Corporate Fraud, Board Gender Diversity and Stock Market Reaction

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Statement of Originality

I hereby certify that the work embodied in the thesis is my own work, conducted under normal supervision. The thesis contains no material which has been accepted, or is being examined, for the award of any other degree or diploma in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made. I give consent to the final version of my thesis being made available worldwide when deposited in the University's Digital Repository, subject to the provisions of the *Copyright Act 1968* and any approved embargo.

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List of Abbreviations

2SLS	Two-stage Least Squares
AAER	Accounting and Auditing Enforcement Release
AAR	Average Abnormal Returns
ACFE	Association of Certified Fraud Examiners
ANOVA	Analysis of Variance
CAAR	Cumulative Average Abnormal Return
CAR	Cumulative Abnormal Returns
CEO	Chief Executive Officer
CFO	Chief Financial Officer
GAAP	Generally Accepted Accounting Principles
NYSE	New York Stock Exchange
OLS	Ordinary Least Squares
SEC	Securities and Exchange Commission
SIC	Standard Industrial Classification
SOX	Sarbanes–Oxley Act
US	United States

Abstract

Conventional wisdom suggests that corruption reduces efficiency; thus, corporate fraud has received much attention during the last decade because of the enormous costs it imposes on firms, investors and the economy. Given that fraud is a result of a complex framework of individual moral choices, group decision-making processes and the internal control systems of corporations, the composition of the board of directors plays an important role in the ultimate unethical behaviour of the managerial team. Therefore, it is essential to explore the attributes of top managers that prevent opportunistic behaviour.

From psychological, sociological and economic perspectives, there have been extensive studies trying to establish behaviour differences between men and women. Prior studies suggested that women are different from men in terms of moral development, risk perception and leadership styles. Some studies have sought to investigate the connection between demographic characteristics, such as age, education, and financial expertise and misconducts. However, the association between board gender diversity and corporate fraud has been largely ignored in empirical research. Therefore, this thesis addresses these research gaps by focusing on one specific demographic feature of the violators—namely, gender. This feature may be significant in reducing corporate misconducts and in enhancing firm reputation. In addition, this thesis provides a unique platform to get an overview of the key features of the financial frauds of US corporations during the period 1999-2015.

Chapter 1 provides an overview of the corporate fraud literature, beginning with the early studies that brought the subject into academic research. With the first study in 1940, frauds in organisations gradually became part of the literature

in disciplines such as psychology, sociology, economics and business. However, prior studies were mostly limited to examining the association between certain board characteristics (such as the presence of independent directors, the number of board meetings and the activity of audit committees) and corporate fraud, with little focus on board gender. This thesis investigates the association between female board presence and corporate fraud, with two separate yet related empirical studies. A hand-collected dataset of fraud committed by United States (US) corporations over the period 1999 to 2015 is examined. The firms were convicted by the Securities and Exchange Commission (SEC) through Accounting and Auditing Enforcement Releases (AAERs) during the period.

Chapter 2 presents the first empirical study that investigated the effect of board gender diversity on the incidence of corporate fraud in the US. Using a hand-collected matched sample of 195 fraud firms and 195 non-fraud firms, this study found that firms with at least one female board member were approximately 20 per cent less likely to commit corporate fraud than otherwise comparable firms with an all-male board. Moreover, the effect of female board presence on fraud likelihood was stronger in the post-Sarbanes–Oxley period and in male-dominated industries and low fraud-intensive industries. We further found that firms with a gender-diverse board were less likely to be involved in financial statement frauds and reduced the likelihood of more serious frauds. However, the study showed that, the benefits derived from additional female board members seemed to disappear at higher levels of diversity, thereby implying the presence of an optimum level of gender diversity.

The second empirical study is presented in Chapter 3. This study examined the market reaction to the detection of corporate frauds for firms with

gender-diverse and non-gender-diverse boards. Using a hand-collected dataset of 246 US firms, and manually collected disclosure dates of the fraud, the study found that the sample firms experienced a share price decline of -8.94 per cent in the three-day event window around the disclosure date. Cross-sectional regressions demonstrated that the announcement period's negative cumulative abnormal returns (CAR) were significantly less pronounced for firms with gender-diverse boards. In a three-day event window, stock price reduction was significantly less negative for firms with two or more female board members (CAR -2.83 per cent) than for firms with zero or one female board member (CAR -11 per cent). Further analysis revealed that the stock price decline around announcements was severe for financial statement frauds and for restatement announcements. The study also examined the penalties imposed on the firms, and found that, the allegation-related wealth losses were much larger compared with the court-imposed monetary penalty.

Overall, this thesis finds evidence of a positive contribution of gender-diverse boards in terms of curtailing frauds and improving firms' reputation. The results of the studies provide evidence in favour of the dynamism that women board members may bring to an organisational climate. This may help regulators, especially in the US, to consider ensuring better gender representations on boards while devising guidelines to manage fraud risks in the corporations.

Chapter 1: Introduction

1.1 Background

Corporate fraud generally refers to intentional fraudulent activities committed by individuals and/or organisations to obtain monetary benefits by deceiving investors or other stakeholders.[1] Fraud has gained considerable attention in the academic literature, particularly because of the devastating effect it can have on firms, stakeholders and the economy. In recent years, widespread fraud incidence around the world has garnered substantial propagation in the press, making this an important focus of research. Corporate frauds entail significant economic costs, such as destroying shareholder value, employment losses, loss of market credibility and inefficient capital allocation (Desai, Hogan & Wilkins, 2006; Free & Murphy, 2015; Murphy, Shrieves & Tibbs, 2009). Hence they are of particular concern to a wide variety of stakeholders, such as investors, employees and suppliers. Several corporate governance mechanisms have been enacted and various regulatory reforms have been initiated in the United States (US) and around the world in response to the eruption of the highly-publicised cases of financial fraud during the last decade. After this wave of frauds hit US firms, the issue was raised as to whether the incidence would differ if more women were on corporate boards monitoring managerial decisions (Adams & Funk, 2012).

Gender diversity on corporate boards has also received much political and media attention in recent times, with governments around the world adopting legislative mandates to ensure better gender representation on boards. These policies are typically premised on the underpinning that female participation leads

[1] This thesis interchangeably uses the terms ‘corporate fraud’, ‘financial fraud’, ‘corporate misconduct’, ‘corporate illegal behaviour’ and ‘corporate crime’.

to better board functioning, and hence more effective board outcomes. Although an array of academic research has investigated whether there is any link between certain sociological, economic, financial and corporate governance factors and corporate frauds, very few studies have examined the association between board gender mix and corporate frauds of US corporations. Hence, this thesis examines the effect of a gender-diverse board within the boundaries of morality in corporate decision-making and from the perceptions of market participants, beyond the organisational framework. Moreover, none of the previous studies in fraud literature scrutinized the features of the vast range of frauds that have arisen in the US market in recent times. A novel contribution of the thesis lies in the data set comprising a comprehensive collection of fraud cases of US corporations. The use of AAER enabled us with certainty to identify the firms that committed fraud, and provided us with extensive information including the violator, duration and fraud descriptions. In addition, augmenting the data with the manual collection of the fraud disclosure dates provided with a complete picture of the fraud. Such combination of using electronic database and hand-collection of additional vital information would avoid the problem of incompleteness in the analysis, as suggested by Karpoff, Koester, Lee and Martin (2017). This analysis could be of particular interest to companies as well as regulators in an effort to curtail misconducts.

The broad aim of this thesis is to provide a detailed analytical overview of the corporate frauds committed by US firms in recent years, with respect to fraud types, offender categories, industry variation and settlement information. Specifically, the objectives of the thesis are to empirically investigate whether board gender diversity has significance in curbing corporate misconducts, and

whether a female board presence can alleviate negative investor reactions upon disclosure of fraud. Through using a unique, hand-collected data set on corporate frauds of US corporations during the period 1999 to 2015, this study provides empirical evidence that gender-diverse boards perform significantly better in ensuring less financial misconduct and result in less negative market reactions when fraud is disclosed.

1.2 White-collar crime and corporate fraud

1.2.1 White-collar crime in early literature

The notion of white-collar crime was first discussed by sociologist Edwin Sutherland (1940) in his presidential address to the American Sociological Society in 1939, with his pioneering research on the illegal activities of major US firms. He defined white-collar crime as 'crime committed by a person of respectability and high social status in the course of his occupation' (Sutherland, 1949, p. 9). These crimes differ from common crimes in terms of the nature of the violation and the involvement of a formal organisation (Wheeler, Weisburd, Waring & Bode, 1988). White-collar crimes are committed by individuals who belong to the upper class of society, occupy influential positions and often survive legal punishment by using their powers (Hirschi & Gottfredson, 1987; Moberg, 1997). Shapiro (1990) stated that white-collar criminals are trust offenders, who use various strategies to rob in a non-violent manner. The extent of white-collar crimes is sometimes worse than for ordinary crimes, since the consequences can affect the economy at large (Hamilton & Sanders, 1999). Quinney (1964) reconceptualised Sutherland's view of white-collar crime by identifying white-collar offenders as professional people who violate the law in connection to their

profession. This reorientation of white-collar criminals from focusing on a rich and powerful status to their occupations provided for an analysis of corporate and organisational crimes. The research on corruption in organisations focuses on corporate fraud (where the organisation is guilty) and occupational fraud (where the employee is liable), and involves analysing both the organisational perspectives and individual characteristics contributing to fraud (Pinto, Leana & Pil, 2008). White-collar crime can be subdivided into corporate fraud (committed with implicit support of the organisation) and occupational fraud (crime undertaken by the employee where the firm is a victim) (Steffensmeier, Schwartz & Roche, 2013). However, in recent years, corporate fraud has been the umbrella term used for all forms of corporate illegal activities.

1.2.2 Types of corporate fraud

Clinard and Quinney defined corporate crime as 'the offenses committed by corporate officials for the corporation and the offenses of the corporation itself' (Clinard & Quinney, 1973, p. 188). Illegal corporate acts essentially violate administrative, civil and (in some cases) criminal laws, and are resolved through regulatory procedures, such as monetary fines, professional bars and decrees by regulatory authorities against the firm or employees. Fraud in recent times spans organisational and individual offenders and involves traditional corporate crimes, as well as complex high-tech frauds. Fraud by top management has been named in various ways in the fraud literature, including white-collar crime, managerial fraud and corporate wrongdoing (Zahra, Priem & Rasheed, 2005). These frauds can take various forms, such as financial statement fraud, antitrust violations, disclosure fraud, violations of generally accepted accounting principles (GAAP),

stock manipulation, bribery, fund misappropriation and tax frauds. It can also vary with respect to the level of involvement. For example, Daboub, Rasheed, Priem and Gray (1995) illustrated the difference between active participation and passive agreement, where, in the first case, individuals actively perform unlawful acts, while, in the second case, individuals refrain from taking remedial actions, despite being informed about corporate illegal activities.

Corporate fraud may be committed by people from either the top or the bottom of the managerial hierarchy and can vary in scope, from encompassing single transactions or multi-organisational schemes. The effects of a firm's illegal activities can also spill over in varying ways to peer firms in the industry. Rival firms may lose market trust because of the misconduct of the accused firm, or may benefit by attracting the accused firm's customers (Goldman, Peyer & Stefanescu, 2012). Large-scale corporate frauds not only affect corporations and their stockholders, but also reach out to affect the lives of individuals with respect to their savings and investments. Hamilton and Sanders (1999) mentioned the 'second face of evil', which essentially refers to the massive financial hazard that result from the various collective actions taken by people occupying responsible positions in organisational hierarchies.

1.2.3 Cognitive motivations of corporate fraud

Early studies showed that the environmental characteristics outside and within an organisation create the conditions for pressure and opportunity that entice managers to engage in illegal activities (Baucus, 1994; Cressey, 1986). The pressure can escalate from market competitiveness and resource scarcity or from management pushing for improved performance. Opportunities for fraud

arise from complex regulations, information asymmetry and management striving for growth. How crime is perceived contributes the most to managerial opportunism. Cressey (1986) termed this 'neutralizing verbalizations/ideologies', which is a situation whereby the offender does not consider the law violation an act of crime and uses neutralising words such as 'necessity' or 'business is business' to rationalise the crime. Therefore, when the company faces a situation, such as falling profits or aggressive competition, they respond by averting the situation through fraudulent accounting or price fixation. Contrary to the traditional view that crime results from relative poverty, Clinard and Quinney (1973) stressed 'occupational theory', which asserts that access to money and resources lead to white-collar crime. Motives for crime further differ between leaders and followers. While leaders are motivated by financial gain and greed, followers follow the guidelines of the leader because of fearing job security (Bucy, Formby, Raspanti & Rooney, 2008). Daboub et al. (1995) argued that top management team characteristics (such as background, education and age) may work as moderating factors in managerial illegal behaviours.

Researchers have emphasised using the theory of the fraud triangle to analyse managerial unethical behaviours (Cohen, Ding, Lesage & Stolowy, 2010; Wilks & Zimbelman, 2004). The fraud triangle argument asserts that corporate fraud is a function of managers' incentives, opportunities and attitude/rationalisation. Among these three factors, attitude is possibly the most difficult to address because of its cognitive nature. Thus, an understanding of managerial attitude is critical to gain insights into the reasons for unethical behaviour. Cohen et al. (2010) examined managerial behaviour in the commitment of several eminent frauds in the US during 1992 to 2005 based on

the framework of the fraud triangle, and suggested that managers' personality traits appeared to be a major fraud risk factor. Therefore, to detect managerial fraud, auditors must evaluate managerial ethical behaviour through assessing managers' subjective norms, moral orientations and behavioural control mechanisms.

1.2.4 Environmental and organisational antecedents of corporate fraud

In a study on fraud by top management, Zahra et al. (2005) developed a framework in which they argued that social associations and aspirations and industry culture, concentration and competition are some of the prominent variables that may create the conditions that encourage fraud. Industry lifecycle has been found to affect fraud propensity, such that fraud is more likely to occur in booms than in busts (Povel, Singh & Winton, 2007). One probable reason for this is information asymmetry among corporations or investors about the true state of the economy, causing delayed adjustments in their monitoring decisions and thereby providing incentives for poorly performing firms to commit fraud. This information environment is noisier in the case of competitive industries, implying that the average fraud propensity is higher (Wang & Winton, 2012). The regulatory environment also affects the propensity to commit fraud. Kedia and Rajgopal (2011) reported that firms that are located in close proximity to the Securities and Exchange Commission (SEC) or located in areas with frequent past SEC enforcement activities are less likely to restate their financial statements.

A stream of literature has identified several organisation-specific motivations for committing corporate fraud. Dechow, Sloan and Sweeney (1996)

reported that their sample of 92 US firms accused of earning manipulation during 1982 to 1992 were driven by the need to attract low-cost external financing and to avoid debt-covenant constraints. Stock-based compensation can entice chief executive officers (CEOs) or managers to commit fraudulent activities that increase their compensation (Burns & Kedia, 2008; Efendi, Srivastava & Swanson, 2007). Managers with unrestricted stockholding face greater financial incentive to commit fraud in an attempt to avoid sharp decline in stock price (Johnson, Ryan & Tian, 2009). The use of accounting information to value stocks may create an incentive for managers to manipulate the financial statement numbers to influence the market value of the firm (Healy & Wahlen, 1999). The organisational environment also sometimes plays a pivotal role. In the study by Crutchley, Jensen and Marshall (2007) on 97 US firms convicted of fraud during 1990 to 2003, it was found that an organisational environment that exhibit significant growth and high earnings smoothing was the most likely to result in accounting falsification. Similar to this finding, Beneish (1999) identified high growth prior to the fraud period as a critical feature of potential manipulation. Dimmock and Gerken (2012) identified that the likelihood of investment fraud is significantly higher for firms having disclosures related to past regulatory violation.

Corporate frauds are also the result of weaknesses in internal managerial oversight. Strong governance mechanisms can reduce corporate illegality by providing tight monitoring over managerial decisions and ensuring punishment for offenders. This effectively increases the expected costs when considering the decision to commit fraud. The governance literature suggests various proxies to measure the strength of a firm's internal governance. For example, Chidambaran,

Kedia and Prabhala (2010) found that CEO–director connections are significantly related to fraud probability, such that non-professional connections increase fraud probability, while professional connections reduce them. While analysing comparative corporate governance systems in Europe and the US that led to corporate scandals, Coffee (2005) claimed that dispersed ownership is an important factor leading to earnings management in the US. Chung, Firth and Kim (2002) found that the presence of large block shareholders deters opportunistic earnings management by managers and thus improves monitoring.

In summary, the research on fraud initially concentrated on defining the term, identifying the various categories of fraud and locating the overall sociological profile of alleged perpetrators. Gradually, the studies focused more on investigating the particular psychological and organisational motivations that can drive management team members and executives into corporate illegal behaviour. However, the literature on the relationship between internal governance mechanisms and corporate fraud has focused primarily on factors such as compensation systems, board independence and ownership structure. However, board gender as a determinant of corporate ethical behaviour has been largely ignored in prior studies. Hence, this thesis aimed to address these research gaps and provide a platform for analysing the impact of gender of the board with two separate yet interrelated empirical studies. Board gender diversity is highly influential for both the ethical deliberations of the top management team and the market reputation of the firm, and hence should be analysed empirically.

1.3 Corporate board gender mix and corporate fraud

Top management performs key roles in shaping corporate strategy, and thus may be the prime antecedent of misconducts. A probable key factor at the root of managerial fraud is argued to be managers' ethical profile and leadership style.

1.3.1 Gender and leadership styles

Van Staveren (2014) stated that the three key dimensions of financial behaviour that exhibit gender differences are ethics or morality, risk choices and leadership styles. The leadership styles of top executives may influence the corporate decision-making process by facilitating conflict resolution and influencing the attributes of the executive team. Van Staveren (2014) further proposed the 'Lehman sisters hypothesis', arguing that the financial crisis of 2008 would not have been as severe, if there were more women in the banking sector. The gender of the top executive may influence the corporate culture prevalent within an organisation and instigate different behavioural patterns among other employees. Eagly and Johnson (1990) hypothesised that, even when in the same organisational position, the leadership styles across genders may differ because of the inherent traits, diverse gendered expectations and structural positions (tokenism) among men and women. While men exhibit a directive style, women are more likely to exhibit a transformational leadership style, which encompasses looking beyond personal gain for the interest of the group. Krishnan and Park (2005) discussed that women perceive power in an organisation as a way of disseminating information to reach targets, whereas men use power to exert influence to achieve goals. Further, Bennouri, Chtioui, Nagati and Nekhili (2018) argued that female board members possess certain unobserved gendered

behavioural features that are not captured in their general attributes of education, tenure or nationality, which contribute to the effectiveness of the board's decision-making process.

Although theories related to the distinctive leadership styles for men and women have been proposed at the individual level, this can be applied to understand how the gender composition of a group influences board competence. From their findings on a study of 201 Norwegian firms, Nielsen and Huse (2010) posited that more women on corporate boards are positively associated with greater strategic control, mediated through increased board development and decreased conflict. In cases of corporate wrongdoing, the organisational context is particularly vital because CEOs' lack of morality together with the corporate strategy may lead to managerial fraud (Zona, Minoja & Coda, 2013). Therefore, the gender of the top executive can mould the corporate culture prevalent within an organisation, which may be significant in reducing propensity of fraud.

1.3.2 Board gender mix and corporate ethical climate

The extant literature on criminology and sociology provides evidence and explanations with respect to variations in male and female offending. Criminologists have universally recognised the comparatively lower level of female offences relative to male offences with the term 'gender gap'. Steffensmeier and Allan (1996) used an integrated approach employing traditional and feminist crime theories to explain the gender gap in corporate crime. They proposed that social culture, moral development and physical difference shape the risk choices and criminal motivations affecting male and

female offending. There are two ways for women to engage in corporate crime: opportunity via job access and via network access. The sex segregation literature suggests that women lack both these opportunities (Steffensmeier et al., 2013). The spectrum of corporate fraud is often described as being dominated by male networks, giving women marginal chances to become involved in joint criminal ventures. In group crimes, women are seldom invited to participate and, even when they do, they act as accomplices to men (Steffensmeier, 1983). Organisational power structure plays also an important role in determining the lead in conspiracy schemes. Managers may face growing pressure to boost revenue or meet analysts' earnings projections, thereby enticing them to resort to unlawful means. Female executives often have less organisational power and resources because of workplace inequality, and even fewer women hold high corporate positions, which reduces their chances to lead crimes. This is why it has been observed that women are more likely to work alone and use fewer organisational resources when undertaking fraud, whereas men work in groups and use company resources/positions for organised crime (Daly, 1989; Steffensmeier & Allan, 1996). Daly (1989) indicated that women constituted 14 per cent of the 1,342 convicted white-collar offenders in the US federal courts in the 1970s. The gender gap is observed with respect to specific types of crime as well. For example, women managers have been found to be less tolerant of corruption than men in case of bribery in a number of countries (Swamy, Knack, Lee & Azfar, 2001). In a sample of firms in Australia, Zhong, Faff, Hodgson and Yao (2014) found that female presence on the board reduced the profitability of insider trading by male board members. They attributed this finding to a stronger 'tone at the top'.

In the US market, Adams and Ferreira (2009) reported that a gender-diverse board allocates more effort to monitoring and aims for an efficient internal control environment. In business decisions, Bernardi and Arnold (1997) found that female managers were more morally developed than male managers in the five largest public accounting firms in the US. Francis, Hasan, Park and Wu (2015) reported that, following a transition from a male chief financial officer (CFO) to female CFO in S&P 1500 companies, the sample firms showed a significant increase in accounting conservatism. In their study on acquisition bids by S&P 1500 companies during 1997 to 2009, Levi, Li and Zhang (2014) concluded that female directors were more likely to create shareholder value, as they were found to be less motivated towards empire building, as reflected in the significantly fewer acquisition decisions and lower bid premiums. Huang and Kisgen (2013) compared corporate investment and finance decisions between male and female executives in US firms, and found that female executives were more cautious when making important corporate decisions (such as acquisition and debt offering) than did male executives, who often became overconfident. Based on the results of their experimental study, Kaplan, Pany, Samuels and Zhang (2009) contended that women board members are more likely to report incidents of fraudulent financial reporting than are male members. Higher female representation among managerial teams was also found to benefit firms by significantly reducing agency costs, especially in firms with weaker external governance (Jurkus, Park & Woodard, 2011).

Few studies have examined board gender diversity in an international setting. Cumming, Leung & Rui (2015) reported that the presence of a higher number of female directors on corporate boards reduced the probability of

securities frauds in China. Arun, Almahrog and Aribi (2015) investigated firms in the UK and showed that those firms with a higher number of female board directors adopted conservative earnings management practices. Likewise, Gull, Nekhili, Nagati and Chtioui (2018), in a sample of firms listed on Euronext Paris, found a significant negative association between the presence of women directors on the board and the magnitude of earnings management during the period 2001 to 2010.

In summary, the literature suggests that there are distinct differences between male and female managers in terms of ethical orientation, monitoring efforts and leadership styles. However, the literature on corporate fraud and board gender is limited to focusing on accounting manipulation, which forms only a part of financial frauds. Moreover, none of the studies analysed the perpetrators, motives, types or severity of frauds in connection to female board presence among the firms in the US market. In addition, studies have not addressed whether there exists a nonlinear relationship between female board presence and financial fraud. Thus, our first study addresses the gaps evident in the prior diversity-fraud literature by using a hand-collected dataset of US firms that were accused of financial fraud during the period 1999 to 2015.

1.4 Corporate fraud and market reaction

Corporate frauds are costly for shareholders and corporations in terms of damage to the firm's market reputation and in terms of punishments imposed by authorities. These punishments include extremely large monetary penalties as well as administrative sanctions. For example, HealthSouth Corporation and WorldCom Inc. had imposed upon them civil monetary penalties of US$100 million and US$500 million, respectively, together with professional restrictions on the managers that perpetrated the earnings management and financial frauds scheme (SEC AAER no. 2263 and 1811, www.sec.gov).

A strand of literature has studied the stock market behaviour to the disclosure of corporate fraud. Kellogg (1984), who analysed market reactions to the announcement of class action lawsuits, was one of the earliest studies. He reported significant negative returns associated with the discovery of accounting misrepresentations by firms.[2] Davidson and Worrell (1988) also conducted an early study to assess market reactions to the public announcement of firms being charged for illegal activities. Using corporate crime announcements in *The Wall Street Journal* for 96 firms as the event date to apply the event study methodology, the results confirmed a significant negative market reaction on the day before the event day (Day -1). Bosch and Eckard (1991) hypothesised that the market reaction comprises forgone expected profits, probable legal costs and various 'market signal' effects. Through investigating stock price reactions to *The Wall Street Journal* announcement of Department of Justice indictments for 127 firms, they found that the statistically significant negative abnormal returns of -

[2] Under SEC Rule 10b-5, class action lawsuits are brought by investors who may have suffered trading losses due to misrepresentation by the company.

1.08 per cent around the announcement corresponded to a loss of US$2.18 billion in equity market value. Feroz, Park and Pastena (1991) reported an abnormal return of -13 per cent around a two-day event window for financial reporting violations for 58 US firms. They used SEC releases and *The Wall Street Journal* to obtain the announcement dates of the SEC investigations to use as the event day. Nourayi (1994) examined the stock market effect of the SEC's enforcement action announcements for a sample of 82 US firms charged with fraudulent practices during 1977 to 1984. The results indicated significant negative abnormal returns of -33.04 per cent on the event day, where the negative effects were larger if the company itself was charged, rather than the employees. Baucus and Baucus (1997) examined the long-term financial performance consequences for convicted firms in Fortune 300. Using a sample of 68 firms convicted during 1974 to 1983, the results revealed that convicted firms experienced significantly lower returns on assets and slower sales growth during the five years following the fraud conviction.

Pritchard and Ferris (2001) studied the stock market reactions to three events related to the litigation process: revelation of fraud, filing of a lawsuit and judicial resolution of the lawsuit. The results documented that, while there was a significant negative reaction to the revelation of fraud, the market returns were not influenced by the outcome of the litigation. Palmrose, Richardson and Scholz (2004) examined the market reaction to a sample of 403 restatements in the US announced from 1995 to 1999, and documented an average negative abnormal return of around nine per cent over a two-day announcement window. The characteristics of the fraud or accounting restatement could also affect the stock market reaction. For example, according to a study by Palmrose and Scholz

(2004) on 492 US firms that announced restatements during 1995 to 1999, companies with core restatements are more frequently involved in intentional misstatements and experience more negative security price reactions to restatement announcements. Gande and Lewis (2009) analysed 605 shareholder class action lawsuits filed during 1996 to 2003 and showed a -4.66 per cent reduction in the stock price during the three-day event window surrounding the announcement, resulting in an average loss of US$355.65 million in shareholder wealth. A statistically significant negative short-term price response was also documented for 238 firms at the announcement of suits by federal class action litigation (Griffin, Grundfest & Perino, 2001).

