{jk} is the number of shortest distance paths between two alters *j* and *k* $g_{jk}(N_i)$ is the number of shortest distance paths between two alters *j* and *k* that contain *i* $j \neq i \neq k$ is the sum of all shortest paths between every pair of actors that do not contain *i*
Power	$$c_i(\alpha, \beta) = \sum_j (\alpha + \beta c_j) R_{ij}$$ Where $$\alpha \sim \sum_i c_i(\alpha, \beta)^2$$ that is: α is selected such that the squared length of $c(\alpha, \beta)$ equals the number of alters in the network β is the probability of a tie originating from *i* Therefore, power takes into consideration the number of alters that *I* has and also the distance between *I* and its alters
Egobetweenness	The sum of ego's proportion of times ego lies on the shortest path between each part of alters. For alters connected to each other, the contribution to between of that pair is 0, for alters connected to each other only through ego, the contribution is 1, for alters connected through ego and one or more other alters, the contribution is 1/k, where k is the number of nodes which connects that pair of alters.
Transitivity	Transitivity is the ratio of actual (closed) triads to possible (open) triads

APPENDIX 5

LIST OF ORGANIZATIONS

1. FIFTH THIRD BANCORP

2. ABBOTT LABORATORIES

3. DENNYS CORP

4. ALEXION PHARMACEUTICALS INC

5. ALLIANT TECHSYSTEMS INC

6. AMERICAN INTERNATIONAL GROUP (AIG) INC

7. AMERICAN TOWER CORP

8. AMEREN CORP

9. AMGEN INC

10. APOLLO GROUP INC

11. ARCHER-DANIELS-MIDLAND CO

12. ARMSTRONG WORLD INDUSTRIES INC

13. AUTOMATIC DATA PROCESSING (ADP) INC

14. BIOANALYTICAL SYSTEMS INC

15. BANK OF AMERICA CORP

16. H & R BLOCK INC

17. BOEING CO

18. CARDINAL HEALTH INC

19. CARVER BANCORP INC

20. CBS CORP

21. CENTERPOINT ENERGY INC

22. CENTURYLINK INC (CenturyTel Inc prior to 06/2010)

23. CIT GROUP INC

24. FRONTIER COMMUNICATIONS CORP (Citizens Communications Co prior to 07/2008)

25. CLIFFS NATURAL RESOURCES INC (Cleveland Cliffs Inc prior to 10/2008)

26. COLGATE-PALMOLIVE CO

27. COMERICA INC

28. CONAGRA FOODS INC

29. CONSTELLATION ENERGY GROUP INC

30. DIGITAL RIVER

31. DUPONT(E.I.)DE NEMOURS & CO

32. EAST WEST BANCORP INC

33. ECOLAB INC

34. ELECTRONIC ARTS INC

35. EMERSON ELECTRIC CO

36. FMC TECHNOLOGIES INC

37. FORTUNE BRANDS INC (American Brands Inc prior to 06/1997)

38. NEXTERA ENERGY INC (FPL Group Inc prior to 05/2010)

39. HAMPSHIRE GROUP LTD

40. HASBRO INC

41. HOME DEPOT INC

42. HORMEL FOODS CORP

43. HUMANA INC

44. HUNTINGTON BANCSHARES INC

45. HUTCHINSON TECHNOLOGY INC

46. IDERA PHARMACEUTICALS INC

47. INTERPUBLIC GROUP OF COMPANIES

48. INTERNATIONAL FLAVORS & FRAGRANCES INC

49. INTERNATIONAL GAME TECHNOLOGY (IGT)

50. INTERNATIONAL PAPER CO

51. JOHNSON & JOHNSON

52. KEYCORP

53. KRAFT FOODS INC

54. KV PHARMACEUTICAL CO

55. LA-Z-BOY INC

56. LSI CORP (LSI Logic Corp prior to 04/2007)

57. METLIFE INC

58. MTS SYSTEMS CORP

59. NAVIGATORS GROUP INC

60. NCI BUILDING SYSTEMS INC

61. APRICUS BIOSCIENCES INC

62. NISOURCE INC

63. NORFOLK SOUTHERN CORP

64. NORTHROP GRUMMAN CORP

65. SCOLR PHARMA INC

66. PEABODY ENERGY CORP

67. PFIZER INC

68. PINNACLE WEST CAPITAL CORP

69. PITNEY BOWES INC

70. PROCTER & GAMBLE CO

71. REALNETWORKS INC

72. RED HAT INC

73. SCHLUMBERGER LIMITED

74. SEALY CORP

75. SVB FINANCIAL GROUP

76. ONCOGENEX PHARMACEUTICALS INC

77. SPORT CHALET INC

78. STAGE STORES INC

79. STANLEY BLACK & DECKER INC (Stanley Works prior to 03/2010)

80. STAPLES INC

81. STARBUCKS CORP

82. STATE STREET CORP

83. DEAN FOODS CO (Suiza Foods prior to 12/2001)

84. TALBOTS INC

85. TARGET CORP (Dayton Hudson prior to 01/2000)

86. MONSTER WORLDWIDE INC

87. TOMPKINS FINANCIAL CORP

88. UNITED CONTINENTAL HOLDINGS INC

89. UNITRIN

90. UNITEDHEALTH GROUP INC (United HealthCare Corp prior to 04/2000)

91. VULCAN MATERIALS

92. WADDELL & REED FINANCIAL INC

93. WHOLE FOODS MARKET INC

94. INTEGRYS ENERGY GROUP (WPS Resources Corp prior to 02/2007)

95. XCEL ENERGY INC

96. YAHOO INC

97. ZIMMER HLDGS INC

98. NASDAQ OMX GROUP INC (Nasdaq Stock Market Inc prior to 02/2008)

99. TEXAS CAPITAL BANCSHARES INC

100. DISCOVER FINANCIAL SERVICES INC

101. TIME WARNER CABLE INC

102. CARMAX INC

103. FIRST MARBLEHEAD CORP

104. CME GROUP INC (Chicago Mercantile Exchange Holdings Inc prior to 07/2007)

105. BIOGEN IDEC INC

106. BLACKBAUD INC

107. MEDCO HEALTH SOLUTIONS INC

108. THE TRAVELERS COMPANIES INC (St Paul Travelers Companies Inc prior to 02/2007)

109. GENWORTH FINANCIAL INC

110. REGIONS FINANCIAL CORP

111. ASSURANT INC

112. REYNOLDS AMERICAN INC

113. WELLCARE HEALTH PLANS INC

114. OREXIGEN THERAPEUTICS INC

115. SAIC INC

116. ACCO BRANDS CORP

117. MONEYGRAM INTERNATIONAL INC

118. ORION ENERGY SYSTEMS INC

119. WESTERN UNION CO

120. WINDSTREAM CORP

121. SPECTRA ENERGY CORP

122. NYSE EURONEXT

123. VISA INC

124. BANK OF NEW YORK MELLON CORP

125. BENEFICIAL MUTUAL BANCORP INC

126. EAGLE ROCK ENERGY PARTNERS LP

127. MSCI INC

128. DR PEPPER SNAPPLE GROUP INC

129. INTERDIGITAL INC

130. CAREFUSION CORP

131. HYATT HOTELS CORP

132. CAMAC ENERGY INC

133. IRONWOOD PHARMACEUTICALS INC

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