Prior literature is limited to studying solely investor reactions to fraud disclosure. However, there is little any evidence as to whether the gender composition of the board plays any role in stock market reactions to the discovery of financial misconducts. For the success of the market economy, trust is a critical element, since investor perceptions affect resource allocations in the economy. Establishing board reputation in the market is critical, given that investors may not have abundant information to judge the management quality of the firm. Miller and Triana (2009) argued that women on the board serve as a positive signal to the public about the quality of governance and the firm's adherence to norms of equality, resulting in enhanced reputation. Hence, the second study addresses this research gap by providing the first empirical evidence on this issue through investigating stock market reactions to the disclosure of fraud across gender-diverse and non-gender-diverse boards. Moreover, this study investigated the market reaction across sources of disclosure and across types of frauds. It also examined the reputational and legal penalties imposed on the firms, and provided

evidence on the difference in equity value losses for firms with varying levels of diversity on the board. The study used a hand-collected dataset on the announcement of frauds for a sample of US corporations accused of fraud announced in the press during 1999 to 2015.

1.5 Research hypotheses, research methods and key findings

This section briefly discusses the research hypotheses and major results associated with the two empirical studies of the thesis.

One ensemble objective of the thesis was to have an insight into the financial frauds that took place in the US firms during 1999-2015. The hand-collected data set enabled us to have an overview of the various features of the misconducts. We observed that in majority of the cases, both the firm itself and the top management (Chief Executive Officer, Chief Financial Officer and Chairman) were convicted of committing the fraud, indicating that the misconducts were often group conspiracies. Furthermore, firms mostly committed frauds related to manipulation in the financial statements. We also found that, for cases that were already settled in the federal court, the most common legal sanction was to impose monetary penalties in varying amounts on the convicted firms and personnel.

The primary objective of the first study was to examine the association between board gender diversity and the likelihood of fraud for a sample of US firms. We drew upon the economic theory of crime, agency theory, resource dependence theory and upper echelons theory and built on evidence sighted in literature on differences across gender in terms of ethics, risk choices and leadership style. We hypothesised that female presence on board was likely to

curtail the firm's involvement in corporate fraud. This impact is due to female traits reflecting ethicality and risk aversion, which result in a resistance to fraud within the corporate culture and monitoring of decision-making at board meetings. For the first empirical study, we adopted the probit regression model with a matched-pair sample of fraud firms and control firms to find out how female presence on corporate board is associated with likelihood of corporate fraud. The results of the study demonstrated that the existence of a gender-diverse board significantly reduced the firm's likelihood of corporate fraud. The findings were consistent for both the pre- and post-Sarbanes–Oxley periods. A female board presence was also more effective in reducing fraud in male-dominated industries and low fraud-intensive industries. Further analysis suggested that a gender-diverse board significantly reduced firms' involvement in financial statement fraud. Also a female board presence was effective in reducing the likelihood of being imposed with monetary penalty, which is argued to be the case of a more serious category of fraud. However, we found that, female presence on the board and the probability of fraud held a nonlinear relationship, suggesting that the benefit derived from additional female board members (in terms of a reduction in fraud propensity) diminishes after an optimal point.

The second study investigated if there was any difference in the stock market responses to the disclosure of fraud across firms with gender-diverse and non-gender-diverse boards. We hypothesised that the stock market reaction upon the disclosure of fraud would be less pronounced for firms with female board members, on the premise that, investors would have a perception of superior reputation for firms with a gender-diverse board. For the second empirical study, we applied standard event study methodology, to analyse stock market reaction

to the disclosure of alleged violation for the accused firms. Using a range of event windows from three-day to twenty-one-day, it was found that the sample firms experienced significant negative abnormal returns to the announcement of fraud. However, the key finding from the cross-sectional regression demonstrated that, firms with more gender-diverse boards experienced significantly less negative announcement period CAR. The less negative investor reactions were robust to using various event windows. Further analysis showed that the investor reactions were more pronounced at the disclosure of restatement by the firms and for committing financial statement frauds. We further found that, one of the devastating consequences of corporate misconduct is the resulting equity value losses, which significantly exceed legal monetary penalties, and hence is an important concern for shareholders.

Overall, our evidence suggests that more female representation on boards is conducive to encouraging ethical practices and reducing fraudulent activities. Such firms are also deterred from engaging in more serious corporate frauds. A gender-diverse board further contributes to enhancing firm reputation and reducing negative investor reactions. The evidence from this thesis complements the growing evidence on the positive effect of female board presence on the board governance process, financial reporting quality and corporate ethicality. In response to growing concerns among regulators regarding reducing corporate fraudulent activities and protecting investors from enduring large value losses, considering increasing equality in the board gender mix could prove to be productive.

1.6 Thesis organisation

The remainder of this thesis is organised as follows. Chapter 2 presents the first empirical study, which examines the effect of board gender diversity on the likelihood of corporate fraud. Chapter 3 presents the second empirical study, which investigates the effect of board gender diversity on stock market reactions to the disclosure of a firm's involvement in fraud. Finally, Chapter 4 presents the concluding remarks, briefly presents the major study results and discusses some limitations of the thesis and the scope of future research.

Chapter 2: The Impact of Board Gender Diversity on Corporate Fraud

2.1 Introduction

Corporate fraud has attracted considerable attention during the last couple of decades, especially after the revelation of corporate scandals by companies such as Enron, HealthSouth, Tyco and WorldCom. These high-profile cases motivated research on the causes and consequences of corporate frauds, and instituted legislative responses such as the *Sarbanes–Oxley Act (SOX) of 2002* and adoption of corporate governance rules by the New York Stock Exchange (NYSE) and NASDAQ in 2004. Despite these regulatory efforts, corporate fraud continues to be a pervasive problem, raising substantial concerns regarding the effectiveness of corporate governance. Corporate misconduct is often a result of decisions by firms' managers; hence, managers are held culpable for such actions. An ethical corporate culture and strong internal control aimed at reducing misconducts can help mitigate corporate illegality. Prior literature has found that superior corporate governance features, such as board independence and a robust audit committee, can reduce the incidence of corporate fraud (Agrawal & Chadha, 2005; Beasley, 1996). However, prior governance-fraud literature was limited to examine the association between certain board attributes and fraud, such as the proportion of outside directors (Uzun, Szewczyk & Varma, 2004), the tenure of the chairperson (Chen, Firth, Gao & Rui, 2006), the number of audit committee meetings and the existence of CEO duality (Farber, 2005). Hence, very few studies have addressed whether there is any association between board gender mix and the likelihood of corporate fraud occurring. Thus, the aim of this study was to examine whether a female presence on corporate boards can mitigate firms' involvement in corporate financial fraud. Through using a hand-collected dataset of financial frauds by US corporations during the period 1999 to

2015, this study demonstrates that a female board presence significantly reduces the likelihood of corporate fraud.

Boards play a pivotal role of acting as both advisor to management and monitor of management (Adams & Ferreira, 2007). Thus, it is plausible that certain observable features of board members may have a bearing on the board decisions and internal control quality. The management philosophies and ethical orientation of the top management have implications for the control environment of a firm. Gender is an important attribute in this regard, since the perceptions of and motives for crime very often develop within a gender paradigm. Hence, to address fraud risk exposure, organisations essentially must understand the behavioural factors that may induce illegal actions. There is considerable evidence in the diversity literature suggesting behavioural differences between males and females. For example, studies have found that women are less risk-seeking in financial decision-making (Byrnes, Miller & Schafer, 1999; Powell & Ansic, 1997), more averse to competition (Croson & Gneezy, 2009; Niederle & Vesterlund, 2007), more ethical and less likely to adopt corrupt practices for financial gain (Betz, O'Connell & Shepard, 1989). Moreover, it is argued that, while dealing with complex problems, heterogeneous groups are more likely to deliver a diverse package of solutions that in turn trigger effective group discussions (Ely & Thomas, 2001).

While the behavioural differences in gender have been studied in sociology, criminology and psychology, the evidence is limited in corporate finance. Moreover, most studies on diversity have predominantly investigated its effect on firm value or performance. The effects of board gender diversity on the probability of fraud have been largely unexplored. Examining the relationship may

therefore provide more insights into the implications of gender for corporate decisions. To the extent that female managers are better monitors, are more ethical, are more intolerant towards opportunistic behaviour and potentially improve group outcomes by reducing groupthink, it can be expected that firms with more women on the board of directors will be less involved in corporate fraudulent activities.

Our research was further motivated by the recent legislation and diversity efforts worldwide drawing attention to the need for female representation on corporate boards. As of 2017, countries such as France, Italy, Belgium and Norway have established mandatory gender quotas, and require companies domiciled in those countries to have at least three women on the boards (MSCI, 2019). Several other countries, such as Denmark, Finland, Germany and Sweden, also have gender quota legislations in place. Although there has been an improvement in boardroom diversity worldwide (women held 20 per cent of directorships in 2019 compared with 17.9 per cent in 2018 and 17.3 per cent in 2017), overall female representation remains very low.[3] Although in the US, as of January 2020, women held only 21.2 per cent of directorships and 5.8 per cent of CEO positions in S&P 500 companies (Catalyst, 2020), female directors are becoming an important feature of US corporate boards. These diversity initiatives imply the importance and relevance of studying board gender diversity.

This study empirically examined the association between a female board presence and the probability of fraud occurrence, with a sample of US firms that committed corporate fraud during the period 1999 to 2015. We used the Accounting and Auditing Enforcement Releases (AAERs) issued by the US SEC

[3] MSCI (2019). Women on Boards, 2019 Progress Report.

to create a unique, hand-collected dataset of fraud firms that contained detailed information on the fraud cases. We used the probit regression model with a matched-pair sample of 195 fraud firms and 195 control firms, and found that the presence of at least one woman on the board was associated with a significantly lower likelihood of corporate fraud. Specifically, firms with at least one female board member were 20.3 per cent less likely to commit corporate frauds. The result of the sub-sample analysis investigating the effect of the SOX showed that, a gender-diverse board reduced firms' fraud propensity by 30.4 per cent in the post-SOX periods, compared with 17.3 per cent in the pre-SOX period. The industry analysis showed that, compared with female-dominated industries, a gender-diverse board is significantly more effective in reducing the likelihood of fraud in male-dominated industries. Moreover, a female board presence significantly reduces fraud in low fraud-intensive industries. We conducted additional tests to identify the effect of board gender diversity across types of fraud and severity of fraud (depending on the litigation settlement). The probit model results revealed that a female board presence effectively reduces a firm's likelihood of committing financial statement fraud and facing a monetary penalty. Further, to test our hypothesis that greater gender diversity on the corporate board may adversely influence the group dynamics, we examined the linearity of the relationship between board gender mix and probability of financial fraud. We found that the relationship is nonlinear, indicating that the benefits of adding more women to the board reverse after a certain level, suggesting that adding a certain level of gender diversity may induce the cognitive dynamics that leads to effective group cohesion.

This study contributes to the corporate fraud literature by providing evidence on the relationship between board gender diversity and corporate frauds. In contrast to the limited prior studies that examined the association between female board presence and financial reporting restatement (Abbott, Parker & Presley, 2012; Wahid, 2019), our research includes a range of types of corporate fraud, namely bribery, insider trading, fraudulent disclosure and asset misappropriation. Examining a comprehensive sample of alleged fraud firms, rather than focusing only on firms that restated their financial statements, provided a larger sample to explore the relationship. In addition, our study on the US market analyses the relationship across industry categories, firm characteristics and fraud types. The Association of Certified Fraud Examiners (ACFE) reports that the US reports the highest number of fraud cases in the world (48 per cent during 2016 to 2017). Moreover, each US firm lost an average of US$108,000 in 2017 because of frauds.[4] Moreover, the sample is based on a hand-collected database on corporate fraud cases that allowed us to analyse the motivations behind the illegality, the alleged personnel, other associated parties, the monetary amount involved in the fraud and the legal sanctions and court sentences. This study is the first to examine the effects of board gender on the full range of corporate frauds in the US.

The remainder of the study is organised as follows. Section 2.2 presents the theoretical analysis and discusses hypothesis development, while Section 2.3 describes the sample construction, provides variable definitions and presents the model. In Section 2.4, we discuss our main empirical findings. Section 2.5 discusses the nonlinear relationship between board gender diversity and

[4] 2018 Global Study on Occupational Fraud and Abuse, ACFE.

corporate fraud, while Section 2.6 presents the analysis of types and severity of frauds. Robustness analysis is presented in Section 2.7, and Section 2.8 concludes the study.

2.2 Why board gender diversity may reduce corporate fraud

2.2.1 Theoretical underpinning and research hypotheses

Several theories from various fields provide insight into the economic and organisational effects of gender diversity. In presenting the hypothesis that a gender-diverse board may be an indicator of good corporate governance that may subsequently reduce fraud, we draw on the economic theory of crime (Becker, 1968), agency theory (Fama & Jensen, 1983), resource dependence theory (Pfeffer & Salancik, 1978) and upper echelons theory (Hambrick & Mason, 1984).

Managers' incentives to use fraudulent mechanisms to achieve monetary goals may be influenced by their assessment of the expected utility gain (monetary income) against the expected costs (the probability of being convicted and punishment if convicted), as presented in Becker's (1968) theory of crime. The risk preferences of individuals can reduce the expected utility and subsequent number of offences. Those who prefer risk are deterred more by the probability of conviction, whereas risk averters fear the punishment if convicted. Therefore, the general idea that offenders are deterred by the probability of conviction, more than the punishment itself, implies that the offenders prefer risk. Several experimental and empirical studies have documented the differences in risk choices across gender. These studies find that, women have a higher degree of financial risk aversion than do men (Charness & Gneezy, 2012; Halko, Kaustia

& Alanko, 2012). Men have been found to take more risks on behalf of a group (Ertac & Gurdal, 2012), whereas women are more concerned about the future consequences (Schubert, 2006). Gender differences in emotional reaction to uncertain situations and relative overconfidence in males are the suggested reasons for these observed differences in risk perception. Given that corporate fraud entails litigation risks, concern regarding regulatory punishment, resulting from differences in risk aversion, may affect managers' tendency to commit fraud. Therefore, a gender-diverse board may adopt a conservative approach to corporate decisions and to financial reporting. For example, in their study of the largest 500 firms listed in the Australian Securities Exchange, Duong and Evans (2016) found that female CFOs were comparatively conservative, and their companies yielded higher reporting quality when compared to those of their male counterparts. The authors stated that these differences might be explained by observed gender-differences in risk preferences.

The significant role of corporate boards in monitoring and controlling managers was incorporated into the agency theory framework of Fama and Jensen (1983). In this framework, the aim of governance is to align the interests of managers and shareholders and to resolve any agency conflict by setting compensation and replacing non-performing managers. Agency conflicts occur when managers fail to consider shareholders' best interests while making significant corporate decisions. Enhanced monitoring of managerial actions and board decisions may provide an effective solution in such a scenario. Empirical evidence suggests that female representation on boards may improve the board's monitoring function in protecting shareholder interests. Adams and Ferreira (2009) studied director level data for 1,939 US firms for the period 1996-

2003, and found that female directors had better attendance at board meetings and were tougher monitors of managerial actions, and that gender-diverse boards were more likely to hold managers accountable for poor stock performance. Gul, Srinidhi and Tsui (2008), based on their study on audit fee data of a sample of US firms from 2001 to 2003, concluded that female directors embodied greater vigilance in financial reporting through increased audit effort proxied by audit fees. So, this imply that women in managerial positions expend more efforts in their responsibilities and could improve effectiveness in board decision making. Board independence is also imperative to ensure that the interests of shareholders are served in the best possible way. Board diversity (in terms of gender, ethnicity or culture) is argued to increase board independence and subsequently to increase board efficiency by ensuring constructive decision-making through questions and conflicts (Carter, Simkins & Simpson, 2003). Several studies contend that women possess high moral standards and are less self-serving (Betz et al., 1989; Eckel & Grossman, 1998), thereby implying their willingness to forego personal benefits for public profits.

To monitor management effectively, boards must be equipped with the right expertise, knowledge and experience. The resource dependence theory (Pfeffer & Salancik, 1978) suggests the boards' function to bring these required skills. Hillman, Cannella and Harris (2002) extended the resource dependence view to include board diversity and highlighted that, as different types of directors bring different sets of resources to the board, a diverse board may provide resources that are more beneficial to the firm than provided by a less diverse board. A greater presence of female directors on boards was found to result in more diverse experiences (Hillman et al., 2002), increased corporate disclosures

(Gul, Srinidhi & Ng, 2011) and greater conflict resolution (Lee & Farh, 2004). A female board presence creates heterogeneity, which reduces groupthink and is more likely to question doubtful elements in quarterly/annual meetings, thereby causing a transparent reporting process. Clarity in financial reporting ensures reliable financial disclosures, establishes efficient internal control systems and discourages fraud and manipulation (Ho, Li, Tam & Zhang, 2015). Gender diversity is related to cognitive diversity, indicating that female members are associated with different beliefs and preferences. As a result, a gender-diverse board is likely to yield a unique information set and non-traditional approaches to problems, which result in better managerial decision-making (Carter, D'Souza, Simkins & Simpson, 2010).

A reduction in fraud may also result from well thought out strategic decisions arising from a board that emphasises long-term benefits and ensures monitoring of management activities. Hambrick and Mason (1984), in their upper echelons theory, proposed that a manager's cognitive features shape the perceptions underlying decision-making. Thus, when the top management team works as a decision-making group, their collective cognitive base will determine the way they process information and find solutions, and will affect team- and firm-level outcomes. Given that the cognitive base develops from an individual's background and experiences, demographic characteristics (such as gender) are predictors of beliefs and values. Based on the socio-psychological process, Chen, Crossland and Huang (2016) explained why a gender-diverse board will be associated with different firm-level strategic actions. They used social identity theory to identify that, while working in a group environment, minority categories (such as women on corporate boards) may perceive identity threats from majority

members and subsequently become more active in demonstrating distinctiveness. The disagreements in a diverse set of upper-echelon executives generate a wider range of issues and more alternative courses of actions. Thus, the decision-making process of a gender-diverse board is argued to be more thorough. Westphal and Milton (2000), while studying the influence of minority directors (in terms of race, gender) on the board, argued that such directors, with their experience as minority, may develop the ability to propose novel perspective by challenging dominant supposition in a way that makes it acceptable to the board.

Studies in psychology and criminology further provides arguments for gender differences affecting fraudulent behaviour. Broidy and Agnew (1997) used general strain theory to explain the 'gender gap' in crime.[5] According to this theory, men are concerned with material success, are more strained by financial problems and face more peer pressure, whereas women are more concerned about procedural justice and face a warmer competitive environment. Under strain, men are more likely to respond with anger and aggression, while women respond with depression and anxiety. These differences in coping skills may help explain the gender gap in crime. The social role theory of leadership suggests that males and females have distinctive values because of their gender roles, pertaining to different moral orientations and decisions (Eagly & Johannesen-Schmidt, 2001; Eagly & Johnson, 1990). Men are guided by 'agentic' attributes (controlling, confidence), making them achievement oriented, while women demonstrate 'communal' features (sensitive, sympathetic) that value

[5] The term 'gender gap' is used by criminologists to refer to differences in the frequency and seriousness of men's and women's crime participation (Becker & McCorkel, 2011).

interpersonal relationships. Likewise, women are more law-abiding and more frequently employ conditional fairness principles (Miller & Ubeda, 2012). Therefore, based on risk attitudes, ethics, group behaviour and leadership styles, the following hypothesis was proposed:

Hypothesis 1: Board gender diversity reduces the likelihood of corporate fraud.

Although gender diversity is argued to ensure effective governance through conflict resolution, the different perspectives raised by diversity may not necessarily result in more effective monitoring, particularly if female board members are disregarded (Carter et al., 2003). If greater gender diversity results in too much cognitive conflict, it may diminish board cohesiveness and make decision-making less effective. In cases where conflicts become prolonged disputes, corporate boards fail to derive the benefits of the additional skills and knowledge yielded by diversity (Forbes & Milliken, 1999). Thus, diversity is a double-edged sword: while it increases the resources at the firm's disposal, it also produces interaction and integration difficulties (Milliken & Martins, 1996). In fact, gender diversity may have a negative effect if the greater participation of directors leads to more interference and disagreement in the boardroom (Adams & Ferreira, 2009). Miller, Burke and Glick (1998) argued that the popular opinion in the diversity literature about the beneficial effect of diversity on organisational outcomes underestimates the associated problems that diversity may cause with respect to communication and integration. Such situation may eliminate the benefits of diversity related to thorough long-term planning and decision-making. Therefore, increasing the number of female directors may not yield incremental

benefits after a certain point, when the costs of diversity outweigh the benefits. Hence, the following hypothesis was proposed:

Hypothesis 2: The effect of gender diversity on the likelihood of corporate fraud follows a U-shaped pattern.

2.3 Data and methodology

2.3.1 Data and sample selection

We assembled hand-collected data on corporate frauds for publicly listed US firms that were subject to enforcement actions for financial misconduct by the SEC during the period 1999 to 2015. The SEC issues AAERs during and/or after investigation of a firm or its officers for alleged accounting or financial misconducts.[6] There were 2,540 AAERs issued during 1999 to 2015 and we manually examined each AAER to extract information.[7] Using AAERs as a source for collecting fraud cases is advantageous, as they provide broad range of information on a case. For research projects that require full narrative of financial misconducts, AAERs are better at capturing value-relevant financial fraud cases than are other data sources (Karpoff et al., 2017). Moreover, the significant investigation undertaken by the SEC before issuing an AAER ensures the reliability of the misconduct (low rate of Type I errors) (Dechow, Ge, Larson & Sloan, 2011). This research identified firms accused of financial fraud by the incidence of issuance of an AAER alleging violation of rules under the *SEC Act*

[6] AAERs have been widely used in the fraud literature as proxies for committing financial fraud (see Dechow et al., 1996; Johnson et al., 2009; Shi, Connelly & Hoskisson, 2017).
[7] The SEC website (http://www.sec.gov) contains all the enforcement releases, alongside other public filings associated with each AAER. Although AAERs were published from 1982, the period for this study began in 1999—the year from which AAERs are electronically available in the SEC website.

of 1934.[8] Figure 2.1 displays a timeline of the typical series of events surrounding an SEC enforcement action.

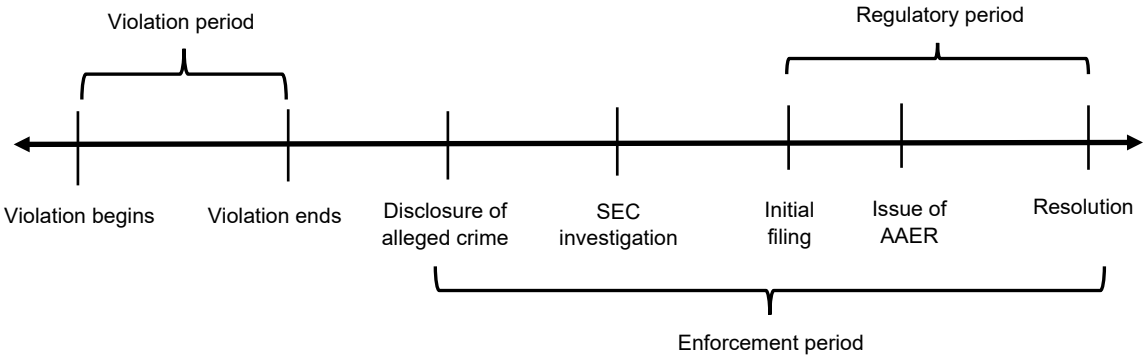

Figure 2.1: Timeline of an enforcement action

The data collection was undertaken as follows. At first, each AAER was read to create a comprehensive database containing detailed information for each fraud firm, such as the number of AAERs pertaining to each firm, date of AAER issuance, the type and description of the violation, the people allegedly involved in the fraud, the monetary amount involved, the settlement penalty, the criminal sentencing information and firm identifiers. In many cases, multiple AAERs may pertain to a single firm, since the SEC may take action against the firm itself, as well as its subsidiaries, executives, managers, suppliers and auditors. In such cases, we linked each AAER with the corresponding company. From this analysis, we identified an initial sample of 604 firms mentioned in the 2,434 AAERs.[9]

[8] The *SEC Act of 1934* includes separate sections for separate classes of financial misconducts, such as Section 10(b) relates to antifraud provision, Section 13(b) relates to accurate bookkeeping and Section 14(b) relates to corporate governance.
[9] We screened out 98 missing AAERs (omitted intentionally or not released by the SEC) and eight AAERs that were counted twice from the total number of 2,540 AAERs released during the period 1999 to 2015.

Table 2.1 presents the sample, with Panel A showing the distribution of fraud firms over calendar years and Panel B presenting the industry distribution. Given that AAERs often take several years to be released after the fraud occurs, our sample covered frauds in fiscal years 1983 to 2012. As observed from Panel A, fraud litigations peaked in around 2000 and showed a significant drop from 2003. This can be attributed to the introduction of the SOX of 2002, which imposed a number of corporate governance rules with respect to public disclosure, auditor independence and penalties for corporate crime. The concentration around 1999 to 2001 corresponded with the dot-com bubble and subsequent market collapse (Denis, Hanouna & Sarin, 2006), providing incentives to managers to adopt fraudulent means to boost declining profits (Dechow et al., 2011). Panel B in Table 2.1 reports evidence that there were significant industry patterns. In particular, technology firms were more involved in fraud litigation, with the computer programming and electronic equipment industries jointly representing 20.78 per cent of all litigations. The chemical and pharmaceuticals, retail trade, insurance and real estate industries also exhibited high fraud concentration.

In the initial sample, we found 12 companies were repeat offenders, which include renowned companies like Citigroup Inc., General Electric Company and International Business Machines Corporation (IBM). We also document that, as a result of the frauds, several companies had either their registration revoked by the SEC, got delisted or the company filed for bankruptcy within few years after the fraud.

Table 2.1: Sample distribution by year of fraud and industry

Panel A: Time distribution

Year of fraud	Sample	
	Number of firms	% of total
1983–1992	15	2.48
1993	12	1.99
1994	17	2.81
1995	20	3.31
1996	29	4.80
1997	40	6.62
1998	56	9.27
1999	67	11.09
2000	87	14.40
2001	60	9.93
2002	40	6.62
2003	27	4.47
2004	26	4.30
2005	17	2.81
2006	13	2.15
2007	21	3.48
2008	16	2.65
2009	19	3.15
2010	15	2.48
2011–2012	7	1.16
Total	**604**	**100**

Panel B: Industry distribution

SIC code	Industry description	Number of firms	% of total
12xx-14xx	Mining	20	3.38
15xx-17xx	Building construction	8	1.35
20xx-209x	Food products	12	2.03
22xx-23xx	Textile and apparel	10	1.69
26xx-27xx	Paper and printing	11	1.86
28xx-283x	Chemicals and pharmaceuticals	35	5.91
30xx-32xx	Rubber and leather	5	0.84
33xx-34xx	Steel and metal	14	2.36
351x-358x	Industrial machinery	13	2.20
357x	Computer and office machine	27	4.56
36xx-369x	Electronic equipment and appliances	50	8.45
37xx	Transportation equipment	8	1.35

38xx	Measuring and analysing instruments	35	5.91
42xx-48xx	Transportation and communication services	27	4.56
49xx	Utilities	17	2.87
50xx-51xx	Wholesale trade	25	4.22
52xx-59xx	Retail trade	41	6.93
602x-603x	Depository institutions	27	4.56
61xx-62xx	Non-depository institutions	12	2.03
63xx-67xx	Insurance and real estate	37	6.25
70xx-736x	Miscellaneous services	24	4.05
737x	Computer services and software	73	12.33
738x	Business services	21	3.55
78xx-79xx	Amusement and recreation	7	1.18
80xx-87xx	Health and other professional services	19	3.21
	Industries with fewer than four firms	14	2.36
	Total	**592***	**100**

* Of the total 604 firms, 12 firms were twice alleged to have been involved in fraud (592 = 604 − 12).

We next searched the Worldscope database for the financial data of fraud firms, and found the required financial data for 460 firms. The research design required the creation of a control group of firms that had not been subject to any enforcement action (non-fraud firms). Following Efendi et al. (2007), we matched each fraud firm with a control firm in the same four-digit Standard Industrial Classification (SIC) industry and with total assets within ±30 per cent of the fraud firm in the year-end prior to the year of the fraud.[10] This process resulted in a matched sample of 415 fraud firms and 415 control firms. Next, we used the BoardEx database to collect required governance data for the selected fraud and

[10] In cases where we were unable to identify a control firm from the corresponding four-digit SIC code, a firm with the same three- or two-digit SIC code was selected. We also individually checked each control firm to ensure that none of them was alleged by the SEC to have committed fraud during the relevant period.

control firms. Our final sample consisted of 195 fraud firms and 195 control firms.[11]

Following this, to enable a further understanding of the types of misconducts committed by the firms and managers, we divided the types of financial frauds into four groups: namely financial statement fraud, misrepresentation/disclosure fraud, bribery and other frauds. A detailed classification of the types of frauds is provided in Table 2.A1, Appendix A.

The sample description is presented in Table 2.2. Panel A presents a summary of the sample selection procedure, while Panels B and C provide the distribution of sample firms in terms of the types of frauds and parties accused. Panel B shows that financial statement fraud was the most common (approximately 45 per cent). Further, 27 per cent of firms committed fraud related to disclosure of material information, while another 14 per cent were involved in bribery. Panel C in Table 2.2 reports that, in approximately 36 per cent of cases, the SEC accused both the firm and top management (CEO, CFO, chairperson) of being involved in fraud. This is indicative of the fact the frauds were often planned schemes, executed in a joint effort by the managerial team. Only the firm itself only was accused in 31 per cent of cases, while, in a further 21 per cent of cases, only the top management was accused of fraud. In the remaining 11 per cent of cases, the charges were brought against either other executive officers, auditors or accountants, or they were classified as being against 'other parties'. Our analysis of the collected fraud cases also indicated that, on average, the

[11] There was a considerable drop in the number of observations when we merged the fraud sample with BoardEx data. This is because BoardEx does not cover firms traded over the counter, American Depository Receipts or de-listed firms.

firms were involved in the fraudulent activities for around 2.33 years, with the highest fraud duration being 10 years.

Table 2.2: Sample description

Panel A: Sample selection procedure	
Match by SIC code	**Number of matches**
Four-digit SIC code	235
Three-digit SIC code	78
Two-digit SIC code	102
Total	415
Sample firms	
Number of fraud firms identified from AAER	604
(Less: number of firms with no available financial data)	(144)
Number of fraud firms with available financial data	460
(Less: number of firms not identified with a control firm)	(45)
Number of fraud firms identified with a control firm	415
(Less: number of firms with no available governance data)	(220)
Final sample of fraud firms	195

Panel B: Sample classification by fraud type		
Type of fraud	Number of firms	Per cent of firms
Financial statement fraud	87	44.61
Misrepresentation and disclosure fraud	53	27.18
Bribery	28	14.36
Other frauds	27	13.85
Total	195	100

Panel C: Parties accused of fraud in the AAERs		
Parties	Number of firms	Per cent of firms
Company and CEO, CFO, chairperson	70	35.90
Company	61	31.28
CEO, CFO, chairperson	42	21.54
Other parties	22	11.28
Total	195	100

2.3.2 Definition of key variables

Corporate fraud (*FRAUD*) was measured by a dummy variable that took the value of 1 if the firm was subject to an AAER and 0 otherwise. Our primary variable of interest was the gender variable. Board gender diversity (*FEBM*) was defined as a dummy variable coded 1 in instances where there was at least one female board member, and 0 otherwise. The additional set of variables in the models comprised firm financial characteristics and governance features that could affect management incentives and opportunities to commit fraud, and were measured one year prior to the fraud year (Chen et al., 2006). Table 2.A2 in Appendix A provides detailed variable definitions.

The model included a number of control variables. The first set of control variables proxied for the corporate governance and monitoring environment of the firm and included board size, board independence, audit committee independence, audit committee size, CEO duality, directors' experience on the board and CEO tenure. Board size (*BSIZE*) can influence board efficacy in monitoring, and it is argued that larger boards are ineffective monitors (Jensen, 1993). This variable was measured as the natural logarithm of the number of directors on the board. Independent directors have reputational incentive to minimise the incidence of financial fraud (Beasley, 1996), since they may face substantial negative consequences on their services when a corporation is alleged to have committed fraud. Therefore, we included the proportion of independent board members (*BRD_IND*) as a variable. We further included the natural logarithm of the number of audit committee members (*ASIZE*) and the natural logarithm of the number of independent directors on the audit committee (*AC_IND*). Audit committees play the role of providing an additional layer of

monitoring by influencing internal control and oversight of the firm (Kuang & Lee, 2017). Audit committees are also likely to be the first to identify potential irregularities. Dechow et al. (1996) argued for the importance of separating the role of CEO and chairperson in establishing the board as an effective monitoring device, noting that the CEO cannot perform the monitoring function of the chairperson without there being agency conflicts. The variables *CEO_TENURE* and *CEO_DUAL* were included to control for the CEO's power to affect the ability of the board to monitor and mitigate corporate fraud. CEO_TENURE is the number of years the CEO has served on the board, while CEO_DUAL is a dummy variable taking the value 1 if the Chairperson and CEO positions are held by the same person, and 0 otherwise. Finally, we included the average tenure of the board members (*DIR_EXP*) as an indicator of board experience (Kuang & Lee, 2017).

The second set of control variables represented firms' economic characteristics, which may provide incentives for management to resort to aggressive accounting, manipulation and eventual fraud (Abbott et al., 2012). The variables were firm size, return on assets, sales growth and losses incurred by firms in previous years. The log of total assets is used as a control for firm size (*FSIZE*), since larger firms are often more prone to misconducts (Fich & Shivdasani, 2007). Rapid growth has an important linkage to fraud (Loebbecke, Eining & Willingham, 1989), since management's desire to maintain the firm's growth rate provides an incentive for earnings manipulation. We measured growth as the average percentage sales growth over the two years prior to the fraud (*GROWTH_S*). Poor financial performance often exerts pressure on managers to improve earnings and profitability, thereby increasing the likelihood

of financial fraud. Return on assets (*ROA*) and a dummy variable for loss (*LOSS*) in the previous two consecutive years were used as measures of financial performance. All continuous variables were winsorised at the top and bottom one per cent to mitigate outlier bias.

We further included some additional variables to augment the baseline model and estimate the impact of the additional variables on the probability of corporate fraud. The additional governance variables include the average age of the directors (AGE_DIR), number of directors on board holding multiple directorships in board of other firms (MULTI_DIR), and average tenure of chairperson (CH_TENURE). Also, the variable MULTI_FEM_DIR provides us with the insight of how many companies have more than one female director on the board in the full sample of firms. The additional measures of firm economic characteristics are Tobin Q (TQ), total asset growth rate (GROWTH_TA), and total debt to total asset (LEV). Further, few other firm characteristic variables total asset (TA), total sales/revenue (REV) and market capitalisation of the firm (MCAP) provide useful information about the financial outlook of the sample firms.

2.3.3 Descriptive statistics

Table 2.3 presents the means and standard deviations of the financial and governance variables on the full sample of fraud firms and control firms. In terms of size, average total assets were US$29,172 million, average market capitalisation was US$13,370 million and average annual sales revenue was US$5,298 million. Of the sample and control firms, 57.7 per cent had at least one woman director on the board, and 22 per cent had more than one woman director on the board. Female held top managerial posts in only a small number of firms.

It is not reported in Table 2.3, but among the 195 fraud firms, only nine firms had a female CEO/CFO and three firms had a female chairperson (untabulated). The mean board size was nine, and the mean percentage of independent board directors was 76 per cent. In 62 per cent of the firms, the CEO also served as chair of the board. The CEO and chairperson tenures were similar in the firms (six years), while each director had served on the board for an average of seven years. There were four directors on the average board with multiple directorships on other public companies and the average director age was 57 years. These statistics are similar to those reported for US firms in previous studies (Abbott et al., 2012; Agrawal & Chadha, 2005).

Table 2.3: Descriptive statistics

This table reports the full sample descriptive statistics of the variables for the sample of 390 firms over the period 1999 to 2015. *FRAUD* is an indicator variable set equal to 1 if the firm was subject to an AAER and 0 otherwise. *FEBM* is an indicator variable set equal to 1 if there was at least one female member on the board of directors, and 0 otherwise. *BSIZE* is the number of board members. *BRD_IND* is the proportion of independent members on the board. *ASIZE* is the number of the audit committee members. *AC_IND* is the number of independent members on the audit committee. *CEO_DUAL* is an indicator variable set equal to 1 if the chairperson and CEO positions were held by the same person, and 0 otherwise. *DIR_EXP* is the average number of years that board members had served on the board. *CEO_TENURE* is the number of years the CEO had served on the board. *CH_TENURE* is the number of years the chairperson had served on the board. *MULTI_DIR* is the number of directors with multiple directorships in other public companies. *AGE_DIR* is the average age of the directors. *MULTI_FEM_DIR* is an indicator variable set equal to 1 if a company had more than one female director on the board, and 0 otherwise. *REV* is the total sales or revenue in million USD. *MCAP* is the market capitalisation in million USD. *TA* represents the sum of the book value of total assets. *GROWTH_S* is the two-year average annual growth rate in sales. *GROWTH_TA* is the two-year average annual growth rate in total assets. *ROA* is the return on assets. *LEV* is total debt divided by total assets. *LOSS* is an indicator variable set equal to 1 if the firm recorded a loss in each of the two years prior to the fraud year, and 0 otherwise. *TQ* measures the market value of common equity, plus book value of total liability, divided by book value of total assets.

Variables	N	Mean	Std dev.
FEBM	390	0.577	0.495
FRAUD	390	0.50	0.50
Corporate governance variables			
BSIZE	390	8.989	3.488
BRD_IND	390	0.760	0.142
AC_IND	376	3.295	1.146
ASIZE	379	3.646	1.155
CEO_DUAL	390	0.625	0.484
DIR_EXP	386	7.352	5.427
CEO_TENURE	384	6.087	6.591
CH_TENURE	371	6.391	6.796
MULTI_DIR	389	4.239	3.544
AGE_DIR	388	57.198	5.581
MULTI_FEM_DIR	390	0.223	0.416
Firm economic characteristics			
REV ($million)	390	5,298.452	15,487.61
MCAP ($million)	377	13,370.51	43,576.99
TA ($million)	390	29,172.24	172,660
GROWTH_S (%)	383	0.227	0.452
GROWTH_TA (%)	382	0.264	0.522
ROA (%)	390	-0.024	0.281
LEV	390	0.223	0.211

LOSS	382	0.023	0.151
TQ	390	2.489	5.199

Table 2.4 presents univariate comparisons between the fraud and non-fraud firms. Non-fraud firms were significantly more likely to have at least one female director than the fraud firms. We see that, 48 per cent of fraud firms had at least one female director, whereas 67 per cent of non-fraud firms had at least one female director. Moreover, the variable MULTI_FEM_DIR shows that, fewer of the fraud firms had multiple women directors on the board compared with non-fraud firms. In comparison with the control group, the firms where fraud was committed had larger market capitalisation, and had higher leverage ratios, although these means were not significantly different. Firms that committed fraud experienced significantly higher sales growth. These characteristics were similar to those reported in studies of corporate fraud of US corporations by Khanna, Kim and Lu (2015) and Kuang and Lee (2017). We also found that fraudulent firms had smaller audit committees, fewer independent directors on the audit committee, and less experienced and younger directors. However, the fraud and non-fraud firms did not differ significantly with regard to other governance variables. Finally, there was no significant difference between the fraud and non-fraud firms in terms of total assets, market capitalisation and sales revenue, thereby indicating that the size-matching procedure was effective.

Table 2.4: Comparison of fraud and non-fraud firms

This table compares the descriptive statistics between the fraud and non-fraud samples. *FEBM* is an indicator variable set equal to 1 if there was at least one female member on the board of directors, and 0 otherwise. *FRAUD* is an indicator variable set equal to 1 if the firm was subject to an AAER, and 0 otherwise. *BSIZE* is the natural logarithm of the number of board members. *BRD_IND* is the proportion of independent members on the board. *ASIZE* is the natural logarithm of the number of audit committee members. *AC_IND* is the natural logarithm of the independent members on the audit committee. *CEO_DUAL* is an indicator variable set equal to 1 if the chairperson and CEO positions were held by the same person, and 0 otherwise. *DIR_EXP* is the average number of years that board members had served on the board. *CEO_TENURE* is the number of years the CEO had served on the board. *CH_TENURE* is the number of years the chairperson had served on the board. *MULTI_DIR* is the number of directors with multiple directorships in other public companies. *AGE_DIR* is the average age of the directors. *MULTI_FEM_DIR* is an indicator variable set equal to 1 if a company had more than one female director on the board, and 0 otherwise. *REV* is the total sales or revenue in million USD. *MCAP* is the market capitalisation in million USD. *TA* represents the sum of the book value of total assets. *GROWTH_S* is the two-year average annual growth rate in sales. *GROWTH_TA* is the two-year average annual growth rate in total assets. *ROA* is the return on assets. *LEV* is total debt divided by total assets. *LOSS* is an indicator variable set equal to 1 if the firm recorded a loss in each of the two years prior to the fraud year, and 0 otherwise. *TQ* is the market value of common equity, plus book value of total liability, divided by book value of total assets. ***, **, and * represent significance at the 0.01, 0.05 and 0.10 levels (two-tailed), respectively.

	Fraud = 1 (*n* = 195)		**Fraud = 0 (*n* = 195)**		**Test for Differences in Means**
	Mean	**SD**	**Mean**	**SD**	***t***
FEBM	0.482	0.501	0.671	0.471	3.854***
Corporate governance variables					
BSIZE	8.815	3.462	9.164	3.514	0.987
BRD_IND	0.756	0.144	0.764	0.138	0.549
ASIZE	3.529	1.118	3.763	1.182	1.979**
AC_IND	3.193	1.068	3.394	1.211	1.707*
CEO_DUAL	0.615	0.487	0.635	0.482	0.418
DIR_EXP	6.459	4.506	8.235	6.089	3.253***
CEO_TENURE	5.580	6.140	6.588	6.988	1.501
CH_TENURE	6.101	6.551	6.671	7.030	0.808
MULTI_DIR	4.191	3.621	4.287	3.474	0.268
AGE_DIR	56.398	5.841	57.991	5.206	2.835***
MULTI_FEM_DIR	0.189	0.393	0.256	0.437	1.582
Firm economic characteristics					
TA ($million)	40,156.8	222,330	18,187.67	100,514.9	-1.257
MCAP ($million)	16,560.03	51,669.19	10,231.34	33,623.09	-1.411
REV ($million)	6,531.14	18,904.1	4,065.75	10,979.47	-1.574
GROWTH_S (%)	0.293	0.493	0.162	0.397	-2.86***
ROA (%)	-0.024	0.275	-0.022	0.286	0.079

LEV	0.237	0.209	0.208	0.212	-1.352
LOSS	0.015	0.124	0.031	0.174	0.994
TQ	2.325	3.158	2.653	6.647	0.623

2.4 Female board presence and likelihood of corporate fraud

To investigate the possible link between female board presence and the probability of fraud, we employed a probit regression model because of the dichotomous nature of the dependent variable *FRAUD*, consistent with prior research on corporate fraud (Chen et al., 2006; Efendi et al., 2007). The probability of committing corporate fraud (P_i) was modelled as follows:

$$P_i(\text{FRAUD} = 1) = \alpha_0 + \alpha_1 FEBM_i + \beta X_{it} + \varepsilon_i \quad (1)$$

Here, *FEBM* represented board gender diversity and X was a set of control variables that affected the incentive for firm i to commit fraud. α_1 measured the effect of female board presence on the probability of committing fraud. As explained in our hypothesis, we expected a negative relationship between board gender diversity and fraud ($\alpha_1 < 0$). The control variables included board size (*BSIZE*), audit committee size (*ASIZE*), proportion of independent board members (*BRD_IND*), independent audit committee members (*AC_IND*), CEO duality (*CEO_DUAL*), average service years of the board members (*DIR_EXP*), average years of service of the CEO (*CEO_TENURE*), firm size (*FSIZE*), return on assets (*ROA*), sales growth rate (*GROWTH_S*) and a dummy variable representing two consecutive years of losses preceding the year of the fraud (*LOSS*). Detailed information on the measurement of these variables is presented in Table 2.A1 in Appendix A. Eq. (1) was estimated using the matched-pair sample of fraud and non-fraud firms.

2.4.1 Baseline results

Table 2.5 reports the maximum likelihood estimation results for the probit model. The table reports the marginal effects, alongside the coefficients and associated *p*-values. The marginal effect of a dummy variable was the change in the probability of belonging to the fraud group, given a change in the dummy variable from 0 to 1. For the continuous variables, we reported the change in the probability of belonging to the fraud group, given a one standard deviation change in the respective variable. The results show that there is a significant and negative association between female board presence (*FEBM*) and corporate fraud, indicating that the presence of at least one female board member reduces the likelihood of committing fraud. The coefficient on *FEBM* is -0.5978 with a *p*-value of less than 0.01. This implies that, the presence of at least one woman on the board is associated with a likelihood of corporate fraud that is 55 per cent of the likelihood without the gender diversity, and that this likelihood is statistically different at the 0.01 level. The corresponding marginal effect is -0.203 (*p*-value < 0.01), implying that the likelihood of fraud in firms with at least one female board member is 20.3 per cent lower than that in firms with no female board member. These results provide support for Hypothesis 1 that the presence of a female director on the board may enhance the team decision-making processes by thwarting over-aggressiveness and preventing the adoption of illegal practices in which an otherwise all-male board may engage in. As seen in Table 2.2 that, in most of the cases fraud was a result of collective unethical decision by top management team, so female presence may effectively preclude the corporate board in endorsing unethical means for monetary gains. The result signals that being a member of a minority group does not preclude one from influencing group

decision-making, and that the addition of even a single female director to an all-male board may prove to be useful.

Turning to the governance variables, we find that the coefficient of audit committee size (*ASIZE*) is significantly negative, indicating that firms with a larger audit committee have a lower tendency to engage in fraud. Director experience on the board (*DIR_EXP*) is also negatively related to fraud likelihood (*p*-value < 0.01), implying that presence of experienced directors on the board reduces the probability of fraud. Other governance variables are not statistically significant.

With regard to firm characteristics, we find that the coefficient of firm size (*FSIZE*) is positive and statistically significant (*p*-value < 0.01), conforming to our expectation that larger firms are more likely to be associated with misconduct. The corresponding marginal effect is 0.095, suggesting that a one standard deviation change in firm size increased the probability of committing fraud by 9.5 per cent. This finding is qualitatively similar to evidence provided by Khanna et al. (2015). The coefficients of the other control variables are not significant.

Table 2.5: Effect of female board representation on likelihood of corporate fraud

This table reports the probit regression results. The dependent variable *FRAUD* is an indicator variable set equal to 1 if the firm was subject to an AAER (an indication of fraud) and 0 otherwise. For the explanatory variables, the estimated coefficients, marginal effects and corresponding *p*-values are presented. *FEBM* is an indicator variable set equal to 1 if there was at least one female member on the board of directors, and 0 otherwise. *BSIZE* is the natural logarithm of the number of board members. *BRD_IND* is the proportion of independent members on the board. *ASIZE* is the natural logarithm of the number of audit committee members. *AC_IND* is the natural logarithm of the number of independent members on the audit committee. *CEO_DUAL* is an indicator variable set equal to 1 if the chairperson and CEO positions were held by the same person, and 0 otherwise. *DIR_EXP* is the average number of years that board members had served on the board. *CEO_TENURE* is the number of years the CEO had served on the board. *FSIZE* is the log of the book value of total assets. *ROA* is the return on assets, measured as net income divided by total assets. *GROWTH_S* is the two-year average annual growth rate in sales. *LOSS* is an indicator variable set equal to 1 if the firm recorded a loss in each of the two years prior to the fraud year, and 0 otherwise. The marginal effect of a dummy variable is the change in the probit probability given a change from 0 to 1, and, for the continuous variables, refers to the change in the probit probability given a one standard deviation change. P-values are based on two-tailed T-tests.

Variables	**Coefficient**	***p*-value**	**Marginal effect**	***p*-value**
FEBM	-0.598	0.000	-0.203	0.000
Governance variables				
BSIZE	0.159	0.608	0.020	0.603
BRD_IND	0.229	0.732	0.018	0.521
ASIZE	-0.769	0.051	-0.078	0.043
AC_IND	0.190	0.582	0.019	0.584
CEO_DUAL	-0.061	0.695	-0.028	0.611
DIR_EXP	-0.307	0.005	-0.105	0.004
CEO_TENURE	0.115	0.248	0.037	0.293
Firm characteristics				
FSIZE	0.126	0.006	0.095	0.007
ROA	-0.081	0.815	-0.007	0.808
GROWTH_S	0.265	0.161	0.038	0.199
LOSS	-0.805	0.138	-0.269	0.161
Intercept	-0.292	0.810		
Pseudo R^2		0.088		
p-value		0.038		
Log likelihood	-227.55			
N	360			
Year dummy included	Yes			

2.4.2 Results for pre- and post-Sarbanes–Oxley periods

Our sample period of 1999 to 2015 spanned the passage of the Sarbanes Oxley Act (SOX) that was enacted in 2002, which was aimed at improving the quality and credibility of corporate governance, audit functions and financial reporting. The SOX Act took steps to restructure corporate boards to improve the monitoring and quality of the financial reporting process. In 2003, stock exchanges in the US (the NYSE, NASDAQ and AMEX) adopted an additional sets of corporate governance rules. These legislative and regulatory rules intended to increase independence in corporate board structures and improving audit quality in the financial reporting process. Thus, the passage of SOX was an exogenous shock to corporate governance structures, and could influence the effect of gender diversity on the likelihood of corporate fraud. To test for SOX effects, we estimated the probit model separately for the pre-SOX period (1999 to 2002) and post-SOX period (2003 to 2011). The results are shown in Table 2.6[12].

We find that, in both the pre- and post-SOX periods, female board presence (*FEBM*) has a statistically significant negative effect on the propensity for fraud, with the effect being more significant in the post-SOX years. The estimated marginal effect of gender diversity indicates that female board members are able to exert greater influence on curbing financial fraud in the post-SOX period. Specifically, in the pre-SOX period, inclusion of at least one female

[12] We have split the sample firms to analyse the impact of female board presence on the likelihood of fraud in pre- and post-SOX periods, across female-dominated and male-dominated industries and across low fraud-intensive and high fraud-intensive industries. Another approach could be to run a full-sample analysis, by introducing an interaction term of the female representation variable (FEBM) and dummies for SOX and type of industries. However, Hoetkar (2007) suggested to estimate separate models for each group and compare the coefficients across the models, instead of using interaction terms. The reason being that, if the unobserved variations are different across groups, the estimated coefficients will not indicate the correct underlying impact of the observed variable on the groups. Hence, we have adopted the split-sample analysis method.

board member results in a 17.3 per cent decrease in fraud probability, whereas the same influence results in a 30.4 per cent decrease in the post-SOX period. The greater negative effect of a female board presence in the post-SOX period conforms with the argument of Lai, Srinidhi, Gul and Tsui (2017), who argue that the passage of SOX prompted corporate boards to exercise more caution in audit efforts and that board gender diversity contributed to increased audit efforts post-SOX. This argument is further strengthened by the finding that, both audit committee size (*ASIZE*) and directors' experience on the board (*DIR_EXP*) exerted a significant negative influence on fraud probability in the post-SOX period (significant at the 0.05 and 0.01 levels, respectively), but these variables did not have a significant effect in the pre-SOX period. In the case of financial features of firms, firm size (*FSIZE*) and a history of negative net income (*LOSS*) were significantly associated with fraud probability in the post-SOX years.

Table 2.6: Effect of female board representation on likelihood of corporate fraud: pre- and post-SOX periods

This table reports the probit regression results for the pre- and post-SOX periods. The dependent variable (*FRAUD*) is an indicator variable set equal to 1 if the firm was subject to an AAER (an indication of fraud) and 0 otherwise. For the explanatory variables, the estimated coefficients, marginal effects and corresponding *p*-values are presented. *FEBM* is an indicator variable set equal to 1 if there was at least one female member on the board of directors, and 0 otherwise. *BSIZE* is the natural logarithm of the number of board members. *BRD_IND* is the proportion of the independent members on the board. *ASIZE* is the natural logarithm of the number of audit committee members *AC_IND* is the natural logarithm of the number of independent members on the audit committee. *CEO_DUAL* is an indicator variable set equal to 1 if the chairperson and CEO positions were held by the same person, and 0 otherwise. *DIR_EXP* is the average number of years that board members had served on the board. *CEO_TENURE* is the number of years the CEO had served on the board. *FSIZE* is the log of the book value of total assets. *ROA* is the return on assets, measured as net income divided by total assets. *GROWTH_S* is the two-year average annual growth rate in sales. *LOSS* is an indicator variable set equal to 1 if the firm recorded a loss in each of the two years prior to the fraud year, and 0 otherwise. P-values are based on two-tailed T-tests.

	Pre-SOX period (1999–2002)				**Post-SOX period (2003–2011)**			
Variables	**Coefficient**	***p*-value**	**Marginal effect**	***p*-value**	**Coefficient**	***p*-value**	**Marginal effect**	***p*-value**
FEBM	-0.462	0.034	-0.173	0.030	-0.922	0.000	-0.304	0.000
Governance variables								
BSIZE	0.324	0.369	0.045	0.364	-0.359	0.563	-0.036	0.560
BRD_IND	0.612	0.421	0.030	0.418	-0.942	0.412	-0.034	0.407
ASIZE	-0.440	0.356	-0.050	0.350	-1.921	0.042	-0.157	0.024
AC_IND	0.008	0.984	0.001	0.984	1.354	0.172	0.113	0.157
CEO_DUAL	-0.081	0.697	-0.03	0.696	-0.194	0.418	-0.063	0.413
DIR_EXP	-0.178	0.217	-0.066	0.212	-0.429	0.016	-0.139	0.010
CEO_TENURE	0.219	0.071	0.081	0.064	-0.146	0.389	-0.047	0.386
Firm characteristics								
FSIZE	0.098	0.092	0.079	0.082	0.197	0.004	0.162	0.001
ROA	-0.402	0.532	-0.024	0.530	0.110	0.791	0.010	0.791
GROWTH_S	0.374	0.119	0.065	0.111	0.011	0.973	0.002	0.973
LOSS	-0.241	0.752	-0.088	0.748	-1.220	0.102	-0.338	0.022
Intercept	-1.151	0.182			2.272	0.084		
Pseudo R^2	0.066				0.175			
p-value		0.092				0.000		
Log likelihood	-133.34				-88.06			
N	206				154			

2.4.3 Board gender diversity and fraud variation across industries

Gender diversity on boards may influence the likelihood of fraud to a varying degree across industries. Occupational sex segregation theories (Anker, 1997) argue that the differences in productivity, skills and experiences of men and women, alongside societal perceptions of gendered roles, contribute to the segmentation of the labour market. Specifically, the sex ratios across occupations relate to the perception of the gender-stereotypical role that men and women commonly play in their lives (Cejka & Eagly, 1999). There are certain industries that are generally regarded as male-dominated and female-dominated industries, depending on the gender of the majority employees of the industries. Industries such as retail clothing, nursing, publishing, healthcare and education are categorised as female-dominated, while industries such as construction, mining and automobiles are recognised as male-dominated industries (US Bureau of Labor Statistics, 2018). It is argued that masculine attributes are important for success in male-dominated industries (Cejka & Eagly, 1999); thus, managers may undertake more aggressive risk-taking behaviour (leading to fraudulent activities) because of managerial greed and ambition, which are more pronounced in male managers. Therefore, a gender-diverse board might be more effective in a male-dominated industry in curbing the propensity to fraud, if the diversity can create more effective monitoring of the aggressive risk-taking behaviours typically found in male-dominated industries. To test this assertion, we estimated the probit model of fraud separately for male- and female-dominated industries. Following Cumming et al. (2015), we categorised an industry as female dominated if at least 50 per cent of employees were female. We obtained data on the percentages of male and female employees in each

two-digit SIC industry category from the US Bureau of Labor Statistics (Current Population Survey, 2018). Of 390 sample firms, 83 firms were categorised to be in female-dominated industries. Table 2.7 presents the results from the probit regressions testing the effect of board gender diversity across male- and female-dominated industries.

The results indicate that a female board presence has a statistically significant impact on the probability of fraud in male-dominated industries. The presence of at least one female member on the corporate board results in a 22 per cent reduction in fraud probability in male-dominated industries, (*p*-value < 0.01). In female-dominated industries, the reduction in fraud probability resulting from female board presence is 22.2 per cent, but this reduction is only significant at the 0.10 level. Earlier research has postulated that, stemming from social norms regarding gender stereotypes, women in male-dominated industries experience higher workplace stress and more negative evaluation of their work than do their male counterparts (Heilman, Wallen, Fuchs & Tamkins, 2004). Therefore, female managers need to perform better to retain leadership roles (Eagly & Johannesen-Schmidt, 2001). This situation drives female managers to invest substantial effort in ensuring legitimate and efficient business decision-making, especially when the industry is male dominated. In case of governance variables, the impact of the size of the audit committee (ASIZE) is significantly negative in male-dominated industries (the marginal effect is -0.306, significant at the 0.05 level), but is insignificant in female-dominated industries. However, longer director experience on the board (*DIR_EXP*) is more efficient to have a significant negative effect on fraud propensity in female-dominated industries (marginal effect -0.168, p-value<0.05), compared with that of in male-dominated

industries (marginal effect -0.082, significant at the 0.10 level). In case of firm characteristics, firm size had a significant positive impact on fraud propensity in case of male-dominated industries only.

Table 2.7: Effect of board gender diversity on corporate fraud across male- and female-dominated industries

This table reports the results of the probit model that examines the effect of board gender diversity on corporate fraud on the sub-samples of firms in male- and female-dominated industries. The dependent variable *FRAUD* is an indicator variable set equal to 1 if the firm was subject to an AAER (an indication of fraud) and 0 otherwise. *FEBM* is an indicator variable set equal to 1 if there was at least one female member on the board of directors, and 0 otherwise. Male- and female-dominated industries were identified based on the percentage of men and women employed, whereby an industry holding more than 50 per cent of male employees was categorised as a male-dominated industry. For the explanatory variables, the estimated coefficients, marginal effects and corresponding *p*-values are presented. *BSIZE* is the natural logarithm of the number of board members. *BRD_IND* is the proportion of independent members on the board. *ASIZE* is the natural logarithm of the number of audit committee members. *AC_IND* is the natural logarithm of the number of independent members on the audit committee. *CEO_DUAL* is an indicator variable set equal to 1 if the chairperson and CEO positions were held by the same person, and 0 otherwise. *DIR_EXP* is the average number of years that board members had served on the board. *CEO_TENURE* is the number of years the CEO had served on the board. *FSIZE* is the log of the book value of total assets. *ROA* is the return on assets, measured as net income divided by total assets. *GROWTH_S* is the two-year average annual growth rate in sales. P-values are based on two-tailed T-tests.

	Male-dominated industry				**Female-dominated industry**			
Variables	**Coefficient**	***p*-value**	**Marginal effect**	***p*-value**	**Coefficient**	***p*-value**	**Marginal effect**	***p*-value**
FEBM	-0.594	0.001	-0.220	0.001	-0.646	0.120	-0.222	0.092
Governance variables								
BSIZE	0.178	0.608	0.064	0.607	0.025	0.972	0.008	0.972
BRD_IND	0.289	0.675	0.104	0.675	0.415	0.783	0.145	0.782
ASIZE	-0.846	0.045	-0.306	0.040	0.602	0.629	0.211	0.627
AC_IND	0.251	0.474	0.091	0.473	-1.238	0.333	-0.434	0.324
CEO_DUAL	-0.058	0.735	-0.021	0.735	-0.023	0.946	-0.008	0.946
DIR_EXP	-0.227	0.059	-0.082	0.054	-0.481	0.053	-0.168	0.038
CEO_TENURE	0.107	0.332	0.038	0.330	0.080	0.733	0.028	0.732
Firm characteristics								
FSIZE	0.135	0.007	0.048	0.005	0.024	0.782	0.008	0.781
ROA	-0.204	0.563	-0.074	0.563	-1.613	0.421	-0.565	0.417
GROWTH_S	0.285	0.146	0.103	0.142	-0.324	0.534	-0.113	0.532

Intercept	-0.336	0.664	1.984	0.283
Pseudo R^2	0.083		0.106	
p-value	0.001		0.403	
Log likelihood	-177.13		-48.50	
N	279		79	

Next, with regard to industry variation, there is significant concentrations of fraud in some industries compared with others, as evident from Table 2.1. Some industries were found to be more fraud-prone (software, electronics and computer equipment) than others (food and textiles). Industries with a high concentration of fraud may encourage employees to adopt an aggressive approach to achieve the desired target (Zahra et al., 2005). Empirical research has indicated that firms in high fraud-intensive industries have weaker corporate governance (fewer audit committees and less independent boards) than do firms in low fraud-intensive industries (Beasley, Carcello, Hermanson & Lapides, 2000). Factors such as high levels of competition, industry concentration, declining demand and the low supply of resources may induce aggressive behaviour by managers to meet earnings targets (Zahra, Priem & Rasheed, 2007). Therefore, it is important to consider the industry context when evaluating the risk of financial fraud. We therefore examined the effect of board gender diversity on fraud likelihood across fraud-intensive and non-fraud-intensive industries. Following Srinidhi, Gul and Tsui (2011), we identified high fraud-intensive industries and segregated the sample firms accordingly.[13] The probit model results are presented in Table 2.8.

[13] Srinidhi et al. (2011) classified chemicals, industrial machinery, computer equipment, technology and retail industries as being high fraud-intensive industries.

Table 2.8: Effect of board gender diversity on corporate fraud across high and low fraud-intensive industries

This table reports the results of the probit model that examines the effect of board gender diversity on corporate fraud on the sub-samples of firms in high and low fraud-intensive industries. The dependent variable *FRAUD* is an indicator variable set equal to 1 if the firm was subject to an AAER (an indication of fraud) and 0 otherwise. High fraud-intensive industries were industries with SIC codes of 2833–2836, 3570–3577, 3600–3674, 5200–5961 and 7370–7370. *FEBM* is an indicator variable set equal to 1 if there was at least one female member on the board of directors, and 0 otherwise. For the explanatory variables, the estimated coefficients, marginal effects and corresponding *p*-values are presented. *BSIZE* is the natural logarithm of the number of board members. *BRD_IND* is the proportion of independent members on the board. *ASIZE* is the natural logarithm of the number of audit committee members, *AC_IND* is the natural logarithm of the number of independent members on the audit committee. *CEO_DUAL* is an indicator variable set equal to 1 if the chairperson and CEO positions were held by the same person, and 0 otherwise. *DIR_EXP* is the average number of years that board members had served on the board. *CEO_TENURE* is the number of years the CEO had served on the board. *FSIZE* is the log of the book value of total assets. *ROA* is the return on assets, measured as net income divided by total assets. *GROWTH_S* is the two-year average annual growth rate in sales. P-values are based on two-tailed T-tests.

	High fraud-intensive industry				**Low fraud-intensive industry**			
Variables	**Coefficient**	***p*-value**	**Marginal effect**	***p*-value**	**Coefficient**	***p*-value**	**Marginal effect**	***p*-value**
FEBM	-0.512	0.180	-0.183	0.160	-0.645	0.000	-0.234	0.000
Governance variables								
BSIZE	0.955	0.195	0.346	0.182	-0.016	0.963	-0.006	0.963
BRD_IND	0.180	0.892	0.065	0.892	0.603	0.398	0.213	0.396
ASIZE	-0.803	0.401	-0.291	0.395	-0.697	0.111	-0.247	0.107
AC_IND	0.775	0.445	0.281	0.441	0.162	0.649	0.057	0.649
CEO_DUAL	0.394	0.223	0.143	0.213	-0.245	0.172	-0.086	0.166
DIR_EXP	-0.170	0.492	-0.061	0.489	-0.376	0.002	-0.133	0.001
CEO_TENURE	-0.213	0.297	-0.077	0.287	0.209	0.063	0.074	0.058
Firm characteristics								
FSIZE	0.005	0.956	0.002	0.956	0.148	0.002	0.052	0.001
ROA	-0.537	0.355	-0.195	0.348	0.325	0.525	0.115	0.524
GROWTH_S	0.243	0.573	0.088	0.571	0.328	0.144	0.116	0.139
LOSS	-0.403	0.607	-0.144	0.594	-0.883	0.283	-0.281	0.182
Intercept	-1.625	0.367			-0.071	0.925		
Pseudo R^2	0.089				0.104			
p-value		0.570				0.000		
Log likelihood	-53.60				-170.69			
N	85				275			

We find that firms in low fraud-intensive industries with a gender-diverse board are 23.4 per cent less likely to commit fraud (p-value < 0.01). The coefficient of *FEBM* in high fraud-intensive industries is negative, but statistically insignificant, which could be a result of the small sample size. Furthermore, among the firms in high fraud-intensive industries, around 50% of the firms (42 firms) had an all-male board, and only 15 firms had more than one woman on the board. Therefore, the impact of female presence is not same as in the case of low fraud-intensive industries (where 43% of firms have an all-male board). With regard to the control variables, directors' experience on the board (*DIR_EXP*) and the tenure of the CEO (*CEO_TENURE*) significantly reduce the likelihood of fraud in low fraud-intensive industries, at the 0.01 level and 0.10 level respectively. Also, larger firms were more likely to be involved in fraud in low-fraud intensive industries, significant at the 0.01 level. However, none of the control variables influences the fraud probability in high fraud-intensive industries, which may indicate weak corporate governance in fraud-intensive industries, as reported earlier by Beasley et al. (2000).

2.5 Nonlinear effect of board gender diversity on corporate fraud

Further to our finding that board gender diversity appears to reduce the likelihood of corporate misconducts, we examine the extent to which diversity could extract these benefits. We discussed earlier that greater gender diversity might influence governance to reduce unethical actions by inducing effective group discussion. However, it may be possible to observe a decline in this group efficiency after an optimal point of diversity, when adding more women to the board reverses the benefits, and group conflicts lead to inefficient decision-

making. To examine if there is an optimal point of gender diversity on the board, we investigated the linearity of the relationship between board gender diversity and corporate fraud.

To capture the nonlinear effect, we modified the probit regression model in two ways. First, *FEBM* in Eq. (1) was replaced with dummy variables representing the extent of female representation on boards. These were *FEBM_D1*, *FEBM_D2* and *FEBM_D3*, denoting dummy variables coded 1 if there was at least 10, 20 or 30 per cent of women directors on the board, respectively, and 0 otherwise. The reference category was a board with more than 30 per cent of female directors. There were a total of 198 firms, 80 firms and 20 firms with at least 10, 20 and 30 per cent of women directors, respectively. Second, we replaced *FEBM* in Eq. (1) with the proportion of female board members, *FEBM_Prop*, and its square, $(FEBM\_Prop)^2$.

Table 2.9 displays the results from the models using the dummy variables for the degree of female representation on boards. Model 1 shows that a female board presence of at least 10 per cent had a significant negative effect (*p*-value < 0.01) on the propensity to commit fraud. The control variables *ASIZE*, *DIR_EXP* and *FSIZE* were significant in the same way as our baseline results in Table 2.5. However, in Models 2 and 3, the female board presence at 20 and 30 per cent was found to have no statistically significant effect on the propensity to commit fraud.

Table 2.9: Effect of degree of gender diversity on likelihood of corporate fraud

This table reports the results of three separate probit models examining the effect of the degree of gender diversity on corporate fraud. The dependent variable *FRAUD* is an indicator variable set equal to 1 if the firm was subject to an AAER (an indication of fraud) and 0 otherwise. For the explanatory variables, the estimated coefficients, marginal effects and corresponding *p*-values are presented. *FEBM_D1* is an indicator variable set equal to 1 if there was at least 10 per cent of women directors on the board, and 0 otherwise. *FEBM_D2* is an indicator variable set equal to 1 if there was at least 20 per cent of women directors on the board, and 0 otherwise. *FEBM_D3* is an indicator variable set equal to 1 if there was at least 30 per cent of women directors on the board, and 0 otherwise. *BSIZE* is the natural logarithm of the number of board members. *BRD_IND* is the proportion of independent members on the board. *ASIZE* is the natural logarithm of the number of audit committee members. *AC_IND* is the natural logarithm of the number of independent members on the audit committee. *CEO_DUAL* is an indicator variable set equal to 1 if the chairperson and CEO positions were held by the same person, and 0 otherwise. *DIR_EXP* is the average number of years that board members had served on the board. *CEO_TENURE* is the number of years the CEO had served on the board. *FSIZE* is the log of the book value of total assets. *ROA* is the return on assets, measured as net income divided by total assets. *GROWTH_S* is the two-year average annual growth rate in sales. *LOSS* is an indicator variable set equal to 1 if the firm recorded a loss in each of the two years prior to the fraud year, and 0 otherwise. P-values are based on two-tailed T-tests.

Variables	**Model 1**		**Model 2**		**Model 3**	
	Coefficient	***p*-value**	**Coefficient**	***p*-value**	**Coefficient**	***p*-value**
FEBM_D1	-0.377	0.013	–	–	–	–
FEBM_D2	–	–	0.213	0.212	–	–
FEBM_D3	–	–	–	–	0.514	0.100
Governance variables						
BSIZE	0.019	0.948	0.038	0.899	0.059	0.845
BRD_IND	0.253	0.703	0.463	0.447	0.495	0.418
ASIZE	-0.839	0.032	-0.838	0.026	-0.811	0.031
AC_IND	0.153	0.655	0.102	0.753	0.079	0.808
CEO_DUAL	-0.067	0.663	-0.097	0.518	-0.101	0.505
DIR_EXP	-0.321	0.003	-0.302	0.004	-0.309	0.003
CEO_TENURE	0.135	0.170	0.107	0.257	0.104	0.272
Firm characteristics						
FSIZE	0.118	0.009	0.078	0.063	0.077	0.065
ROA	-0.076	0.826	-0.087	0.799	-0.080	0.815
GROWTH_S	0.286	0.131	0.338	0.063	0.327	0.070
LOSS	-0.800	0.134	-0.689	0.188	-0.688	0.187
Intercept	0.052	0.965	0.156	0.818	0.127	0.852
Pseudo R^2	0.074		0.060		0.062	
p-value		0.145		0.007		0.005

Log likelihood	-230.96	-234.44	-233.83
N	360	360	360

Table 2.10 presents the results from testing the nonlinear effect of board gender diversity, whereby we added both *FEBM_Prop* and (*FEBM_Prop*)^2 to the model. The coefficient of *FEBM_Prop* is negative and the coefficient of (*FEBM_Prop*)^2 is positive, which indicates that the relation between the proportion of female board members and the probability of fraud is nonlinear. Both coefficients are statistically significant at the 0.01 level. An increase in the proportion of female board members initially reduced the likelihood of fraud; however, beyond a threshold level of gender diversity, the likelihood of fraud increased with an increase in the proportion of female board members. The estimated threshold level of female representation on boards was 15.37 per cent.[14]

[14] Calculated as $\beta 1/(2 \times \beta 2)$, where $\beta 1$ is the coefficient on *FEBM_Prop* and $\beta 2$ is the coefficient on (*FEBM_Prop*)^2.

Table 2.10: Nonlinear effect of gender diversity on likelihood of corporate fraud

This table reports the results of the probit model that examines the nonlinear effect of gender diversity on the likelihood of corporate fraud. The dependent variable *FRAUD* is an indicator variable set equal to 1 if the firm was subject to an AAER (an indication of fraud) and 0 otherwise. For the explanatory variables, the estimated coefficients, marginal effects and corresponding *p*-values are presented. *FEBM_Prop* is the proportion of female directors on the board and $(FEBM\_Prop)^2$ is its square term. *BSIZE* is the natural logarithm of the number of board members. *BRD_IND* is the proportion of independent members on the board. *ASIZE* is the natural logarithm of the number of audit committee members. *AC_IND* is the natural logarithm of the number of independent members on the audit committee. *CEO_DUAL* is an indicator variable set equal to 1 if the chairperson and CEO positions were held by the same person, and 0 otherwise. *DIR_EXP* is the average number of years that board members had served on the board. *CEO_TENURE* is the number of years the CEO had served on the board. *FSIZE* is the log of the book value of total assets. *ROA* is the return on assets, measured as net income divided by total assets. *GROWTH_S* is the two-year average annual growth rate in sales. *LOSS* is an indicator variable set equal to 1 if the firm recorded a loss in each of the two years prior to the fraud year, and 0 otherwise. P-values are based on two-tailed T-tests.

Variables	Coefficient	*p*-value
FEBM_Prop	-9.034	0.000
$(FEBM\_Prop)^2$	29.391	0.000
Governance variables		
BSIZE	0.283	0.373
BRD_IND	0.664	0.339
ASIZE	-0.772	0.052
AC_IND	0.097	0.781
CEO_DUAL	-0.105	0.503
DIR_EXP	-0.319	0.003
CEO_TENURE	0.103	0.306
Firm characteristics		
FSIZE	0.109	0.018
ROA	-0.112	0.748
GROWTH_S	0.288	0.133
LOSS	-0.684	0.214
Intercept	-0.546	0.656
Inflection point (%)	15.37	
Pseudo R^2		0.106
p-value		0.005
Log Likelihood	-222.989	
N	360	
Year dummy included	Yes	

At the initial level, a female presence may reduce fraud propensity by introducing an acceptable level of diverse arguments, by females being more vocal and being less conformist, and thereby leading to better board deliberations and outcomes. However, it is possible that, beyond the optimal diversity level, the benefit diminishes, as the costs of adding more dispersed perspectives outweighs the benefits, which leads to an increase in the probability of fraud, thereby indicating the presence of an optimal level of gender diversity. Figure 2.2 displays the curvilinear relationship between the probability of fraud and proportion of female board members.

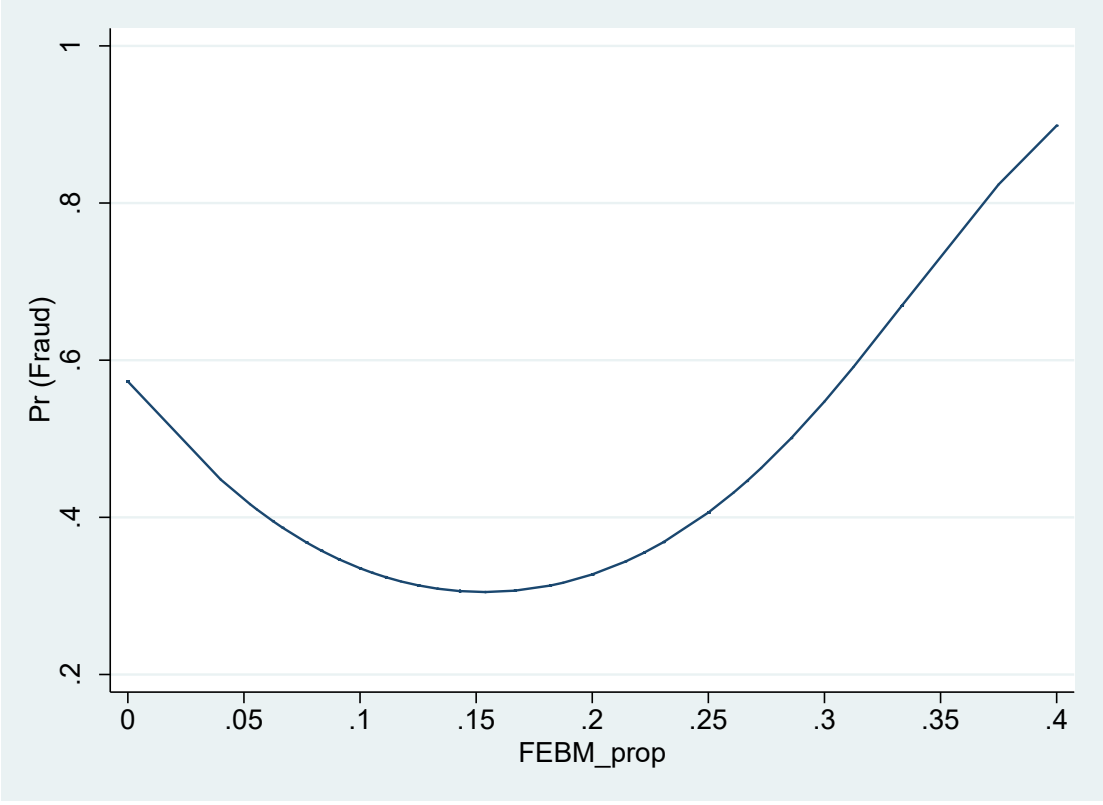

Figure 2.2: U-shaped relationship between probability of fraud and proportion of female board members

This finding is consistent with empirical studies that have found that additional female members on the board may have a negative effect on the board decision-making process if the appointments were primarily motivated to achieve gender equality (Campbell & Mínguez-Vera, 2008). Farrell and Hersch (2005) documented that US firms appointed female directors on boards in response to internal or external calls for diversity, not because of an increased supply of qualified female candidates. In our sample, the average board size was 7.28 for firms with all-male boards, 9.17 for firms with at least one female board member and 11.93 for firms with multiple female board members. Thus, if greater gender diversity is merely an attempt to reach a desired gender mix in an otherwise large board, the essence of diversity may lose its effect. Board demography is a complex phenomenon and is likely to have conflicting effects on firm processes over time. The effectiveness of the intra-board socio-psychological process determines whether the female board presence is beneficial for a firm. Consistent with Adams and Funk (2012), it may be argued that, once women directors break through the glass ceiling and acquire their seat in the boardroom, they may adapt to the male-dominated culture and become more achievement oriented and risk loving. Hence, this behavioural shift would affect board decision-making dynamics.

2.6 Types and severity of corporate fraud

2.6.1 Board gender diversity and types of fraud

In this section, we examine whether the effect of board gender diversity on fraud propensity differs across types of corporate fraud. The literature on corporate fraud documents differences in male and female managers'

involvement in different types of fraud. For example, Wheeler et al. (1988) found that women managers were less involved in organised conspiracies, such as securities fraud, which require the use of a formal organisation. Holtfreter (2005) reported that financial statement frauds were mostly committed by male executives/managers. For our analysis, we drew on our categorisation of frauds (financial statement fraud, disclosure fraud, bribery and other fraud) discussed earlier in Section 2.3.1. We estimated a multinomial probit model for the probability of fraud. The multinomial probit model is an extension of the binary probit model that estimates the probability of different alternatives (types of fraud in our case) relative to the probability of a baseline (no-fraud firms). Comparing the coefficients of the multinomial probit model allowed us to test the effect of board gender diversity across fraud types. The results of the multinomial probit model are presented in Table 2.11.

The results indicate that, among all fraud categories, a firm with a gender-diverse board is least likely to be involved in financial statement fraud. Specifically, the presence of at least one female member on the board significantly reduces a firm's probability of being involved in financial statement fraud by 16 per cent (p-value < 0.01). Financial statement fraud entails greater risk as they involve active violation of Generally Accepted Accounting Principles (GAAP) and in most cases may require executives to act in collusion. Hence, our result suggests that female presence on the board may deter corporate conspiracy. For the remaining fraud categories, the effect of gender diversity on likelihood of fraud is statistically significant only in the case of 'other fraud', which primarily includes frauds such as funds embezzlement, insider trading and options backdating. For the control variables, a larger audit committee reduced

the likelihood of disclosure fraud and other fraud, while director experience reduced the probability of all fraud types, except bribery. CEO tenure has a significant positive impact on fraud propensity for other fraud category, and higher return on assets significantly reduced likelihood of financial statement fraud and bribery (p-value < 0.05). Finally, firm size is positively associated with disclosure fraud (significant at the 0.05 level), and with other fraud (significant at the 0.10 level).

2.6.2 Board gender diversity and severity of fraud

The probit model used thus far treated all frauds as having equal severity. However, some frauds may be regarded more severe than others. We now examine the effect of female board presence on the likelihood of committing more or less severe fraud. Existing empirical evidence suggests that women lag behind men in committing large-scale organised crimes and are involved in less serious offences (Heidensohn & Silvestri, 1985). A possible explanation for this finding could be internal moral constraints or external social control levels that stringently monitor female offending. Female executives often lack access to large-scale criminal opportunity either through having less organisational power or not being part of the male-dominated conspiracy groups because of doubt about their ability to commit fraud (Steffensmeier & Allan, 1996). Another crucial reason for the observed gender gap in serious frauds is the lesser participation of women in the upper echelons of the firm, providing fewer opportunities to be involved in elite crimes (Dodge, 2007). Moreover, female managers may lack the violent attitude

demanded by a serious fraud scheme. Therefore, a gender-diverse board is likely to reduce the incidence of severity of corporate fraud.

To classify the sample firms in terms of the severity of the alleged fraud, we obtained information on the legal actions taken by the SEC or federal court against the culpable firms and/or the managers at the settlement of the case. We manually read the AAERs and SEC litigation releases that include settlement information for the firms that have already settled the case with the SEC. Among the sample firms, the majority of firms (151 firms, 77 per cent) received monetary penalties from the regulatory authority. Another 23 firms (12 per cent) faced cease-and-desist orders, which are legal orders from federal agencies to stop the fraudulent activities immediately. The remaining firms faced either permanent injunctions, which are court orders regarding future violations (12 firms), or professional bars from holding future director posts for the managers (nine firms). To test for the effect of a female board presence on severe and less severe frauds, we employed an ordered probit model that used an ordinal dependent variable to measure fraud severity. We considered imposition of a monetary penalty as a regulatory outcome of committing a more serious offence. Therefore, the firms facing a monetary penalty were coded 2, and the rest of the fraud firms and matched control firms were coded 1 and 0, respectively. Table 2.12 presents the coefficients and marginal effects from the ordered probit model.

Table 2.11: Board gender diversity and types of corporate fraud (multinomial probit regression model)

This table reports the results of a multinomial probit regression comparing each of the fraud firm groups with the control groups. The model examines the effect of board gender diversity across fraud types. The dependent variable *FRAUD* is an indicator variable set equal to 1 if the firm was subject to an AAER (an indication of fraud) and 0 otherwise. *FEBM* is an indicator variable set equal to 1 if there was at least one female member on the board of directors, and 0 otherwise. For the explanatory variables, the estimated coefficients, marginal effects and corresponding *p*-values are presented. *BSIZE* is the natural logarithm of the number of board members. *BRD_IND* is the proportion of independent members on the board. *ASIZE* is the natural logarithm of the number of audit committee members. *AC_IND* is the natural logarithm of the number of independent members on the audit committee. *CEO_DUAL* is an indicator variable set equal to 1 if the chairperson and CEO positions were held by the same person, and 0 otherwise. *DIR_EXP* is the average number of years that board members had served on the board. *CEO_TENURE* is the number of years the CEO had served on the board. *FSIZE* is the log of the book value of total assets. *ROA* is the return on assets, measured as net income divided by total assets. *GROWTH_S* is the two-year average annual growth rate in sales. *LOSS* is an indicator variable set equal to 1 if the firm recorded a loss in each of the two years prior to the fraud year, and 0 otherwise. P-values are based on two-tailed T-tests.

	Financial statement fraud (*N* = 87)				**Disclosure fraud (*N* = 53)**				**Bribery (*N* = 27)**				**Other fraud (*N* = 28)**			
Variables	**Coeffic ient**	***p*-value**	**Marginal effect**	***p*-value**	**Coeffic ient**	***p*-value**	**Marginal effect**	***p*-value**	**Coeffic ient**	***p*-value**	**Marginal effect**	***p*-value**	**Coeffic ient**	***p*-value**	**Marginal effect**	***p*-value**
FEBM	-0.912	0.000	-0.160	0.002	-0.459	0.109	-0.008	0.835	-0.459	0.166	-0.009	0.787	-0.633	0.055	-0.024	0.417
BSIZE	0.296	0.533	0.053	0.570	0.165	0.756	0.009	0.899	0.253	0.698	0.017	0.797	-0.069	0.912	-0.020	0.716
BRD_IND	0.664	0.491	0.104	0.585	-0.135	0.898	-0.083	0.572	1.580	0.266	0.150	0.296	0.259	0.829	-0.004	0.967
ASIZE	-0.603	0.311	-0.002	0.983	-1.284	0.074	-0.122	0.229	-0.437	0.602	0.011	0.896	-2.256	0.007	-0.170	0.022
AC_IND	0.225	0.652	0.024	0.806	0.492	0.437	0.065	0.471	0.537	0.523	0.046	0.589	-0.410	0.548	-0.059	0.327
CEO_DUAL	-0.074	0.755	-0.002	0.957	-0.105	0.697	-0.007	0.855	-0.270	0.385	-0.025	0.445	-0.063	0.849	0.000	0.987
DIR_EXP	-0.349	0.028	-0.035	0.247	-0.469	0.009	-0.043	0.081	-0.209	0.293	0.000	0.999	-0.581	0.009	-0.035	0.073
CEO_TENURE	0.084	0.580	-0.004	0.894	0.196	0.264	0.017	0.490	-0.009	0.963	-0.011	0.552	0.512	0.024	0.043	0.038
FSIZE	0.100	0.120	0.004	0.729	0.208	0.004	0.022	0.025	0.087	0.324	0.001	0.900	0.229	0.009	0.014	0.060
ROA	-0.645	0.190	-0.265	0.011	-0.216	0.742	-0.092	0.330	3.750	0.016	0.409	0.012	1.217	0.273	0.105	0.294
GROWTH_S	0.316	0.253	0.057	0.289	0.306	0.332	0.034	0.442	-0.561	0.307	-0.077	0.174	0.489	0.167	0.037	0.227
LOSS	-1.302	0.149	-0.158	0.053	-0.702	0.443	-0.036	0.720	-9.744	1	-0.078	0.000	-0.398	0.720	0.010	0.920
Intercept	-1.075	0.317			-1.083	0.345			-3.228	0.038			0.594	0.670		
p-value	0.009															
Log likelihood	-428.93															
N	360															

Table 2.12: Board gender diversity and severity of corporate frauds

(ordered probit regression)

This table reports the results of an ordered probit model that examines the association between board gender diversity and the probability of a firm's involvement in more and less severe corporate frauds, depending on the litigation settlement outcomes. The model uses an ordinal dependent variable to incorporate severity. The dependent variable is coded 2 for firms that were ordered to pay monetary penalty (and hence were involved in more severe fraud), coded 1 for firms penalised with non-monetary penalty (less severe fraud) and coded 0 for matched control firms (no fraud). *FEBM* is an indicator variable set equal to 1 if there was at least one female member on the board of directors, and 0 otherwise. The first column shows the coefficient and *p*-value for the model, and the second and third columns show the marginal effects and *p*-values for less and more severe frauds, respectively. *BSIZE* is the natural logarithm of the number of board members. *BRD_IND* is the proportion of independent members on the board. *ASIZE* is the natural logarithm of the number of audit committee members. *AC_IND* is the natural logarithm of the number of independent members on the audit committee. *CEO_DUAL* is an indicator variable set equal to 1 if the chairperson and CEO positions were held by the same person, and 0 otherwise. *DIR_EXP* is the average number of years that board members had served on the board. *CEO_TENURE* is the number of years the CEO had served on the board. *FSIZE* is the log of the book value of total assets. *ROA* is the return on assets, measured as net income divided by total assets. *GROWTH_S* is the two-year average annual growth rate in sales. *LOSS* is an indicator variable set equal to 1 if the firm recorded a loss in each of the two years prior to the fraud year, and 0 otherwise. P-values are based on two-tailed T-tests.

Variables	**Whole sample: monetary penalty (2), non-monetary penalty (1)**		**Non-monetary penalty (less severe fraud, coded 1) n = 44**		**Monetary penalty (more severe fraud, coded 2) n = 151**	
	Coefficient	***p*-value**	**Marginal effect**	***p*-value**	**Marginal effect**	***p*-value**
FEBM	-0.450	0.003	-0.006	0.064	-0.162	0.003
Governance variables						
BSIZE	0.121	0.677	0.002	0.680	0.042	0.676
BRD_IND	0.336	0.564	0.006	0.570	0.119	0.564
ASIZE	-0.593	0.101	-0.010	0.155	-0.209	0.098
AC_IND	0.065	0.838	0.001	0.838	0.119	0.564
CEO_DUAL	-0.060	0.679	-0.001	0.667	-0.021	0.680
DIR_EXP	-0.301	0.002	-0.005	0.040	-0.106	0.001
CEO_TENURE	0.103	0.255	0.002	0.286	0.036	0.253
Firm characteristics						
FSIZE	0.104	0.009	0.002	0.056	0.037	0.008
ROA	-0.114	0.723	-0.002	0.724	-0.040	0.722
GROWTH_S	0.158	0.335	0.003	0.369	0.056	0.333
LOSS	-0.573	0.253	-0.022	0.427	-0.179	0.174
Pseudo R2	0.054					

p-value	0.000
Log likelihood	-325.53
N	360

The results from the ordered probit model reveal that a gender-diverse board is significantly more effective in reducing firms' probability of committing serious corporate fraud. The presence of at least one female board member reduces the probability of facing monetary penalty by 16.20 per cent (*p*-value < 0.01), which is considerably higher than the reduction in the probability of less severe fraud (marginal effect 0.6 per cent, significant at the 0.10 level). Overall, the model coefficient of *FEBM* is significantly negative with a *p*-value of 0.003, stating the effectiveness of gender-diverse boards in reducing both severe and less severe legal punishments. The results indicate that the greater sense of risk aversion observed in women may deter female managers from being involved in serious corporate misconduct. The results also show that size of audit committee (ASIZE) and directors' experience on the board (DIR_EXP) are more inefficient in reducing more serious fraud, whereas larger firms are more involved in serious fraud compared with less serious fraud.

2.7 Robustness tests

2.7.1 Endogeneity

Studies in corporate governance generally evoke the concern of potential endogeneity issues, as they may result in biased and inconsistent parameters (Wintoki, Linck & Netter, 2012). Endogeneity could arise in our case if firms facing vulnerability to fraud and opting to reduce managerial entrenchment appointed female members on the board. Endogeneity could also result from the omission

of a relevant independent variable correlated with an included independent variable. The lagged nature of our control variables did much to address endogeneity issues (Chen, Leung & Goergen, 2017). We addressed the endogeneity concern in this study by employing an instrumental variable two-stage least squares (2SLS) regression model. In our case, female board presence (*FEBM*) was treated as endogenous. Consistent with Srinidhi et al. (2011), we selected the percentage of women employed in each two-digit SIC industry category (*%WOMEN_industry*) as an instrument for female board presence. While it is likely that the percentage of women employed in an industry may influence the female presence on corporate boards, their association with fraud probability was less likely. The information on the percentage of women employed in each industry category has been taken from Current Population Survey (2018), the US Bureau of Labor Statistics. In the 2SLS model, the first stage predicted the presence of female directors on the board using a probit model, while the second stage predicted the probability of fraud using Eq. (1), but by replacing *FEBM* with its predicted value $\widehat{FEBM}$ as a regressor. We obtained the percentage of women employed in each two-digit SIC industry group from Bureau of Labor Statistics data. The variables of board size, firm size, return on assets and sales growth rate were also used as control variables in the prediction model following Gul et al. (2011). The results of the 2SLS regression are shown in Table 2.13.

Table 2.13: 2SLS regression

This table reports the results of the 2SLS regression model to address the endogeneity concerns arising from omitted variable bias. The variable *%WOMEN_industry* represents the percentage of women employees in each two-digit SIC industry category. This variable was used as the prime predictor of female board presence (*FEBM*). *FRAUD* is an indicator variable set equal to 1 if the firm was subject to an AAER (an indication of fraud) and 0 otherwise. *FEBM* used here is the fitted value of the female board presence calculated from the first-stage analysis. Columns (1) and (2) show the results (coefficients and *p*-values) from the first- and second-stage regressions, respectively. *BSIZE* is the natural logarithm of the number of board members. *BRD_IND* is the proportion of independent members on the board. *ASIZE* is the natural logarithm of the number of audit committee members. *AC_IND* is the natural logarithm of the number of independent members on the audit committee. *CEO_DUAL* is an indicator variable set equal to 1 if the chairperson and CEO positions were held by the same person, and 0 otherwise. *DIR_EXP* is the average number of years that board members had served on the board. *CEO_TENURE* is the number of years the CEO had served on the board. *FSIZE* is the log of the book value of total assets. *ROA* is the return on assets, measured as net income divided by total assets. *GROWTH_S* is the two-year average annual growth rate in sales. *LOSS* is an indicator variable set equal to 1 if the firm recorded a loss in each of the two years prior to the fraud year, and 0 otherwise. P-values are based on two-tailed T-tests.

	Dependent variables			
	FEBM (1)		**FRAUD (2)**	
Variables	**Coefficient**	***p*-value**	**Coefficient**	***p*-value**
%WOMEN_industry	0.010	0.032		
FEBM			-0.837	0.441
BSIZE	0.894	0.010	0.193	0.699
BRD_IND			0.462	0.470
ASIZE			-0.712	0.064
AC_IND			0.199	0.554
CEO_DUAL			-0.086	0.575
DIR_EXP	0.078	0.425	-0.315	0.008
CEO_TENURE			0.122	0.220
FSIZE	0.123	0.010	0.149	0.010
ROA	0.052	0.885	-0.208	0.550
GROWTH_S	-0.457	0.012	0.212	0.420
LOSS			-0.911	0.099
Intercept	-3.041	0.000	-0.422	0.745
p-value	0.042			
Log likelihood	-420.16			
Industries	Included			
N	360			

Column (1) shows the results of the model to predict female directors, where we regressed the female presence dummy (*FEBM*) on the variable

%WOMEN_industry and other controls. We noted that the variable *%WOMEN_industry* had a significant positive association (co-efficient 0.010, *p*-value < 0.05) with the presence of female directors. A larger firm size and board size also significantly enhanced the female presence on the board. Column (2) presents the estimation results from the second-stage 2SLS with the probability of fraud as the dependent variable, with the variable of interest being the predicted value of *FEBM* from the first-stage regression. The coefficient of *FEBM* in Column (2) is negative, though it is not significant.

2.7.2 Additional variables

Several prior empirical studies identified certain other variables associated with corporate misconduct and accounting quality. Therefore, we examined whether the effect of gender diversity on the likelihood of corporate fraud was robust to augmenting the additional corporate governance and financial variables into the baseline model. Following Cumming et al. (2015), Srinidhi et al. (2011) and Chen et al. (2006), we included the average age of the directors (*DIR_AGE*), the number of directors on the board holding multiple directorships on the boards of other firms (*MULTI_DIR*) and average tenure of the chairperson (*CH_TENURE*) as additional corporate governance variables. We also included additional firm characteristics: Tobin's Q (*TQ*), total asset growth rate (*GROWTH_TA*), long-term debt to total assets (*LTDA*) and leverage (*LEV*) following Srinidhi et al. (2011) and Agrawal and Chadha (2005). The variable definitions are provided in Table 2.A1 in Appendix A and the results for the augmented probit model are presented in Table 2.14. The results were similar to those obtained from the base model in Table 2.6, showing that the effect of a

female board presence was significant and negative on the likelihood of fraud. Specifically, firms with at least one female board member were 20.8 per cent less likely to commit corporate misconduct than were firms with no female board member. However, none of the additional corporate governance or financial variables were significant and their addition did not change the main results.

Table 2.14: Effect of female board representation on likelihood of corporate fraud—an augmented probit model

This table reports the results of a probit model of corporate fraud with additional governance and financial variables. The dependent variable *FRAUD* is an indicator variable set equal to 1 if the firm was subject to an AAER (an indication of fraud) and 0 otherwise. For the explanatory variables, the estimated coefficients, marginal effects and corresponding *p*-values are presented. *FEBM* is an indicator variable set equal to 1 if there was at least one female member on the board of directors, and 0 otherwise. *BSIZE* is the natural logarithm of the number of board members. *BRD_IND* is the proportion of independent members on the board. *ASIZE* is the natural logarithm of the number of audit committee members. *AC_IND* is the natural logarithm of the number of independent members on the audit committee. *CEO_DUAL* is an indicator variable set equal to 1 if the chairperson and CEO positions were held by the same person, and 0 otherwise. *DIR_EXP* is the average number of years that board members had served on the board. *CEO_TENURE* is the number of years the CEO had served on the board. *CH_TENURE* is the number of years the chairperson had served on the board. *MULTI_DIR* is the number of directors with multiple directorships in other public companies. *AGE_DIR* is the average age of the directors. *FSIZE* is the log of the book value of total assets. *GROWTH_S* is the two-year average annual growth rate in sales. *GROWTH_TA* is the two-year average annual growth rate in total assets. *ROA* is the return on assets. *LEV* is total debt divided by total assets. *LOSS* is an indicator variable set equal to 1 if the firm recorded a loss in each of the two years prior to the fraud year, and 0 otherwise. Tobin's Q (*TQ*) is the market value of common equity, plus book value of total liability, divided by book value of total assets. *LTDA* is long-term debt divided by total assets. P-values are based on two-tailed T-tests.

Variables	Coefficient	*p*-value	Marginal effect	*p*-value
FEBM	-0.576	0.001	-0.208	0.000
Governance variables				
BSIZE	0.453	0.197	0.163	0.194
BRD_IND	0.850	0.205	0.306	0.202
ASIZE	-0.724	0.070	-0.261	0.066
AC_IND	0.195	0.573	0.070	0.573
CEO_DUAL	-0.016	0.920	-0.006	0.920
DIR_EXP	-0.261	0.027	-0.094	0.024
CEO_TENURE	-0.008	0.953	-0.003	0.953
CH_TENURE	0.018	0.301	0.006	0.299
MULTI_DIR	-0.035	0.239	-0.013	0.237
AGE_DIR	-0.020	0.206	-0.007	0.203

Firm characteristics				
FSIZE	0.116	0.013	0.042	0.011
GROWTH_S	0.242	0.268	0.087	0.266
GROWTH_TA	-0.085	0.658	-0.031	0.658
ROA	0.173	0.666	0.062	0.665
LEV	0.552	0.483	0.199	0.482
LOSS	-0.870	0.163	-0.314	0.160
TQ	0.006	0.828	0.002	0.828
LTDA	-0.574	0.507	-0.207	0.506
Intercept	0.120	0.908		
Pseudo R^2	0.088			
p-value	0.001			
Log likelihood	-217.731			
N	345			

2.8 Conclusion

A major motivation of this study is to provide an insight into fraudulent behaviours of US corporations in recent years. This study empirically examines the impact of board gender diversity on the likelihood of financial frauds by US corporations. The existing fraud literature typically emphasizes the association between fraud and company characteristics or board features. However, although gender diversity in corporations has received significant attention in recent years from investors, regulators and academic research in general, studies predominantly focused on a narrow outcome, namely firm performance. We contribute to the literature by exploring the association between the gender mix on the board and the incidence, types and severity of corporate fraud. We hypothesized that firms with a gender diverse board would be less likely to be involved in corporate fraud compared to firms with an all-male board. Using a matched-pair sample of 390 US firms, the probit model results provide evidence that the likelihood of fraud in a firm with at least one female board member was

approximately 20 per cent lower than that of a firm with an all-male board, thereby supporting our hypothesis. In the sub-sample analysis, we found that gender diverse boards had stronger implications for reducing corporate fraud in the post-SOX period, in male-dominated industries and in low fraud-intensive industries. Results from a multinomial probit model showed that female presence on the board reduced the likelihood of financial statement fraud by 16 percent. Furthermore, ordered probit model results reported that firms with gender diverse boards were around 16.20 percent less likely to be punished with monetary penalty at the settlement in the federal court. This indicated that gender-diverse boards were significantly more effective in reducing firm's involvement in more serious frauds.

The analysis of our fraud data set revealed crucial information regarding the financial frauds of the corporations over time. There was a significant drop in the number of frauds encountered from the year 2002, which could indicate the positive impact of implementing tougher corporate governance policies through the Sarbanes-Oxley Act in 2002. In the industry sectors, technology industries were more prone to committing misconducts. Furthermore, firms were mostly involved in accounting frauds that directly manipulated revenue and cost figures, in an effort to reach financial objectives, or to meet or beat analyst's projections. Additionally, the data revealed that the convicted firms worked in conjunction with the top management team (CEO, CFO, and Chairman) and other directors, and sometimes with the auditors, to carry out the corporate crime schemes.

Our study has significant implications for corporations. In the aftermath of massive accounting scandals, the US Congress responded with the SOX Act of 2002 to restore investor confidence by ensuring effective monitoring. However,

the Act is criticised for missing the opportunity to harness board gender diversity as a method to combat corporate crime (Ramirez, 2003). We found that gender diversity reduced the likelihood of corporate fraud by a larger magnitude in the post-SOX period. This finding suggests that the representation of women on corporate boards may serve as an additional voice in the boardroom to thwart corruption at an early stage. Our results further indicated that gender-diverse boards significantly reduce the likelihood of fraud in male-dominated industries and low fraud-intensive industries. In addition, we found that a female board presence significantly reduces the likelihood of committing serious corporate misconduct. Although a few studies have found weak or no evidence of change in firm risk-taking behaviour from additional women board members, our results imply significant improvements of fraud propensity reduction accruing from gender-diverse boards.

Our results have relevance in light of the current debate on the role of directors in corporate fraud. Although countries such as Norway, Finland, France and Spain have legislative mandates that companies must have at least 40 per cent of women directors (Catalyst, 2014), a higher female board presence does not necessarily mean better governance. The additional skills/knowledge, cognitive conflict and changes in group dynamics resulting from a diverse board (compared with a non-diverse board) will have differential implications for decisional coherence. Our test for the nonlinear effect of female representation on boards suggests that the likelihood of corporate fraud may be minimised for a typical firm when the proportion of female directors is 15.37 per cent. However, we do not suggest a mandatory gender quota for all US firms because, in determining an optimal level of gender diversity, regulators must also consider

the effects of gender diversity on other aspects of firms' financial and non-financial performance. Ahern and Dittmar (2012) argued that a mandatory quota may adversely affect firm value if a firm's existing board size and composition are optimal.

Nevertheless, women are severely underrepresented on the boards of US firms. In our sample of 390 US firms, only 22 per cent of firms had more than one women director on the board, nine firms had a female CEO/CFO and three firms had a female chairperson. Hence, regulators may consider introducing guidelines for board gender diversity that are advisory, rather than mandatory. To the extent that gender diversity serves as an additional layer of governance through monitoring effectiveness, regulators may focus on ensuring that corporate boards encompass the voices of both genders, rather than specifying a gender quota.

Chapter 3: Board Gender Diversity and Stock Market Reaction to Corporate Fraud

3.1 Introduction

This study investigated the effect of board gender diversity on stock market reactions to the announcement of allegations of corporate fraud. Using hand-collected data on a sample of 246 US firms convicted for fraud by the SEC during the period 1999 to 2015, this study found that firms with more women directors on the board experienced significantly less negative share price reactions upon revelation of fraud.

Corporate fraud poses a growing concern among shareholders and investors alike, primarily because of the damage it can cause to the firm, both in terms of financial and reputational effects. When Enron Corporation announced the restatement of its earnings for the previous five years on November 8, 2001, the stock price declined from over US$30 to less than US$1 within a month (Kedia & Philippon, 2009). The associated legal and reputational penalties are enormous. For example, in 2006, American International Group was required to pay over US$800 million in penalties to the federal authorities to settle for securities fraud charges (SEC AAER no. 2371, www.sec.gov). Sampath, Gardberg and Rahman (2018) found that the loss in market value amounted to US$60.61 billion for firms facing bribery charges during 1978 and 2010 in the US. Amid this, to strengthen the quality of corporate governance and reporting requirements, regulatory authorities have responded with governance reforms such as the SOX Act of 2002, and changed the listing rules of the NYSE, NASDAQ and AMEX. However, an exhaustive approach towards efficient market regulation must recognise the link between corporate governance mechanisms and investor responses or perceptions. Farber (2005) demonstrated that the market considers improvement in the quality of corporate governance as a way

to restore trust after fraud. Hence, our study sought to identify the association between stock market reaction to the announcement of fraud allegation and the presence of women on the corporate boards of the convicted firms.

It is clear in the literature that shareholders suffer large losses in terms of falling stock prices when firms are accused of misconduct (Karpoff, Lee & Martin, 2008a; Karpoff & Lott, 1993). The reputational damage caused by the revelation of corporate fraud is highly important to shareholders and investors, as it directly affects firm value. The market-imposed penalty can extend far beyond legal punishments by exposing the firm to loss of credibility, revisions in terms of trade and higher operational and financing costs, which ultimately affect the costs of capital and market value. The consequences of corporate fraud can be far reaching. Top executives of the fraud firms may have to bear professional consequences, such as losing their jobs within at least two years of the fraud event (Desai et al., 2006) and facing restrictions on their future employment and shareholding (Karpoff, Lee & Martin, 2008b). In cases of notorious fraud, criminal charges are brought against the executives, who may face harsh legal consequences, including heavy monetary penalties and jail sentences.

Prior research has focused solely on stock market reactions to revelations of fraud and documented strong evidence of significant negative reactions. Studies have reported negative stock market responses in the form of abnormal returns ranging from -4 to -13 per cent across various markets (Dechow et al., 1996; Feroz et al., 1991; Palmrose et al., 2004). The negative returns resulting in significant market value losses have been attributed to multiple factors, such as changes in investor expectations of future cash flows, perceptions about managerial integrity, and uncertainty regarding future prospects. The literature

has examined a number of firm characteristics that explain the magnitude of market reactions to fraud detection, such as managers' trading behaviour (Badertscher, Hribar & Jenkins, 2011), family-controlled firms (Ma, Ma & Tian, 2016) and director interlocks (Kang, 2008), but no studies have used board gender mix as a moderating factor in stock price behaviour. Such market response is essentially a result of investor perceptions about the firm. An organisation's reputation is built around stakeholders' trust, which in turn depends on the available information about the organisation. While transparency and voluntary disclosure may reduce information asymmetry between managers and investors, board features are likely to affect disclosure practices (Cai, Keasey & Short, 2006).

Our research introduces board gender diversity as a factor in determining the magnitude of market reaction to fraud announcements. We present a detailed empirical analysis of the stock market's response to the accusation of fraud by the SEC. We empirically examined the market reaction to the detection of corporate fraud in firms with gender-diverse and non-gender-diverse boards. We applied standard event study methodology to investigate stock market return behaviour around disclosure of alleged misconduct. The event date was the first public disclosure of the conviction by the SEC or other regulatory body. We also scrutinised the legal fines and wealth effects resulting from the fraud conviction. The sample was a hand-collected selection of 246 US firms that were convicted of fraud by the SEC through AAERs during the period 1999 to 2015.

Using market-adjusted abnormal returns, we documented that the negative mean market reaction to the announcement of fraud was less pronounced for firms with more women members on the board. On average, the

246 sample firms experienced statistically significant negative abnormal returns of -8.94 per cent after the disclosure of fraud. Further, the subgroup analysis showed that markets reacted less negatively to firms with two or more female board members (CAR -2.83 per cent, significant at the 0.01 level) than to firms with zero or one female board member (CAR around -11 per cent), in the three-day event window surrounding the announcement, both significant at the 0.01 level. The cross-sectional regression results also provided evidence that having more female board members was associated with significantly less negative price reactions. Further, the stock price decline around announcements was severe for financial statement fraud and when the disclosure was a restatement announcement. Additional analysis demonstrated that the convicted firms experienced significant legal and reputational penalties. However, the legal fines of US$24.92 million paid by the convicted firms was much smaller compared with the cumulative wealth loss of US$1,624.02 million in equity market value in the three-day window around the announcement day.

This study contributes to the literature in two distinctive ways. First, it introduces female board presence as a determinant in stock market reactions to the accusation of corporate fraud, as distinct from the other governance characteristics examined in earlier studies. Second, this study provides a detailed analysis of the stock market response, legal penalties and wealth loss effects of a sample of firms that were convicted of a range of corporate misconducts (such as bribery, insider trading and asset misappropriation), in contrast to prior literature that focused on shareholder class action lawsuits and restatement announcements only. Our study is important and timely in light of growing

worldwide considerations to reform board structure, while considering that gender diversity improves board efficacy. Furthermore,

comparative analysis of the legal and reputational penalties suffered by the convicted firms showed the enormous effect of fraud, and hence assured the importance of investigating the channels to mitigate the negative market reaction. To the best of our knowledge, this is the first study providing evidence on the effect of board gender diversity as a determinant of the magnitude of the stock market reaction to the announcement of fraud.

The rest of this study is organised as follows. Section 3.2 presents a review on the reputational and legal penalties for fraud cited in the literature. Section 3.3 discusses the hypothesis development, while Section 3.4 discusses the sample construction, measurement of abnormal returns and variable definitions. Section 3.5 presents the descriptive statistics and univariate results, while Section 3.6 discusses our main empirical findings from the multivariate analysis. Section 3.7 discusses the legal and reputational penalties, and Section 3.8 concludes the study.

3.2 Reputational and legal penalties associated with fraud

While courts can impose criminal and civil sanctions on firms, this is not the only penalty that companies pay for corporate crime. The accompanying effects on the market values of firms as a result of fraud allegations are often termed reputational penalties, and can often be more damaging than legal punishments. Karpoff and Lott (1993) conducted one of the earliest studies to examine the significance of reputational costs compared with other costs borne by the accused firms. Their study of 132 US fraud cases reported that initial press

reports of corporate frauds resulted in an average decrease of 1.34 per cent (US$60 million) in the common stock values of the affected firms. Extending the work of Karpoff and Lott (1993), Alexander (1999) posited that reputational penalties could often take the form of loss of business with customers and/or suppliers. His study compiled data on the business suspensions and labour market transactions of 78 convicted firms and presented evidence that, firms experience significant loss of cash flows resulting from termination of customer relationships, more significantly with the news of related-party crime. Bhagat, Bizjak and Coles (1998) estimated that, on an average, each defendant firm experienced a significant wealth loss of 0.97 per cent of the equity market value upon filing a suit. Karpoff et al. (2008a) examined the penalties imposed on the 585 firms targeted by SEC enforcement actions for financial misrepresentation from 1978 to 2002. The results obtained from analysing both first public disclosure and subsequent regulatory actions revealed that the reputational penalty resulting from the news of enforcement actions was 7.5 times higher than the monetary penalty imposed by regulatory authorities.

These reputational penalties may be indicative of a change in investor expectations because of the uncertainty over the accounting practices of the alleged firms (Kang, 2008). The lack of information regarding the alleged firm's financial condition, together with inefficiency of the board in preventing the fraudulent actions, result in higher perceived risks and thus higher cost of capital for investors. For example, Hribar and Jenkins (2004) showed that accounting restatements led to an increase in cost of equity capital of around 7 to 19 per cent on average in the month after the restatement. They claimed that this was a result of increased suspicion regarding the credibility of managers, causing investors to

require a higher rate of return. In China, a sample of 271 firms announcing accounting fraud during 2000 to 2005 experienced a significant increase in both cost of capital and bid-ask spreads (Firth, Rui & Wu, 2011). Murphy et al. (2009) reported a 2.6 per cent reduction in earnings and increase in risks, along with losses in equity value to the allegation of 394 events of corporate misconduct in the US. Moreover, there is a wide effect of fraudulent accounting on the economy, in terms of distortion in the allocation of economic resources (Kedia & Philippon, 2009).

The consequences of corporate fraud have a direct bearing on the executive team and board members. Beneish (1999) identified a sample of 64 litigated firms using the SEC AAERs and news media releases during 1987 to 1993, and documented substantial penalties (managerial job losses and monetary sanctions) imposed on the perpetrating managers subsequent to discovery of fraud. Srinivasan (2005) provided evidence on the labour market penalties of outside directors and reported that 48 per cent of the outside directors experienced job loss for firms that restated their earnings. The study examined a sample of 409 US companies that restated their earnings from 1997 to 2001, as reported by the Government Accounting Office. Further, the displaced managers found it difficult to attain subsequent employment, or employment in the same or higher designation as before (Desai et al., 2006). Fich and Shivdasani (2007) investigated the labour market effect of financial fraud on outside directors for a sample of 216 US firms facing shareholder class action lawsuits. The results indicated that the outside directors of the convicted firms lost about 50 per cent of their directorships in other firms.

Marciukaityte, Szewczyk, Uzun and Varma (2006) investigated the changes in governance after a sample of 276 firms were accused of fraud in the US during the period 1978 to 2001. They demonstrated that, after the accused firms suffered a negative market reaction upon the detection of fraud, they increased the number of independent directors on their board in an attempt to improve the internal control system and reinstate investor confidence in the firm. McTier and Wald (2011) found that, after being sued in a securities class action lawsuit, firms on average increased cash holdings and decreased overinvestment, signifying a reduction in management aggression attitude. In a study by Gurun, Stoffman and Yonker (2018), investors were found to withdraw and relocate their assets after some of the financial advisors collapsed.

There is also evidence of market reactions in countries outside the US. Aggarwal, Hu and Yang (2015) studied stock market reactions to the detection and announcement of fraud in Chinese listed firms, and found a severe negative effect on the stock price upon detection of fraud. This stock market effect on the announcement date was more pronounced for firms charged with serious fraud. Chen, Firth, Gao and Rui (2005) used event study methodology to identify the effect on stock prices for regulatory enforcement actions on a sample of 169 Chinese listed firms during 1999 and 2003. The study reported that firms suffered wealth loss of around two per cent in the five days surrounding the event, irrespective of enforcement type and enforcement authority. Song and Han (2017) analysed the association between corporate crime announcement and market reaction in South Korea during the period 2001 to 2010. The results revealed significant negative abnormal returns using three-, seven- and 11-day

event windows, with the results quite similar for individual crime and organisational crime.

The above literature review gives an overview that the prior studies focused largely on the share price reaction to the disclosure of misconduct, but did not analyse the factors in the corporate governance mechanism that may have an effect in moderating the investor reactions. Hence, this study aims to fill the research gap by exploring the gender mix on the corporate board as a determinant to stock market reaction when the firm is involved in fraud.

3.3 Hypothesis development

Gender-diverse boards may experience less negative share price reactions to fraud enforcement actions for several reasons. Heminway (2007) identified the gender of the board members as an important attribute when considering restoring investor trust in corporations after the massive corporate frauds unfolded in the US. Given that informed capital market participants value governance improvements (Farber, 2005), a diverse board is likely to receive positive feedback from the market. If women are viewed to be more ethically sensitive than men, as found in prior studies (Bernardi & Arnold, 1997; Eckel & Grossman, 1998), fraud is less likely to be viewed by shareholders as severe, since investors may place more trust in the diverse board in that situation. Women's presence on the board is believed to contribute to board effectiveness by breaking up the 'all-male' networks. Such networks sometimes engage in self-serving agendas at the expense of the organisation. Hence, a better gender mix on the corporate board increases the board's legitimacy and trustworthiness,

fosters shareholders' trust and ensures that the board will adhere to the fiduciary duties entrusted with them (Perrault, 2015).

Moreover, female directors on the board may contribute to enhancing public confidence in the accounting quality of the firm. The relatively improved ethical philosophies of female members in top management have been found to contribute to a stronger emphasis on ethical financial reporting and reinforce compliance with the SOX Act (Ho et al., 2015). Gender-diverse boards have been found to allocate more effort to monitoring, direct more effort towards an efficient internal control environment and emphasise conservative financial reporting (Adams & Ferreira, 2009). Gul et al. (2011) showed that firms with gender-diverse boards improve the quality of public disclosure by incorporating more firm-specific information in stock prices. This in turn enhances confidence among both informed and uninformed investors. Huang and Kisgen (2013) demonstrated that announcement returns are higher around acquisition and debt offerings for firms with a female executive, compared with firms with male executives, thereby signifying that investors react more favourably to corporate decisions made by firms with female executives.

The actions and signals that firms send out to the market become crucial for the public in judging the quality of a firm, especially in the presence of information asymmetry. In this context, Miller and Triana (2009) used signalling theory to examine how board characteristics increase firm reputation. They suggested that board gender diversity enhances firm reputation in three ways: (i) by sending signals to the public on the firm's ability to cater to diverse market needs, (ii) by adhering to norms of social equality and hence implying credibility, and (iii) by providing better socially responsible and community services. Rhode

and Packel (2010) similarly claimed that the composition of boards of directors sends signals to investors about the robustness of the governance mechanisms, and may subsequently enhance firm reputation. In light of the above discussion regarding corporate reputation, public disclosure and good governance, the following hypothesis was proposed:

Hypothesis 1: A gender-diverse board experiences less negative share price reactions upon revelation of fraud.

3.4 Data and methodology

3.4.1 Data and sample selection

We began our sample selection by searching for firms that had been accused of financial fraud. The sample of firms was hand-collected by identifying the publicly listed US firms that were subject to AAERs by the US SEC during 1999 to 2015. Regulatory violation of the *Security Exchange Act of 1934* results in the issuance of AAERs. The AAER refers to the secondary designation assigned by the SEC to administrative proceedings or litigation releases, and represents cases where the SEC believes there is sufficient evidence of accounting or financial fraud to prosecute a case. The AAER may be issued by the SEC during or after investigation of a firm or its officers for alleged accounting or financial misconduct. We manually read all the 2,540 AAERs issued during 1999 to 2015 available on the SEC website (http://www.sec.gov) and extracted information on the fraud firms, such as the date of AAER issuance, type and description of the violation, the executives involved in the fraud and the regulatory verdict. As mentioned in Study 1 (Chapter 2), we initially identified 604 firms that

were subject to SEC enforcement actions for corporate malfeasance during the timeframe.

SEC conducts investigations to ensure that firms and managers are complying with accounting, auditing and financial fiduciary responsibilities in the best interests of the shareholders and other stakeholders. The SEC may initiate informal investigation as soon as it learns of any possible misconduct that the firm may have committed, and subsequently proceed with formal investigation if there is sufficient evidence. If the formal investigations confirm violations by the firm or executives, the SEC then considers imposing legal enforcement actions, leading to final settlement. Investors generally learn of these informal/formal investigations through disclosures in the news media. In some cases, the news of possible involvement in fraud may only be disclosed at the time of eventual SEC enforcement actions (AAER). However, AAERs may not be published until several years after the initial disclosure of the fraud in the news media, resulting in a major lag between actual fraud and enforcement action (AAER) (Feroz et al., 1991). Our analysis revealed that the average duration between initial disclosure and subsequent AAER issuance is around 2.52 years, with the highest lag being 10 years. Disclosure of fraud may also result in restatements of financial statements by the company or filing of class action lawsuits by investors. Investors may learn about the alleged fraud either during a formal investigation or at the issuance of SEC responses. Figure 3.1 illustrates the major events that highlight the stages in SEC enforcement actions.

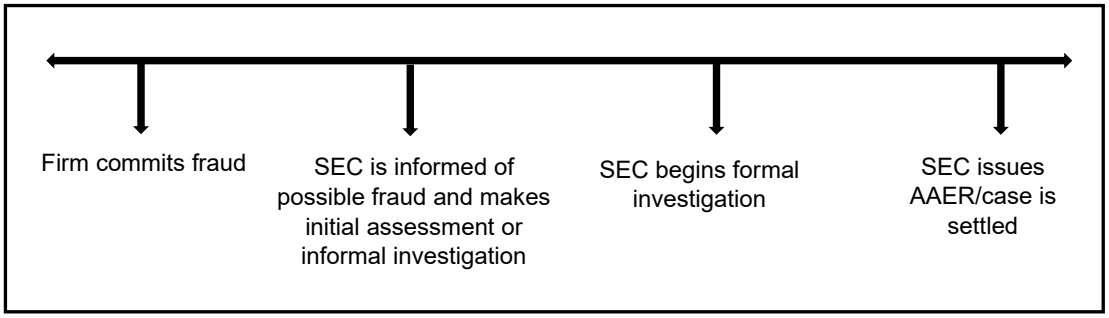

Figure 3.1: Events surrounding SEC enforcement actions

For the identified 604 firms who were eventually prosecuted by the SEC for financial and accounting fraud, we obtained the first day that the allegation of the fraud became public. To ensure that we captured the earliest day that investors learnt about the news, we conducted a manual search of *The Wall Street Journal* index. In cases where *The Wall Street Journal* coverage was not found, we supplemented the search with other news media sources for the disclosure date.[15] These media sources were major newswire services that disseminate corporate news almost instantaneously to investors and the general public (Neuhierl, Scherbina & Schlusche, 2013). We collected information on the period over which the fraud lasted from the AAERs and looked for any announcement of the violations by searching from the beginning of the fraud period until the AAER release date (final settlements) in the news media sources. If multiple news sources covered the same disclosure on different dates, we selected the first date as the announcement date. To minimise confounding events, once the first disclosure date was found, the news media sources were screened to ensure that no additional allegations or other announcements were made within the year of the announced allegation.

[15] Apart from *The Wall Street Journal*, the other news media sources included Associated Press, Business Wire, *The Financial Times*, *The New York Post*, *Tribune Business News*, US Federal News Service, *The Washington Post* and PR Newswire.

The availability of financial data from DataStream and governance data from BoardEx reduced the sample size further. For a few companies, the trading of stocks stopped because of either being delisted or suspended. The intersection of announcement dates and availability of financial and governance data resulted in a final sample of 246 firms.

3.4.2 Distribution of sample by year, industry, fraud type and perpetrator

In this section, we present the distribution of the sample across calendar years, industry sectors, types of fraud committed and types of people accused. Table 3.1 presents the sample description, starting with a synopsis of the final sample selection process from the initial list of firms that were accused by the SEC (Panel A). In Panel B, we report the years across which the first public disclosures of the fraud were announced. As we can see, the disclosure events were not much concentrated except for the year 2002, which reported the highest number of disclosures of fraud (around 15 per cent). This may have resulted from greater SEC activism surrounding the introduction of SOX in 2002, which imposed a number of corporate governance rules with respect to public disclosure, auditor independence and penalties for corporate crime. It can also be seen that the fraud disclosures increased after 2002, compared with the years prior to 2002.

Panel C in Table 3.1 reports a breakdown of the number and percentage of sample firms across industry groups. As shown in the table, the firms were distributed across industries, but were more concentrated in the technology industries (SIC codes of 357, 36 and 737), representing a total of around 29 per cent of the whole sample. Pharmaceutical firms and financial institutions also comprised significant portions of the distribution (around 23 per cent).

Table 3.1: Description of sample fraud firms

Table 3.1 presents descriptive statistics of the sample of firms accused of fraudulent activities. Panel A shows the final sample selection process according to various sample selection criteria. Panels B and C classify the final sample according to year of disclosure and industry, respectively.

Panel A: Sample selection	
Number of fraud firms identified from AAER	605
(Less: number of firms with no available financial or governance data)	344
(Less: number of firms with no available price data)	15
Final sample of fraud firms (with announcement date information available)	246

Panel B: Sample distribution by year of first public disclosure

Year of disclosure	**Sample**	
	Number of firms	**% of total**
1995–1999	13	5.28
2000	13	5.28
2001	10	4.07
2002	37	15.04
2003	17	6.91
2004	21	8.54
2005	22	8.94
2006	23	9.35
2007	14	6.07
2008	13	5.28
2009	15	6.10
2010	13	5.28
2011	14	6.07
2012–2015	21	8.54
Total	**246**	**100**

Panel C: Industry distribution

SIC code	**Industry description**	**Number of firms**	**% of total**
10xx-16xx	Mining and construction	13	5.28
20xx-27xx	Food, textile and paper	15	6.09
28xx-29xx	Chemicals and pharmaceuticals	21	8.54
30xx-355x	Rubber, steel and industrial machinery	14	5.69
357x	Computer and office machine	20	8.13
36xx-37xx	Electronic and transportation equipment	25	10.16
38xx	Measuring and analysing instruments	14	5.69
42xx-49xx	Transportation and utilities	17	6.91

50xx-51xx	Wholesale trade	9	3.65
52xx-59xx	Retail trade	16	6.50
60xx	Depository institutions	16	6.50
61xx-67xx	Non-depository institutions and insurance	19	7.72
70xx-736x	Miscellaneous services	12	4.87
737x	Computer services and software	24	9.75
738x-87xx	Business services, amusement and health	11	4.47
	Total	**246**	**100**

Next, similar to Study 1 (Chapter 2), we classified the sample firms according to the category of financial fraud into four groups for a further understanding of the types of misconduct conducted by the sample firms and top management. The categories were as follows: financial statement fraud, misrepresentation and disclosure fraud, bribery and other fraud. A detailed classification of fraud types is provided in Table 2.A1, Appendix A. We also identified the managerial-level personnel who were accused of being involved in each fraud case, alongside the accused firm. Table 3.2 provides the classification of the sample firms by fraud type and by perpetrators involved in the fraud. In Panel A, we can see that firms were mostly accused of fraud related to revenue and cost accounts in financial statements (51.62 per cent), followed by disclosure fraud and bribery (17.89 and 17.48 per cent, respectively). Panel B in Table 3.2 shows that, in approximately 44 per cent of cases, the SEC accused both the firm and the top management (CEO, CFO, chairperson) of being involved in the fraud. In another 41.87 per cent of cases the SEC only indicted the company, while top management was convicted in 11 per cent of frauds. In the remaining cases, the charge was brought against either other executive officers, auditors or accountants, who we classified under ‘other parties’.

Table 3.2: Sample composition by fraud type and perpetrator

Panel A: Sample classification by fraud type		
Type of fraud	**Number of firms**	**Per cent of firms**
Financial statement fraud	127	51.62
Misrepresentation and disclosure fraud	44	17.89
Bribery	43	17.48
Other frauds	32	13.01
Total	246	100
Panel B: Parties accused of fraud in the AAERs		
Parties	**Number of firms**	**Per cent of firms**
Company and CEO, CFO, chairperson	109	44.31
Company	103	41.87
CEO, CFO, chairperson	28	11.38
Other parties	06	2.44
Total	246	100

3.4.3 Event study methodology

To conduct an event study, it is imperative to define the event for which the research is being undertaken. In this study, the event was an announcement or disclosure of corporate fraudulent actions of a firm that could affect the stock returns of the firm. The announcement date (*day* = 0) was the earliest day that the market learnt about the company/executives being involved in fraudulent activities.

Table 3.3 lists the type of first public disclosure of the fraud. The most frequent disclosure event (96 firms) was the SEC announcing that it had started investigating the particular firm or its officials because of some financial fraudulent actions. For 36 firms (14.63 per cent of cases), the first public disclosure was the announcement of the eventual settlement with the SEC through issuance of an AAER. The other common disclosure events included the SEC formally charging the firm for financial fraudulent activities (34 firms), followed by announcement of

voluntary restatement by the firm upon finding errors in previously filed financial statements (28 firms) and self-disclosure by the firm of some wrongdoing or disclosure of the firm's internal investigation of the alleged fraud (26 firms).

Table 3.3: Categories of first public disclosure of violations

Type of disclosure	Number of firms	Per cent
Announcement of SEC investigation	96	39.02
Company settling with SEC	36	14.63
SEC charging the company	34	13.82
Firm announcing restatement	28	11.38
Firm announcing internal investigation/admitting fraud	26	10.57
Shareholders filing lawsuit	10	4.07
Investigation by other agencies	10	4.07
Resignation of auditor/director	6	2.44
Total	**246**	**100**

3.4.4 Measurement of market returns

To investigate the market reaction around fraud disclosure, we used a market-adjusted model to calculate the effect of the disclosure of fraud involvement. The event day (day = 0) was the first day that the market came to know about the fraudulent actions of the firm, either by disclosure in *The Wall Street Journal* or other media sources or by the regulatory actions of the SEC. In the market model, the expected return ($\hat{R}_{it}$) on stock *i* was:

$$\hat{R}_{it} = \hat{\alpha}_i + \hat{\beta}_i R_{mt} - \varepsilon_{it}$$

The parameters of the market model, $\hat{\alpha}_i$ and $\hat{\beta}_i$, represented the intercept and systematic risk of firm *i*, respectively. R_{mt} was the return on market index and ε_{it} was the error term, whereby $E(\varepsilon_{it}) = 0$ and $var(\varepsilon_{it}) = \sigma_\varepsilon^2$ (MacKinlay, 1997). We used the S&P 500 index as the market portfolio and estimated the model parameters $\hat{\alpha}_i$ and $\hat{\beta}_i$ using 250 trading days (Day -260 to Day -11) before the

announcement day (day = 0). Therefore, the abnormal return (AR_{it}) for stock *i* on day *t* could be estimated as below:

$$AR_{it} = R_{it} - (\hat{\alpha}_i + \hat{\beta}_i R_{mt})$$

Here, R_{it} was the actual return on firm *i*'s common stock on day *t*. The abnormal stock returns for each day over the event window were then summed to calculate the CAR for each firm:

$$CAR_{i(T1,T2)} = \sum_{t=T1}^{T2} AR_{it}$$

where CAR_i was the CAR for company *i* over the specific event window. This CAR measured the market reaction or reputational penalty in the event of disclosure of alleged fraud.

The abnormal returns of the sample companies could be further developed by calculating the average abnormal returns (AAR). This provided additional insights into the average effect of all the sample firms, instead of examining the individual effects. AAR was measured by summing the abnormal returns for each event day across all the alleged firms (*N*):

$$AAR_i = \frac{1}{N}\sum_{i=1}^{N} AR_{it}$$

Subsequently, the average cumulative effects on all the sample firms could be estimated by accumulating the CARs over various event windows to provide the cumulative average abnormal return (CAAR):

$$CAAR_{i(T1,T2)} = \frac{1}{N}\sum_{i=1}^{N} CAR_{it}$$

The framework of an event study needs to define the observation interval and estimation window, as well as the event window. The observation interval for the study was one day; hence, we used daily stock return data. We employed a 21-day event window, comprising 10 pre-event days and 10 post-event days. Although we mainly focused on the immediate market reaction using a three-day event window (-1, +1), we also used seven-day (-3, +3), 15-day (-7, +7) and 21-day (-10, +10) event windows for further analysis. The estimation window was used to determine the ordinary least squares (OLS) estimators of the market model parameters. For each firm, a 250-day period before the fraud disclosure period (the event window) was used as the estimation window.

3.4.5 Regression model and variables

To examine if women's presence on the board was related to the market reaction to the allegation of corporate misconduct, we tested for a systematic relationship between announcement period changes in the stock prices of the firms and corporate board gender diversity. The dependent variable for the cross-sectional regression was *CAR* over several event windows relative to the announcement day (day = 0) for the accused firms. The primary test variable in our context was the presence of female members on the corporate board, as we sought to analyse the association between board gender diversity and market reactions to the disclosure of fraud. The variable *Fem_Board* was defined as the number of women members on the board. We expected a positive relationship between female presence and *CAR*, signifying that more female members on the corporate board reduced negative market reactions.

We included several other variables to control for company financial characteristics that could influence the market reaction to the disclosure of fraud.

To capture the effect of fraud on company reputation, we used measures of qualitative and quantitative features to assess the pervasiveness and persistence of the fraud, following Palmrose et al. (2004). We defined core fraud as an indicator variable that takes the value of 1 for firms that committed fraud related to revenue, cost of sales or operating expense accounts for ongoing operations, and 0 otherwise. Palmrose and Scholz (2004) found that core restatements were positively associated with shareholder litigation, suggesting that investors regard revenue or cost restatements as more serious. Market perception of the fraud disclosure could also depend on the pervasiveness and persistence of the fraud, which in turn may affect investor perception of the magnitude of the fraud and subsequent firm performance. To assess this, we included a variable to express the number of years that the firm had been involved in the fraudulent activity (*Fraud_years*). We expected a negative association between the number of years that the fraud was committed and the stock price reaction.

We also included three other control variables representing firm characteristics that could influence stock price reactions to fraud detection, following prior studies (Ma et al., 2016; Palmrose et al., 2004). Prior research found that market reactions are larger for smaller firms. Griffin et al. (2001) showed that both the short- and long-term stock price reactions were more pronounced for smaller firms. Thus, we included the natural logarithm of total assets (*Firm size*) as the control for firm size. The second variable was the ratio of total debt to total asset (*Leverage*), as market reactions may also vary according to debt levels (Palmrose et al., 2004; Song & Han, 2017). Finally, the market reaction may differ across firms depending on recent stock performance. Therefore, we included a measure of buy-and-hold abnormal returns (*Past*

returns) calculated over the 120 days prior to the disclosure date, following Palmrose et al. (2004) and Wu (2002). We presented two other governance variables to enable a better understanding of the sample firms' board characteristics: number of board members (*Board_size*) and proportion of independent members on the board (*Board_independence*). Further, to analyse the implications of legal and reputational penalties, we included additional variables following Murphy et al. (2009): *Mkt_Cap* (equity capitalisation at the fiscal year-end prior to announcement, in million dollars), *Legal_Fine* (legal penalties imposed on firms for financial misconduct, reported in AAER, in million dollars), *Adjusted_Fine* (ratio of *Legal_Fine* to *Mkt_Cap*) and *ΔMKT_Value*$_{(T1,\ T2)}$ (estimated announcement period change in market value of equity, equal to the product of $CAR_{i(T1,T2)}$ and *Mkt_Cap*).

3.5 Descriptive statistics and univariate results

This section is divided into several subsections. Section 3.5.1 presents basic information about the variables, while Section 3.5.2 presents the descriptive statistics of the abnormal returns around the disclosure periods. Several figures are included to illustrate the effect of announcements on the AAR and CAR. Section 3.5.3 presents the univariate analysis of the market reaction for firms with variations in gender mix on the board, while Section 3.5.4 describes the stock price reactions based on types of fraud and types of disclosure.

3.5.1 Descriptive statistics

Table 3.4 presents the descriptive statistics of the test and other variables for the full sample of fraud firms. The table shows that, on average, the fraud

firms experienced a significant drop of -8.94 per cent in the stock price around three days after the disclosure of fraud. On average, the convicted firms were involved in the fraudulent acts for around three years, with a maximum of 24 years. About 52 per cent of firms were indicted for fraud related to core items in the financial statements, such as revenue or cost items. In terms of board characteristics, the convicted firms on average had nine members on the board, with around 73 per cent being independent members. The average prior 120-day returns for the sample firms were -19.4 per cent, the mean book value of the total assets of the sample firms was US$65,193 million and the mean debt/asset ratio was 24 per cent.

Table 3.4: Descriptive statistics

This table reports the full sample descriptive statistics of the variables for the selected 246 sample firms. *CAR* is the three-day Cumulative Abnormal Return for the sample firms around the disclosure date. *Fraud_years* is the number of years during which the fraud was committed. *Core_fraud* is an indicator variable set equal to 1 if the fraud involved revenue, cost of sales or operating expense accounts for ongoing operations, and 0 otherwise. *Board_size* is the number of board members. *Board_independence* is the number of independent members on the board. *Fem_board* is the number of female members on the board. *Past_returns* are the buy-and-hold abnormal returns calculated over the 120 days prior to the disclosure date. *Firm_size* is the book value of total assets (in millions of dollars) of the sample firms. *Leverage* is total debt divided by total assets of the sample firms. All financial and governance variables were measured at the fiscal year-end prior to the disclosure year.

Variable	N	Mean	Std dev.	Min.	Max.
CAR (%)	246	-8.940	22.396	-157.591	40.630
Fraud years	246	3.004	2.711	1	24
Core fraud	246	0.520	0.501	0	1
Board characteristics					
Board_size	246	9.237	3.322	2	22
Board_independence	246	73.254	16.099	0	100
Fem_Board	246	1.008	1.109	0	6
Financial characteristics					
Past returns	243	-0.194	0.514	-3.563	1.472
Total assets (in mill $)	246	65193.7	255445.9	0	2415689
Leverage	246	0.245	0.230	0	2.266

3.5.2 Market reaction to announcement of fraud

In this section, we analyse the stock price reaction to the revelation of fraud among the sample firms. Table 3.5 presents the descriptive statistics of the abnormal returns for the sample firms around the disclosure period. Given that the news at Day 0 may have been released at close of trading, we could expect reactions to some announcements on Day +1. Similarly, price behaviour at Day -1 could capture early news leakage.

Consistent with prior research, we found that, on average, allegations of misconduct resulted in significant negative stock price reactions. As shown in Table 3.5, the firms experienced negative abnormal returns in each of the three

days, significant at the 0.01 level. The comparatively smaller yet significant abnormal returns of -1.03 per cent (t-statistics -3.789) on Day -1 indicated that the market anticipation of the announcement effect primarily occurred on Day 0 and Day +1. Therefore, the abnormal returns on both Day 0 and Day +1 were significantly negative, with the largest price impact on the event day (-4.812 per cent, significant at the 0.01 level), followed by significant negative abnormal returns on Day +1 (-3.098 per cent, significant at the 0.01 level), demonstrating that the market continues to react after the revelation of fraud.

Table 3.5: Descriptive statistics of abnormal returns

This table presents the summary statistics of abnormal returns for the three days surrounding the first disclosure of corporate fraud. The market-adjusted abnormal returns were calculated for a sample of 246 firms, with the announcements made during 1995 to 2015. The event day (day = 0) was the first day of the fraud announcement in the news media. *** denotes statistical significance at the 0.01 level (two-tailed test). The null hypothesis was abnormal returns = 0.

	Event windows surrounding disclosure date (day = 0)		
	-1	**0**	**1**
Market-adjusted abnormal returns (%)			
Mean	-1.030	-4.812	-3.098
(t-statistic)	(-3.789)***	(-17.705)***	(-11.4)***
Median	-0.194	-0.896	-0.353
Standard deviation	8.506	14.383	12.203
Minimum	-106.555	-118.330	-102.295
Maximum	28.316	21.671	39.926
Sum	–253.318	-1183.831	-762.230
Count	246	246	246

To further illustrate the stock price behaviour, we calculated AAR and CAAR over longer event windows (from Day -10 to Day +10) for the whole sample of firms (Panel A, Table 3.6), and CAR for four selected event windows (Panel B, Table 3.6). As seen in the results in Panel A, the reaction to the announcement is significant over the period -1 to +1. Panel B shows that, during the three-day

announcement period surrounding the announcement, there was a significant negative stock price reaction of -8.94 per cent (significant at the 0.01 level). The significant negative market reaction increased in the periods examined. Indeed, there was a large negative announcement-period stock price reaction for larger event windows of seven days (-9.45 per cent), 15 days (-11.48 per cent) and 21 days (-12.28 per cent), all significant at the 0.01 level. These results imply that the market perceives the conviction of fraud as a red flag, having adverse effects on future economic prospects.

Table 3.6: Abnormal returns around first disclosure

Panel A in this table presents the AAR and CAAR of the sample of 246 firms from Day -10 to Day +10 around the first public disclosure of the fraud conviction. Panel B reports the CAR for selected event windows. *CAR* (-1, +1) is the cumulative three-day announcement period excess return, *CAR* (-3, +3) is the cumulative seven-day announcement period excess return, *CAR* (-7, +7) is the cumulative 15-day announcement period excess return and *CAR* (-10, +10) is the cumulative 21-day announcement period excess return. The event day (day = 0) is the first day of the fraud announcement in the news media. The sample period was 1995 to 2015. *** and ** denote statistical significance at the 0.01 and 0.05 levels (two-tailed tests).

Panel A: Daily abnormal returns

Event date	*AAR*	t-statistics	*CAAR*
-10	-0.345	-1.270	-0.345
-9	-0.354	-1.304	-0.699
-8	0.092	0.340	-0.607
-7	-0.324	-1.194	-0.932
-6	-0.184	-0.676	-1.115
-5	-0.763	-2.808***	-1.879
-4	-0.158	-0.582	-2.037
-3	-0.535	-1.967**	-2.571
-2	0.129	0.475	-2.442
-1	-1.029	-3.788***	-3.472
0	-4.812	-17.705***	-8.284
1	-3.098	-11.399***	-11.383
2	0.063	0.232	-11.319
3	-0.163	-0.600	-11.483
4	0.031	0.116	-11.451
5	0.094	0.345	-11.357
6	-0.408	-1.499	-11.765
7	-0.320	-1.179	-12.086
8	0.055	0.204	-12.030
9	-0.011	-0.040	-12.041
10	-0.237	-0.870	-12.278

Panel B: CAR over selected event windows

	Mean	t-statistics
CAR (-1, +1)	-8.941	-18.991***
CAR (-3, +3)	-9.446	-13.135***
CAR (-7, +7)	-11.478	-10.904***
CAR (-10, +10)	-12.278	-9.857***

Figures 3.2 and 3.3 illustrate the stock price behaviour of the sample firms around the announcement period. Figure 3.2 shows the AAR for the sample firms around 10 days before and after the announcement day. Although there seemed to be some sort of information leakage prior to the three-day event window (significant abnormal returns on day -3 and -5), the majority of stock price decline occurred within the three days surrounding the fraud allegation announcement. As evident in Figure 3.2, there was a spike in the line representing AAR during the three days surrounding the event day (day = 0), indicating the immediate response of the market to the announcement. The returns remained relatively flat subsequent to the event window, suggesting that the initial reaction was not an overreaction (Hribar & Jenkins, 2004). Similarly, the CAAR for the sample firms shown in Figure 3.3 showed a significant drop in the three days around the event day, and then becoming relatively smooth thereafter.

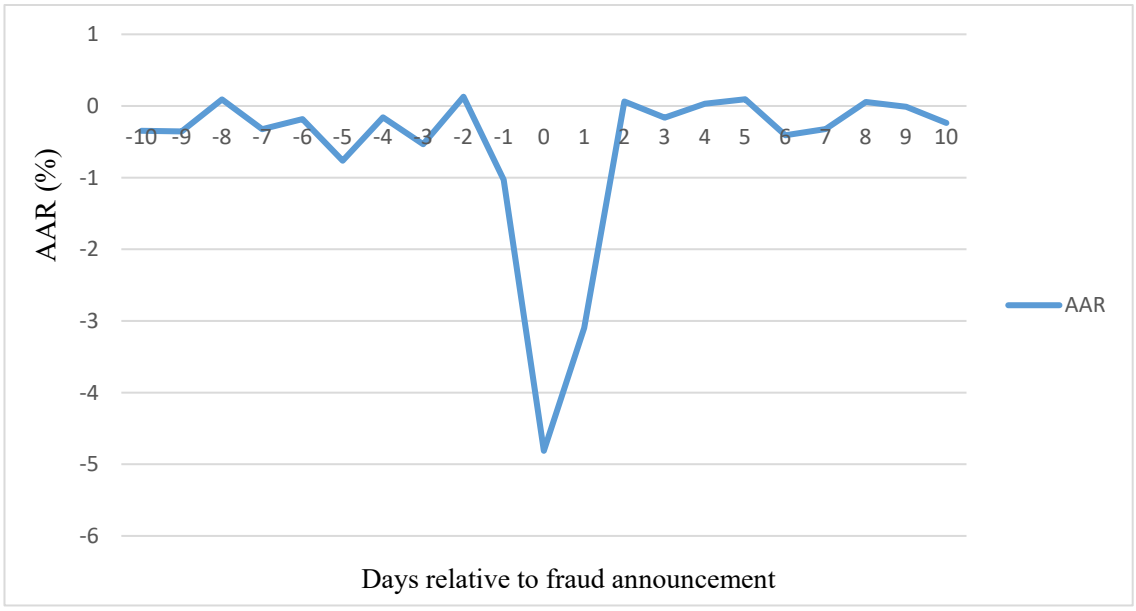

Figure 3.2: Average abnormal returns (AAR)

This figure shows the AAR for the sample of 246 firms before and after the announcement of fraud. The event date (Day 0) is the first announcement of a firm's violation or alleged violation. The abnormal stock return behaviour was observed for 21 days surrounding the announcement in the news media during 1995 to 2015.

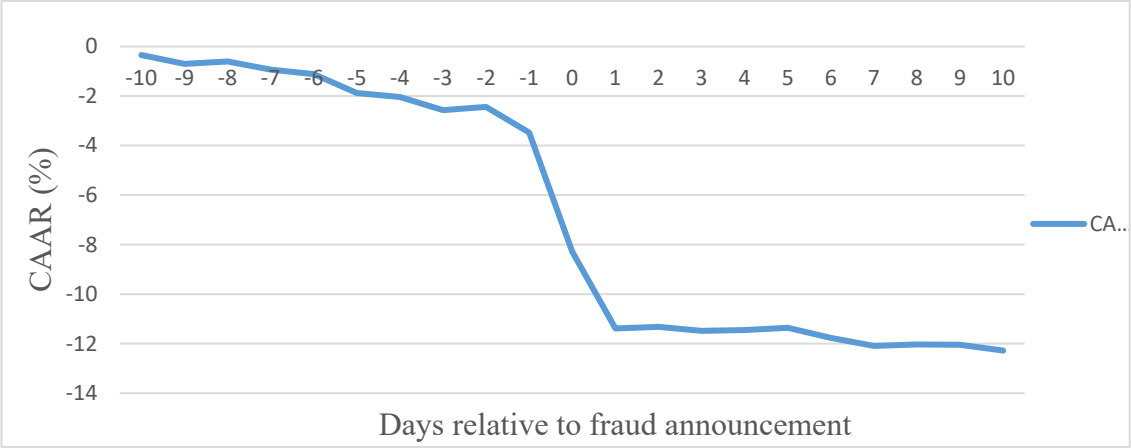

Figure 3.3: Cumulative average abnormal returns (CAAR)

This figure shows the CAAR for the sample of 246 firms before and after the announcement of fraud. The event date (Day 0) is the first public announcement of a firm's violation or alleged violation. The abnormal stock return behaviour was observed for 21 days surrounding the announcement in the news media during 1995 to 2015.

3.5.3 Univariate analysis of market reaction for gender-diverse and non-gender-diverse firms

This section provides univariate evidence on the linkage between the abnormal returns associated with the fraud announcement and gender diversity on the corporate board. Table 3.7 compares the abnormal returns of five different event windows across the sample firms grouped according to gender mix in the corporate board. We estimated abnormal returns over windows of (-1, 0), (-1, +1), (-3, +3), (-7, +7) and (-10, +10) relative to the event day. For the comparison of abnormal returns across firms, we split the sample firms into three subgroups based on varying levels of gender diversity on the board: (i) firms with no woman on the board, (ii) firms with one woman on the board and (iii) firms with two or more women on the board. We found that, irrespective of the event windows, more gender-diverse firms (firms with two or more women on the board) experienced the least negative market reaction to the announcement of fraud, significant at the 0.01 level. The results showed that, although the stock price

reactions were negative and significant in all subgroups, the mean returns were two to three times lower for the subgroup of firms with two or more women on the board. For example, we observed a two-day (t = -1, 0) CAR of -8.37 per cent (t-statistic of -10.524) for firms with no women on the board as compared with -1.83 per cent (t-statistic of -4.28) for firms with two or more women on the board. Similar results were observed for the other event windows. We used the F-test for the significance of subgroup differences, and the results (untabulated) supported the conclusion that the CARs were statistically smaller for firms with two or more women board members. Thus, the results of the univariate analysis provided evidence to support our hypothesis that firms with more women on the corporate board face less harsh stock market reactions.

3.5.4 Type of fraud, type of first disclosure and market reaction

In this segment, we investigate the announcement period abnormal returns based on the type of corporate misconduct and type of first public disclosure. The financial frauds committed by the convicted firms were categorised into four types: (i) financial statement fraud, (ii) disclosure fraud, (iii) bribery and (iv) other fraud (such as insider trading, options backdating and embezzlement). Next, we split the sample firms into four groups based on the type of misconduct committed by them, and observed the investor reactions for five different event windows. The results are presented in Table 3.8.

The results in Table 3.8 show that the market responded significantly negatively to the announcement of all types of corporate misconduct. Within fraud categories, financial statement fraud generated the largest negative stock market reaction, averaging around -8 to -15 per cent in various event windows, significant

at the 0.01 level. The result was similar to the findings of Desai et al. (2006), who documented the largest negative price reactions for revenue and cost-related restatements. Allegations of disclosure fraud produced the next largest stock price reaction, ranging from -3 to -14 per cent across the event windows, significant at the 0.01 level. Other fraud also garnered the same significant negative returns (averaging from -3 per cent to -11 per cent) as disclosure fraud. These results imply that investors perceive financial statement fraud as more serious than the other types of misconduct. The significance of the subgroup differences in CAR were tested using ANOVA. The results indicate that, the abnormal returns among the fraud subgroups differed significantly for event windows of two-day, three-day and twenty-one day.

Table 3.7: Univariate analysis of stock market reaction

This table reports the results of the univariate analysis of the stock market reaction for the announcement of fraud across firms with gender-diverse and non-gender-diverse boards. The sample comprised the selected 246 firms that were convicted of fraud by the SEC during the period 1999 to 2015. The whole sample was split into sub-samples of firms with varying levels of gender diversity in their corporate boards. The subgroups were: (i) firms with zero women on the board, (ii) firms with one woman on the board and (iii) firms with two or more women on the board. *CAR* is the announcement period excess returns from days *i* to *n*, whereby the event date (Day 0) is the first public announcement of a firm's violation or alleged violation. *CAR* is calculated over five different event windows. *CAR* (-1, 0) is the cumulative two-day announcement period excess return, *CAR* (-1, +1) is the cumulative three-day announcement period excess return, *CAR* (-3, +3) is the cumulative seven-day announcement period excess return, *CAR* (-7, +7) is the cumulative 15-day announcement period excess return and *CAR* (-10, +10) is the cumulative 21-day announcement period excess return. *** denotes statistical significance at the 0.01 level (two-tailed tests). We used t-test for significance of means and F-test for significance of subgroup differences.

	Category							
Variable	**Whole sample (*N* = 246)**		**Firms with zero women on the board (*N* = 100)**		**Firms with one woman on the board (*N* = 80)**		**Firms with two or more women on the board (*N* = 66)**	
	Mean	**t-stat.**	**Mean**	**t-stat.**	**Mean**	**t-stat.**	**Mean**	**t-stat.**
CAR (-1, 0)	-5.842	-15.198***	-8.369	-10.524***	-5.994	-11.229***	-1.828	-4.281***
CAR (-1,+1)	-8.940	-18.990***	-11.061	-11.357***	-11.327	-17.325***	-2.834	-5.419***
CAR (-3,+3)	-9.446	-13.135***	-11.585	-7.787***	-11.651	-11.666***	-3.531	-4.420***
CAR (-7,+7)	-11.478	-10.903***	-18.050	-8.288***	-10.799	-7.387***	-2.344	-2.004***
CAR (-10,+10)	-12.277	-9.857***	-19.773	-7.673***	-11.313	-6.540***	-2.089	-1.510

Table 3.8: Stock market reaction across types of corporate fraud

This table reports the stock market reaction to the announcement of various types of fraud for the sample of 246 firms. The sample firms were categorised into four groups based on the financial fraud committed by the firms, described in Table B2 in Appendix B. *CAR* is the announcement period excess returns from days *i* to *n*, whereby the event date (Day 0) is the first public announcement of a firm's violation or alleged violation. *CAR* is calculated over five different event windows. *CAR* (-1, 0) is the cumulative two-day announcement period excess return, *CAR* (-1, +1) is the cumulative three-day announcement period excess return, *CAR* (-3, +3) is the cumulative seven-day announcement period excess return, *CAR* (-7, +7) is the cumulative 15-day announcement period excess return and *CAR* (-10, +10) is the cumulative 21-day announcement period excess return. ***, ** and * denote statistical significance at the 0.01, 0.05 and 0.10, and levels (two-tailed tests), respectively, using t-test for significance of means and analysis of variance (ANOVA) for significance of subgroup differences.

	Types of corporate fraud								
Variable	**Financial statement fraud (*N* = 127)**		**Disclosure fraud (*N* = 44)**		**Bribery (*N* = 43)**		**Other fraud (*N* = 32)**		**ANOVA**
	Mean	**t-stat.**	**Mean**	**t-stat.**	**Mean**	**t-stat.**	**Mean**	**t-stat.**	**F-stat.**
CAR (-1, 0)	-8.686	-17.563***	-3.727	-2.637***	-1.470	-2.914***	-3.327	-4.705***	2.509*
CAR (-1, +1)	-12.983	-21.435***	-6.661	-3.847***	-2.403	-3.888***	-4.759	-5.496***	3.200**
CAR (-3, +3)	-12.834	-13.872***	-9.183	-3.473***	-3.097	-3.281***	-4.756	-3.595***	2.098
CAR (-7, +7)	-14.839	-10.957***	-12.459	-3.219***	-2.727	-1.974***	-8.424	-4.351***	1.949
CAR (-10, +10)	-15.518	-9.684***	-14.537	-3.174***	-1.008	-0.617	-11.356	-4.957***	2.501**

Next, we analysed how the market responded to the type of first public disclosure of the alleged violation. For this, we split the sample firms into six subgroups based on the type of initial announcement, and then estimated the announcement period abnormal returns for each of the subgroups of firms for five event windows relative to the announcement day. The results presented in Table 3.9 revealed that the market responded most negatively when the firm announced financial statement restatement (mean return ranging from -12 to -26 per cent, significant at the 0.01 level). Previous studies also documented large negative price responses to restatements (Desai et al., 2006; Palmrose et al., 2004). Informed investors appear to consider and revise their perception according to the fact that restatements are essentially an acknowledgement by the company that the original financial statements violated GAAP.

We also documented a large significant negative stock price decline of -13 per cent (significant at the 0.01 level) when the firm announced internal investigation during the three days around the announcement day. This negative response is expected, since, in most of these cases, the firms disclosed that the investigation was a result of information regarding the ongoing fraudulent activities either through auditors, SEC officials or the firm's own executives. Hence, this announcement was a stronger confirmation of the alleged fraud than the announcement of an SEC investigation, which in many instances resulted in case dismissal for lack of evidence. Announcements of SEC investigation, SEC charging the firms and other public disclosures (shareholder lawsuit or resignation of auditor/director) also resulted in a substantial decline in stock prices.

Table 3.9: Stock market reaction across types of first public disclosure

This table reports the stock market reaction to the categories of first public announcement of fraud for the sample of 246 firms. The sample firms were categorised into six groups based on the type of first public disclosure reported in Table 3.3. The disclosure group 'other sources' included shareholder lawsuits, investigation by other agencies and resignation by auditor/director. *CAR* is the announcement period excess returns from days *i* to *n*, whereby the event date (Day 0) is the first public announcement of a firm's violation or alleged violation. *CAR* is calculated over five different event windows. *CAR* (-1, 0) is the cumulative two-day announcement period excess return, *CAR* (-1, +1) is the cumulative three-day announcement period excess return, *CAR* (-3, +3) is the cumulative seven-day announcement period excess return, *CAR* (-7, +7) is the cumulative 15-day announcement period excess return and *CAR* (-10, +10) is the cumulative 21-day announcement period excess return. *** and ** denote statistical significance at the 0.01 and 0.05 levels (two-tailed tests), respectively, using t-test for significance of means and ANOVA for significance of subgroup differences.

	Type of first public disclosure												
Variable	**SEC investigation (*N* = 96)**		**Settlement with SEC (*N* = 36)**		**Firm charged by SEC (*N* = 34)**		**Firm announces restatement (*N* = 28)**		**Firm internal investigation (*N* = 26)**		**Other sources (*N* = 26)**		**ANOVA**
	Mean	**t-stat.**	**Mean**	**t-stat.**	**Mean**	**t-stat.**	**Mean**	**t-stat.**	**Mean**	**t-stat.**	**Mean**	**t-stat.**	**F-stat.**
CAR (-1, 0)	-6.371	-8.158***	0.349	0.600	-5.536	-6.269***	-12.133	-13.245***	-8.215	-11.169***	-3.714	-3.121***	1.863
CAR (-1, +1)	-8.757	-9.155***	0.686	0.963	-7.931	-7.334***	-17.383	-15.494***	-13.024	-14.458***	-11.091	-7.610***	2.431**
CAR (-3, +3)	-8.264	-5.656***	0.528	0.485	-8.828	-5.344***	-20.171	-11.769***	-10.794	-7.844***	-15.534	-6.978***	2.635**
CAR (-7, +7)	-10.571	-4.943***	0.442	0.278	-10.869	-4.494***	-25.521	-10.172***	-13.349	-6.627***	-15.140	-4.646***	2.636**
CAR (-10, +10)	-11.698	-4.623***	-0.240	-0.127	-9.361	-3.272***	-26.548	-8.943***	-16.050	-6.734***	-15.758	-4.087***	2.572**

We did not observe any significant reaction to the announcement of settlement with the SEC, possibly because in most instances the settlement took several years after the initial information of fraud in the market because of the judicial procedure.

3.6 Multivariate analysis

The results thus far indicated that the market responded with significant negative abnormal returns to the announcement of fraud allegation for the convicted sample firms. To further investigate our hypothesis presented earlier regarding whether the market distinguishes between companies based on gender diversity on the board, we next employed a cross-sectional regression analysis that included the firm characteristics expected to influence market reactions to fraud. The following regression model was employed using the CAR, $CAR_{i(T1,T2)}$, for the sample firms as a dependent variable:

$$CAR_i = \alpha_0 + \alpha_1 Fem\_Board_i + \beta W_i + \varepsilon_i \quad (1)$$

Our main variable of interest here was *Fem_Board*, which indicated the number of female members on the board. W included the set of control variables found to be associated with market reactions to fraud announcements in the earlier literature. α_1 measured the effect of female board presence on the magnitude of the abnormal market returns around the disclosure date. As explained in our hypothesis, we expected a negative relationship between board gender diversity and market reaction to fraud allegation announcement ($\alpha_1 > 0$). The control variables included an indicator variable for firms involved in frauds involving revenue or cost accounts (*Core Fraud*), the number of years over which the fraud was committed (*Fraud_years*), buy-and-hold abnormal returns

calculated over Day -120 to Day -1 (*Past returns*), *Leverage* and *Firm size*. The financial and governance variables were measured in the year prior to the announcement of the fraud. Detailed information on the measurement of variables is presented in Table 3.A1 in Appendix A.

To precisely estimate the effect of board gender as a determinant of magnitude of market reactions to fraud announcements, we estimated five separate cross-sectional multivariate regressions, with the dependent variable being five *CAR* calculated over five event windows of (-1, 0), (-1, +1), (-3, +3), (-7, +7) and (-10, +10). The regression results are reported in Table 3.10. The results documented that the sign of the coefficient of *Fem_Board* was positive and significant at the 0.01 level in all five regression models. This result was consistent with our univariate analysis and supported our hypothesis that, when a firm is convicted of fraud, having more female directors on the corporate board is associated with significantly less negative short-term stock returns. This suggests that investors consider firms' corporate governance features to formulate their perceptions, and recognise firms with more female directors as different from firms with no female directors. For the control variables, we found that *Core Fraud* was negatively associated with the two- and three-day announcement period abnormal returns (significant at the 0.10 level), consistent with our expectation. This result indicated that the market responds more negatively when the fraud involves the revenue or expense accounts of the firm. *Firm size* was positive and significant in all five regression models (significant at the 0.01 level for three-day event window, and significant at the 0.05 and 0.10 levels for other windows). This positive effect of firm size suggests that smaller firms suffer a more negative stock price reaction than do larger firms, consistent

with prior studies (Griffin et al., 2001; Murphy et al., 2009). The results of the other governance or financial controls did not show any significant effect on the announcement period abnormal returns.

The prior analyses suggest that having a female board member is associated with less negative reaction to fraud allegation announcement. However, firms with female board members are likely to be a non-random sample of firms, since this might reflect a firm's self-selection or choice to have female members on board. A selection bias arises when the incidence of having female board member is correlated with the error term of equation (1). In order to address this bias, we have adopted a treatment effect model. This model employs two simultaneously estimated equations:

Outcome: $CAR(-1,+1)_i = \gamma_0 + \gamma_1 FEBM_i + \omega W_i + u_i$ (2)

Treatment: $Fem\_Board\_D_i = \delta_0 + \delta_1 \%WOMEN\_industry_i + \varphi X_i + v_i$ (3)

The control variables (X) in equation (3) are mostly similar to those (W) of in equation (2). In order to control the self-selection it is essential that at least one explanatory variable in treatment equation should effectively predict female board member but does not affect CAR (-1,+1) directly. Therefore, we have included percentage of women employed in each industry category (%WOMEN_industry) in equation (3).

Table 3.11 shows the results from both outcome and treatment equations. Treatment equation results are consistent with our expectations. The coefficient of female board member dummy (FEBM) shows a positive sign, which shows qualitatively similar result to which we found from the results in Table 3.10.

Table 3.10: Stock market reaction and board gender diversity (multiple regression results)

This table reports the results from five different OLS regressions to determine the stock market reaction. The dependent variable *CAR* is the announcement period excess returns from days *i* to *n*, whereby the event date (Day 0) is the first public announcement of a firm's violation or alleged violation. *CAR* is calculated over five different event windows and used as the dependent variable in four respective regression models. *CAR* (-1, 0) is the cumulative two-day announcement period excess return, *CAR* (-1, +1) is the cumulative three-day announcement period excess return, *CAR* (-3, +3) is the cumulative seven-day announcement period excess return, *CAR* (-7, +7) is the cumulative 15-day announcement period excess return and *CAR* (-10, +10) is the cumulative 21-day announcement period excess return. *Fem_board* is the number of women directors on the board. *Core fraud* is an indicator variable set equal to 1 if the fraud involved either revenue, or cost of sales or operating expense accounts for ongoing operations, and 0 otherwise. *Fraud_years* is the number of years over which the fraud was committed. *Past returns* are the buy-and-hold abnormal returns calculated over the 120 days prior to the disclosure date. *Firm size* is the natural log of the book value of total assets (in millions of dollars). *Leverage* is total debt divided by total assets of the sample firms. All the financial and governance variables were measured at the fiscal year-end prior to the disclosure year. ***, ** and * denote statistical significance at the 0.01, 0.05 and 0.10 levels, respectively (two-tailed).

	Dependent variables									
	CAR (1, 0)		***CAR (-1,+1)***		***CAR (-3,+3)***		***CAR (-7,+7)***		***CAR (-10,+10)***	
Independent variables	**Coeff.**	**t-stat.**	**Coeff.**	**t-stat.**	**Coeff.**	**t-stat.**	**Coeff.**	**t-stat.**	**Coeff.**	**t-stat.**
Fem_Board	1.972	2.51***	2.495	2.73***	2.625	2.47***	5.192	4.09***	5.193	3.89***
Core Fraud	-4.144	-1.87*	-5.340	-1.85*	-4.245	-1.3	-1.595	-0.4	-0.487	-0.12
Fraud_years	0.135	0.46	0.249	0.75	0.318	0.88	0.591	1.18	0.624	1.25
Past returns	-4.694	-1.61	-5.544	-1.59	-3.833	-1.01	-6.817	-1.34	-7.043	-1.46
Firm Size	0.000	1.79*	0.000	2.48***	0.000	1.99**	0.000	2.17**	0.000	2.18**
Leverage	-0.346	-0.08	-3.322	-0.52	-4.975	-0.61	-11.790	-1.09	-13.367	-1.34
Intercept	-6.826	-2.93***	-9.933	-3.56***	-10.810	-3.51***	-16.007	-3.84***	-16.542	-3.86***
Adjusted R^2	0.0608		0.0587		0.0413		0.0671		0.0651	
F-statistics	2.34		3.41		2.56		4.63		4.17	
p-value	0.0328		0.003		0.0204		0.0002		0.0005	
N	246		246		246		246		246	

Table 3.11: Treatment effect model

This table reports the results of the Treatment effect model to address the self-selection bias. The variable *%WOMEN_industry* represents the percentage of women employees in each two-digit SIC industry category. *FEBM* is an indicator variable set equal to 1 if there was at least one female member on the board of directors, and 0 otherwise. The first two columns show the coefficients and *p*-values from the Outcome equation. The third and fourth columns show the coefficients and *p*-values from Treatment equation. *Core fraud* is an indicator variable set equal to 1 if the fraud involved either revenue, or cost of sales or operating expense accounts for ongoing operations, and 0 otherwise. *Fraud_years* is the number of years over which the fraud was committed. *Past returns* are the buy-and-hold abnormal returns calculated over the 120 days prior to the disclosure date. *Firm size* is the natural log of the book value of total assets (in millions of dollars). *Leverage* is total debt divided by total assets of the sample firms. *Board_size* is the number of board members. *Board_independence* is the number of independent members on the board. All the financial and governance variables were measured at the fiscal year-end prior to the disclosure year. P-values are based on two-tailed T-tests.

	Outcome variable = CAR(-1,+1) **Treatment variable = Female director on board**			
	Outcome equation		**Treatment equation**	
Variables	**Coefficient**	***p*-value**	**Coefficient**	***p*-value**
FEBM (treatment variable)	3.514	0.588		
Core Fraud	-5.262	0.056		
Fraud_years	0.264	0.597		
Past returns	-5.352	0.039		
Firm Size	0.000	0.506	0.000	0.650
Leverage	-4.190	0.480	0.044	0.929
Board_size	-0.823	0.376	0.316	0.000
Board_independence	1.927	0.029	0.017	0.827
%WOMEN_industry			0.012	0.093
Intercept	-14.831	0.003	-3.015	0.000
Wald Chi-square	20.430			
(p-value)	0.009			
LR test of independence equations (ρ =0) Chi-squared statistic	0.280			
(p-value)	0.595			
N	242			

3.7 Legal and reputational penalties

Generally stock prices decline in response to investor anticipation that convicted firms will be penalised in terms of either monetary fees or non-monetary sanctions when the court seeks to settle the charges for financial misconduct. Therefore, the monetary or non-monetary impositions become vital to firm reputation. We obtained detailed information on the types of settlements by manually reading each of the AAERs published during 1999 to 2015, and we present the settlement information for the sample firms in the following sections.

3.7.1 Legal penalties

We obtained settlement data by manually reading the SEC litigation releases and AAERs thoroughly. These SEC documents report whether a case is still awaiting final judgement from the court or has been settled. In cases where the SEC had reached a settlement with the firm or its executives, we obtained information on the type of regulatory punishments and the amount of monetary penalty, where applicable. Table 3.12 summarises both the monetary penalties (Panel A) and non-monetary legal penalties (Panel B) for the sample firms.

Among the sample firms, the majority (179 firms, 73 per cent) were imposed with monetary penalties, and the remaining 67 firms were imposed with non-monetary sanctions. Panel A in Table 3.12 shows number of firms imposed with monetary penalty, along with the subgroups of the monetary punishments. Among the firms penalised monetarily, around 50 per cent firms were imposed with only legal fines, whereas other firms were imposed with added punishments, such as restriction on holding directorial positions (74 firms), permanent injunctive orders (15 firms) and even prison sentences for convicted management officials (four firms). Panel A also displays the summary statistics for the monetary

penalties. The mean (median) legal penalty was US$24.92 million (US$1.42 million). For non-monetary penalties (Panel B, Table 3.12), the majority of sanctions (53 firms, around 80 per cent) corresponded with cease-and-desist orders, which are court orders to stop illegal activities immediately.

Table 3.12: Legal sanctions for corporate frauds

This table presents a summary of the monetary and non-monetary penalties imposed through SEC and federal sanctions for corporate fraud charges against the 246 sample firms for which we obtained information. Cease-and-desist orders are legally binding orders from the federal regulatory agency to stop fraudulent activities. Permanent injunctions refer to court orders regarding future violations. Managerial bars prevent the convicted personnel of the firm from serving in certain managerial positions for a certain number of years. Monetary penalties include legal fines, disgorgements and interest.

Panel A: Monetary penalties	
Number of firms imposed with legal fines	179
Only monetary penalty	86
Managerial bar alongside legal fines	74
Permanent injunction orders alongside legal fines	15
Prison sentence alongside legal fines	4
Penalties ($million)	
Total	4,485.81
Mean	24.92
Median	1.42
Minimum	0.02
Maximum	701
Panel B: Non-monetary sanctions	
Number of firms imposed with non-monetary sanctions	67
SEC cease-and-desist orders	53
SEC permanent injunctions	9
Bar on holding managerial position	5

3.7.2 Economic effect of fraud

One major consequence of the decline in stock prices after the announcement of fraud is the resulting change in market value for the convicted firms. Therefore, evaluating the announcement period change in equity value

(wealth loss) resulting from the market response, alongside comparing the legal fines with the pre-announcement equity values, may provide better insight into the relevance of legal and reputational penalties for companies with gender-diverse and non-gender-diverse boards. This wealth loss (*ΔMKT_Value*) generally reflects the market's loss of confidence in the firms, as a result of probable revisions by investors on the valuation of the company and anticipation of added expenses to be borne by the firms (such as legal fines, court fees and costs for remedial actions). The loss in market value is also indicative of the lost goodwill and reputation in the market produced by the negative publicity—hence the name 'reputational penalty'.

The legal penalty is presented by the amount of legal fines (in million USD) imposed on the sample of the convicted firm. We further scaled the legal fine amount by the equity market capitalisation (*Mkt_Cap*) of the firms to create adjusted legal fine (*Adjusted_Fine*), for a better understanding of the monetary penalty with respect to equity market value. We then developed a comparative picture of the legal fines and adjusted legal fines for firms with varying gender mix on the board. The economic effect of the announcement period (*ΔMKT_Value*) was calculated by multiplying the mean value of the equity market capitalisation (in million USD) of the firms with the CAR for five event windows, following Murphy et al. (2009). Table 3.13 presents a summary of the legal and reputational penalties across the whole sample and subgroup of sample firms based on the gender mix on the board. The table indicates that the share value losses far surpassed the average legal penalty. The mean legal fine of US$24.92 million explained only 1.54 per cent of the aggregate total share value loss of US$1,624.02 million in the three-day event window. Therefore, it is evident that

the largest penalties are imposed by the market itself, and therefore the equity value losses should be more concerning to the shareholders and other stockholders. Hence, considerable efforts are essential to identify the mechanisms through which the market reputation of the firms can be enhanced, so that the reputational losses are minimised.

Next, although the mean monetary penalty of the firms with two or more female board members amounted to US$58 million, which was higher than the other subgroups, the adjusted legal fine (*Adjusted_Fine*) was the lowest (0.20 per cent) compared with firms with zero or one female board member. It indicates that the firms with better gender-mix on the board (with two or more female board members) faced less monetary fine proportional to market capitalisation. In regard to market value losses, even though firms with two or more female board members suffered the least negative stock price decline (reported in Table 3.7), we see that, these firms suffered the largest wealth losses across all event windows. This occurred because these firms had distinctively larger market capitalisation (mean US$46,451 million) compared with firms with one female (mean US$13,079 million) and firms with zero females on the board (mean US$3,563 million). This indicated that only comparatively large firms had two or more female members on the corporate board. For example, in our sample, the firms with two or more female board members included large market capitalisation firms, such as The Coca-Cola Company, Pfizer Inc., IBM Inc. and The City Group Inc.

However, we noted that, the wealth losses reported in Table 3.12 for the sample firms may suffer from survivorship bias, since cases with a material legal outcome and/or a surprise to the investment community are more likely to receive

increased media attention and hence more likely to be reported in *The Wall Street Journal* or other sources (Murphy et al., 2009).

Table 3.13: Legal and reputational penalties and board gender diversity

This table presents the announcement period wealth effect for the announcement of fraud and legal penalties imposed on convicted firms, across firms with varying levels of gender diversity on the corporate board. The sample was 246 firms convicted of fraud by the SEC during the period 1999 to 2015. The sample was split into sub-samples of firms with varying levels of gender diversity on their respective corporate boards. The subgroups were as follows: (i) firms with zero women on the board, (ii) firms with one woman on the board and (iii) firms with two or more women on the board. *Legal_Fine* is the penalty imposed on the firms for financial misconduct, reported in AAER ($million). *Mkt_Cap* is the equity market capitalisation at the fiscal year-end prior to the announcement ($million). *Adjusted_Fine* is the ratio of *Legal_Fine* to equity market capitalisation (*Mkt_Cap*). *CAR* is the announcement period excess returns from days *i* to *n*, whereby the event date (Day 0) is the first public announcement of a firm's violation or alleged violation. *ΔMKT_Value* is the estimated announcement period change in market value of equity, equal to the product of $CAR_{i(T1,T2)}$ and *Mkt_Cap*. *ΔMKT_Value* is calculated over five different event windows.

		Category		
Variable	**Whole sample (*N* = 246)**	**Firms with zero women on board (*N* = 100)**	**Firms with one woman on board (*N* = 80)**	**Firms with two or more women on board (*N* = 66)**
Legal_Fine ($million)	24.937	15.313	12.109	58.153
Adjusted_Fine	0.012	0.026	0.004	0.002
ΔMKT_Value (-1, 0)	-1,061.191	-298.219	-784.054	-849.323
ΔMKT_Value (-1, +1)	-1,624.023	-394.159	-1,481.486	-1,316.682
ΔMKT_Value (-3, +3)	-1,715.850	-412.848	-1,523.875	-1,640.323
ΔMKT_Value (-7, +7)	-2,085.034	-643.211	-1,412.476	-1,088.813
ΔMKT_Value (-10, +10)	-2,230.201	-704.586	-1,479.732	-970.695

3.8 Conclusion

Gender mix on the corporate board has received much importance as a means of improving corporate governance. As evident through legislative requirements in a number of countries, such as Norway, Finland and Spain, where companies must have at least 40 per cent of women directors (Catalyst, 2014), the issue of board gender diversity has practical implications. Despite these implications, women representation on corporate boards around the world remains low. The US ranks ninth in the world in terms of board seats held by women, and women hold a 19 per cent directorship in the S&P 500 companies (Catalyst, 2014). Most of the earlier research contributions related to board gender diversity have primarily focused only firm performance implications, with hardly any evidence on investor perceptions towards gender-diverse boards.

This study provided new evidence on the effects of board gender diversity on the magnitude of stock market reaction to the disclosure of corporate fraud for a selected sample of US firms during 1999 and 2015. The stock market reaction was measured by estimating the CAR for a number of event windows around the announcement day using a market-adjusted model for the sample firms.

We predicted a strong negative price reaction to the revelation of fraud, mainly because such news not only results in reassessment of the company's valuation, but also paves the way for market conservatism regarding the company's potential liabilities resulting from the lawsuit. As expected, we found that the 246 sample firms experienced a statistically significant negative abnormal return of -8.94 per cent (significant at the 0.01 level) in the three-day window surrounding the announcement day. We next examined whether firms with more female members on the board may receive less negative share price

reactions than firms with very few to no women board members, given that a better gender mix may result in efficient foresight of company actions and timely financial reporting, thereby enhancing corporate reputation and trust among investors. The results from the univariate analysis and multivariate regression model provided support for our hypothesis that having more female board members significantly reduces negative price reactions. The additional analysis indicated that firms experienced significantly more negative market reaction when the first public disclosure was the announcement of restatement by the firm, and when the firm was alleged of committing financial statement frauds. The study also demonstrated significant legal and reputational penalties being imposed on convicted firms in terms of monetary fines and losses in market value from price decline around the announcement day.

This research has both practical and policy implications. Our results suggest that, the legal fines imposed on the convicted firms were only a small portion of the total cost, with the greater cost being the large equity value losses resulting from lost reputation. Thus, female representation on the board may be used as a mechanism to enhance corporations' public image by conveying a message of progressive leadership. Understanding the effect of board gender diversity on stock prices is essential in evaluating the gender quota legislations in the US and elsewhere. Governance choices are firm specific; thus, the value-maximising governance choices differ among firms (Larcker, Ormazabal & Taylor, 2011). Hence, given the scenario that board gender composition is relevant to investor perception, any policy formulation regarding improving board governance may benefit from the findings of this study.

Chapter 4: Conclusion

4.1 Overview

Corporate fraud entails enormous risks to corporations and investors by exposing them to monetary losses and reputational penalties. The Global Economic Crime and Fraud Survey (PricewaterhouseCoopers, 2020) showed that companies worldwide continue to struggle with the ever-increasing rates of financial and economic crimes, amounting to a total loss of around US$42 billion in 2018 to 2019. The report further noted that asset misappropriation, bribery and financial statement frauds constituted 31, 30 and 28 per cent of the global financial crimes in 2018 to 2019. With this in mind, businesses and regulatory bodies strive to reduce the exposure to financial crimes by implementing policies regarding auditory services, financial reporting processes and (most importantly) corporate governance mechanisms. Increasing business complexity has elevated the significance of the role of the board of directors in organisations. Fraud has attracted significant coverage in academic research, investigating the root causes and consequences. Nevertheless, relatively little is known about the role of gender of the board members as a pivotal factor related to corporate illegal behaviour. Moreover, no prior studies incorporated board gender to determine stock market responses to the disclosure of fraud. Therefore, this thesis provides the first empirical evidence of examining board gender in within-firm deliberations and among stock market perceptions.

The board of directors is deemed the central monitoring and controlling body of a firm (Fama & Jensen, 1983); therefore, board composition is crucial for effective board decisions and subsequent firm outcomes. Shafer (2015) stated that the existing ethical climate in a corporation reflects the ‘tone at the top’, and leads to adjustments in the ethical attitudes of executives towards rationalising

earnings management or adopting other corrupt means. A number of studies suggest that there is substantial gender difference in ethical evaluations and risk perceptions, which may have an important bearing on business decisions (Cohen, Pant & Sharp, 1998; Jianakoplos & Bernasek, 1998; Sunden & Surette, 1998). Heterogeneity in team demography may influence strategic decision-making by providing a breadth of perspectives (Wiersema & Bantel, 1992). A power-sharing board ensures the ideology of equality and lessens dominance of any single voice. Research evidence indicates that greater gender diversity on the board leads to adopting more persistent and less risky financial policies (Bernile, Bhagwat & Yonker, 2018). The perception of improved integrity in both financial reporting practices and the internal control environment resulting from a female presence on the management team may also enhance the firm reputation in the market.

We hypothesised that women on corporate boards are more likely to blow the whistle on unethical behaviours than are their male counterparts, and the presence of a gender-diverse board is likely to minimise the negative perceptions of investors in the event of fraud disclosure through the news media. We conducted two separate yet interrelated empirical studies with a comprehensive, hand-collected dataset on the US corporations that were convicted by the SEC of committing financial fraud over a span of 16 years.

4.2 Major findings

The hand-collected data set of the thesis allowed us to examine several general features of the corporate fraud cases in the US corporations during 1999 to 2015. We observed that, among the various types of corporate misconducts, the most frequently committed fraud was financial statement fraud, which primarily involves manipulation in revenue and cost accounts of the firm. Further, in most of the fraud cases, both the firm and the top management were found to be guilty in carrying out the fraud scheme. In addition, on an average, a corporate crime lasted for about 2.33 years.

The first study in Chapter 2 used a matched-pair sample of 195 fraud firms and 195 control firms, and employed a probit model for the main empirical analysis. The results of the first study provided evidence that firms with at least one female board member were 20.3 per cent less likely to commit fraud, consistent with our expectation. Moreover, audit committee size and director experience on the board had significant effects in reducing corporate fraud, while large firms were more likely to be involved in illegal conduct. The study also showed that the effect of a female presence was more pronounced in the post-SOX periods, resulting in a 30.4 per cent reduction in fraud probability, compared with a 17.3 per cent reduction in the pre-SOX years. We also found that a gender-diverse board was more competent in reducing fraud in male-dominated and low fraud-intensive industries. The results from further analysis indicated that a female board presence reduced firm's involvement in financial statement fraud. Moreover, a gender-diverse board had lower probability of committing more severe fraud, proxied by the imposition of monetary penalty at the settlement in federal court. Nonetheless, the reduction in fraud probability was not linearly

related to the number of women on boards, meaning that an optimal level of diversity ensures the best board deliberations.

The second study presented in Chapter 3 used a sample of 246 US firms that were convicted of financial fraud in the news media, and employed event study methodology, with manual collection of the fraud disclosure dates. Using a range of event windows from three to 21 days, the study found that, on average, the sample firms experienced a significant decline in share price in response to fraud disclosure. The average three-day CAR was -8.94 per cent. However, the cross-sectional regression analysis showed that, firms with more female directors experienced significantly less negative announcement period CAR, relative to firms with few or no female directors. Further analysis showed that firms suffered more negative reactions to the announcement of financial fraud involvement and to the disclosure of restatement by the alleged firms. We also analysed the economic effect of the fraud disclosure, by calculating the wealth losses around the disclosure date. Although majority 73 per cent of the convicted firms were penalized monetarily by the federal court, the average legal fines of US$24.92 million equal only 1.54 per cent of the total equity value losses of US$1,624.02 million associated with the fraud disclosure.

4.3 Gender diversity and fraud: policy implications

The findings of this thesis have implications for corporations, regulatory authorities, capital market legislators and public policy analysts worldwide, and particularly in the US. The US government introduced the SOX Act in 2002 in response to some of the biggest corporate scandals that shook investor confidence in the market. The Act emphasised the need to have more

independent directors on the board to ensure stronger corporate governance. While the general focus was to strengthen monitoring function, the Act did not include diversity as a tool to combat corruption. In contrast, the legislative gender balance requirement instituted in several countries in recent years (such as Norway, Belgium, France and Germany) is an indication of greater perceived efficiency in board decisions and is a step forwards in reducing the gender gap in the boardroom. Hence, legislative stakeholders in the US may step in to facilitate incorporating gender diversity, possibly in selected sectors at the initial level. Only recently, in 2018, California became the first US state to mandate board gender quota requiring the listed companies in the state to have at least two (three) female members in a five (six or more) member boards (Greene, Intintoli and Kahle, 2020). The steps taken thus far towards diversity in the US are relatively limited compared with other developed societies. Even in the absence of a mandatory gender quota regulation, US corporations can consider adding female members to an all-male board to ensure the addition of dynamism in the boardroom and reduce groupthink. As we found that market-imposed penalties associated with fraud detection were extremely large, increasing market reputation may help reduce these wealth losses. In this regard also, adding female members to the corporate board can be considered to strengthen market reputation, through signalling the good governance of the firm.

This study also helps to understand discrimination in corporate positions. Even in a developed market such as the US, we found that only 22 per cent of the sample firms in our first study had more than one female director on the board. Moreover, only nine of the sample firms had a woman holding the top managerial posts (CEO/CFO), while only three firms had a female chairperson. In the sample

firms in the second study, about 41 per cent firms had all-male boards and only about 26 per cent of firms had two or more female directors on the board. This does not come as a surprise, since, according to a report by the MSCI (2019), female directors held about 26 per cent of board seats in US corporations in 2019, while female directorships worldwide stand at 20 per cent. Given the evidence of the positive effect of a female board presence on monitoring functions, financial reporting quality, strategic business decisions and overall group behaviour, there could be a business case for women in the boardroom. Our research results provided evidence that a female board presence can produce benefits even at a low diversity level.

However, effective monitoring of management activities to alleviate corporate misconduct will require managers to have certain expert attributes. Some studies have found weak or no evidence of value addition or risk reduction resulting from a female board presence (Carter et al., 2010; Sila, Gonzalez & Hagendorff, 2016). Therefore, the decision to employ female members on the corporate board should be made based on their distinctive demographic features (such as business experience and education), rather than implementation of specific gender quota. Moreover, the benefits of gender diversity depend on the existing governance structure of the firm. Provided that the firm has good governance in place, mandating a gender quota may appear counterproductive, with chaos in the boardroom. Thus, policies may instead focus on ensuring and increasing the inclusion of the voices of both genders. This research will be effective to understand the costs and benefits of diversity in the workplace and stock market, and to study corporate governance issues.

4.4 Limitations and avenues for further research

This research faced the following limitations. The sample size for both studies was reduced from the initial sample numbers because of lack of access to governance data. This could enable a potential robustness analysis in the future, especially for the first study, since a large sample may allow for robustness tests using a bivariate probit model that accounts for the partial observability issue of corporate fraud.[16] The further availability of governance data may also enable the use of other governance variables as control variables in the empirical models. In addition, possible future research may aim to identify the channels through which gender diversity affects fraudulent behaviour in an organisation. While this study's results were tested to avoid endogeneity problems in our empirical investigation, further methods could be applied to reduce endogeneity concerns from unobservable factors. For example, the propensity-score matching approach could be adopted to match the treatment and control firms to address selection based on observable firm characteristics (Levi et al., 2014).

This research could be further extended in the context of emerging, developing and other developed nations, with varying levels of societal conservativeness and market development. This would open up the opportunity to explore the effect of gender across societies with variations in gender roles and gendered expectations. Future research may also employ a survey approach to interview directors and estimate their views on corporate ethicality.

The director appointment process was beyond the scope of our study, yet is important in the context of governance. Whether the inclusion of a woman

[16] The partial observability problem of corporate fraud indicates that, in the standard probit model, we do not observe the probability of fraud—rather, we observe the probability of detected fraud, which is quite different from the former (Wang, 2013).

member on the board is merely a diversity agenda or whether the appointment employs the best candidate from a pool of qualified personnel bears importance on the efficiency of diversity during board discussions. Moreover, little is known about the shift in the group behaviour of firms with gender-diverse and all-male boards. These and other similar questions are worth pursuing in future analysis.

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Appendices

Appendix A

Table 2.A1: Classification of corporate frauds

	Fraud name	Description
1	Financial statement fraud	Refers to revenue/income misstatement/ overstatement, prematurely/improperly recognising revenue/income, recognising conditional sales, GAAP violations in revenue/expense recording, and improperly inflating the value of securities, among others.
2	Misrepresentation and disclosure fraud	Includes failure to disclose material information to the public/investors/auditors, fraud schemes such as defrauding investors by issuing false press releases regarding company financial health, defraud by concealing losses/gains, false representation of purchase orders and related party transactions, among others.
3	Bribery	Bribery involves illegal amounts paid to government officials in various countries to obtain permits/contracts in violation of the *Foreign Corrupt Practices Act.*
4	Other frauds	Includes all other offences, such as company fund embezzlement, insider trading, manipulating markets through improper sale of stocks, forgery in purchase orders, options backdating, asset fabrication and sale of unregistered stocks.

Table 2.A2: Definition of variables (Chapter 2)

Variable name	Definition
Dependent variable	
FRAUD	A dummy variable that takes the value of 1 if the firm is subject to an AAER and 0 otherwise.
Independent variable	
FEBM	A dummy variable that takes the value of 1 if there is at least one female member on the board of directors, and 0 otherwise.
Control variables	
BSIZE	Natural logarithm of total number of members on the board.
BRD_IND	Proportion of independent members on the board.

ASIZE	Natural logarithm of total number of audit committee members.
AC_IND	Natural logarithm of number of independent members on the audit committee.
CEO_DUAL	A dummy variable that takes the value of 1 if the chairperson and CEO positions are held by the same person, and 0 otherwise.
CEO_TENURE	The number of years the CEO has served on the board.
DIR_EXP	The average number of years each board member has been on the board.
%WOMEN_industry	The percentage of female employees in each two-digit SIC industry category.
GROWTH_S	Average sales growth in the two years prior to the year of fraud.
LOSS	A dummy variable that takes the value of 1 if the firm has recorded a loss in each of the two years prior to the fraud year, and 0 otherwise.
ROA	Return on assets.
FSIZE	Natural logarithm of total assets.
Additional variables	
MULTI_FEM_DIR	A dummy variable that takes the value of 1 if a company has more than one female director on the board, and 0 otherwise.
FEBM_D1	A dummy variable that takes the value of 1 if there is at least 10 per cent of women directors on the board, and 0 otherwise.
FEBM_D2	A dummy variable that takes the value of 1 if there is at least 20 per cent of women directors on the board, and 0 otherwise.
FEBM_D2	A dummy variable that takes the value of 1 if there is at least 30 per cent of women directors on the board, and 0 otherwise.
FEBM_Prop	The proportion of female directors on the board.
AGE_DIR	The average age of the board members.
MULTI_DIR	The number of directors on the board with multiple directorships in publicly listed companies.
CH_TENURE	The number of years the chairperson has served on the board.
GROWTH_TA	Average asset growth in the two years prior to the year of the fraud.
TQ	Tobin's Q (market value of equity + book value of total debt) / book value of total assets).
LEV	Total debt divided by total assets.
REV	Total sales or revenue in a given year (in million US$).

MCAP	Market capitalisation (market price at year-end × common shares outstanding).
TA	The sum of total assets.
LTDA	Long-term debt divided by total assets.
Year	Year dummy variable.
Industry	Industry dummy variable.
Error term	
ε	Error term.

Table 3.A1: Definition of variables (Chapter 3)

Variable name	Definition
Dependent variable	
$CAR_{i(T1,T2)}$	Market-adjusted CAR over specific event windows, where day = 0 is the date of the first public disclosure of fraud.
Independent variable	
Fem_Board	The number of female members on the corporate board.
Control variables (W)	
Core Fraud	Dummy variable that takes the value of 1 for firms that committed fraud related to revenue, cost of sales or operating expense accounts for ongoing operations, and 0 otherwise.
Fraud_ years	The number of years over which the fraud was committed.
Past returns	Buy-and-hold abnormal returns calculated over the 120 days prior to the disclosure date (Day -120 to Day -1).
Leverage	Total debt divided by total assets, based on book values at year-end prior to the announcement.
Firm size	Natural logarithm of total assets at fiscal year-end prior to the announcement.
Other variables	
Board_size	The number of members on the corporate board.
Board_independence	The proportion of independent members on the board.
Mkt_Cap	Equity capitalisation at the fiscal year-end prior to the announcement ($million).
Legal_Fine	Legal penalties imposed on the firms for financial misconduct, reported in AAER ($million).
Adjusted_Fine	Ratio of *Legal_Fine* to *Mkt_Cap.*
ΔMKT_Value$_{(T1, T2)}$	Estimated announcement period change in market value of equity, equal to the product of $CAR_{i(T1,T2)}$ and *Mkt_Cap.*