Board Gender Diversity, Innovation and Performance of Listed Small and Medium Enterprises in Australia

Debi Mitra

Student No. 3060703

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Victoria University Melbourne, Victoria Australia

Faculty—Institute of Sustainable Industries & Liveable Cities (ISILC)

Principal Supervisor: Dr Yongqiang Li

Co-Supervisor: Professor Dong Wang

Abstract

This research analyses the relationship between gender diversity and financial performance within corporate boards of Australian Securities Exchange (ASX) listed small and medium enterprises (SMEs). It is innovative in that it addresses a gap in prior research, which either fails to consider, or is inconclusive regarding the relationship between gender diversity and financial performance in the context of SMEs. The proportion of female representation is identified in prior literature as an important variable to measure board gender diversity. Accordingly, a gender diversity index has been developed.

This study discusses the key theoretical perspectives underlying the gender diversity framework. The conceptual framework underpinning this study to test the hypotheses have been based on resource dependence theory, human capital theory, agency theory, upper echelon theory and critical mass theory. Hypotheses were developed to test relationships between: (1) gender diversity and firm innovation; (2) innovation and firm performance; and (3) the effect of gender diversity on firm performance. The potential moderating effect of innovation on the relationship between gender diversity and firm performance was also tested. The study further analysed the effect of situational and contextual factors associated with the organisational environment under which board decisions are made.

The research design used a quantitative research method to test the two research questions and four hypotheses. The sample is consisted of 798 SME firms from 2014 to 2018. The study was extended to include association between gender diversity and performance for the subgroups of nine SME sectors. Data were extracted from the Orbis database and firm annual reports. Linear fixed model and adjusted mixed-effect models were used for data analysis.

The primary independent variable is gender diversity, which is measured by Blau's index; the dependent variable is firm performance, which is measured by return on assets (ROA), return on equity (ROE), return on capital employed (ROCE) and Tobin's Q. This study used four control variables: firm size, board size, firm age, and leverage. The potential

for innovation as a moderating variable was explored using the firms' research and development (R&D) expenditure.

The study found that the percentage of female board members was 24.94% in 2018 compared with 16.67% in 2014. The sector-wise performance data demonstrated no significant difference in firm performance with the presence of gender diversity (75% of performances across all sectors are positive but not statistically significant). There was no association between gender diversity and performance. Further, the potential effect of R&D expenditure as a moderator was not statistically significant.

This study is innovative because no previous research on board gender diversity and its influence on listed SME performance, with innovation as a potential moderating variable, has been undertaken in the Australian setting. The findings of this study are consistent with prior research, where contradictory results or no results were found when investigating the effect of board diversity on performance.

The analysis of the results shows some significant effects of gender diversity on financial performance, and it found no evidence of a significant negative link between board gender diversity and performance. Thus, the results do not contradict the case for the inclusion of female members in SME corporate boards. The effect of gender diversity may be different under different circumstances and at different times and across firms and time periods; the results may offset and produce no effect on firm performance.

Dedication

For my mother (Mrs Supti Chowdhury) and my mother-in-law (Mrs Sibarani Mitra) and to my husband (Dr Biswanath Mitra) and my son (Professor Biswadev Mitra), with love.

Declaration of Authenticity

I, Debi Mitra, declare that the PhD thesis entitled 'Board gender diversity, innovation, and performance of listed small and medium enterprises in Australia: An empirical study' is no more than 80,000 words in length, including quotes and exclusive of tables, figures, appendices, bibliography, references, and footnotes. This thesis contains no material that has been submitted previously, in whole or in part, for the award of any other academic degree or diploma. Except where otherwise indicated, this thesis is my own work.

I have conducted my research in alignment with the Australian Code for the Responsible Conduct of Research and Victoria University's Higher Degree by Research Policy and Procedures.

Signature… 

Date… 22/12/2021

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List of Abbreviations

AI	Age index
ANP	Analytic network process
ASIC	Australian Securities and Investments Commission
AT	Agency theory
BIST	Borsa Istanbul
BLS	Business Longitudinal Survey
CFO	Cash flow from operations
CIS	Community Innovation Survey
CMT	Critical mass theory
COE	Cost of equity
CRSP	Centre for Research in Securities Prices
CSP	Core service performance
EBIT	Earnings before interest and Tax
EI	Education index
FFI	Female FTSE Index
FP	Financial performance
FTSE	Financial Times Stock Exchange
GD	Gender diversity
GDI	Gender diversity index

GI	Gender index
GICS	Global industry classification standard
GMM	General method of moment
HCT	Human capital theory
IP	Intellectual property
IPR	Intellectual property rights
IQV	Index of qualitative variation
IRRC	Investor Responsibility Research Center
KIF	Knowledge-intensive firms
LIML	Limited information maximum likelihood
M&A	Mergers and acquisitions
ML	Maximum likelihood
NSE	National stock exchange
OLS	Ordinary least squares
R&D	Research and development
RDT	Resource dependence theory
REML	Restricted maximum likelihood
ROA	Return on assets
ROCE	Return on capital employed
ROE	Return on equity
ROI	Return on investment

ROS	Return on sales
S&P	Standard & Poor
SEC	Securities and Exchange Commission
SEM	Structural equation modelling
SIT	Social identity theory
ST	Signalling Theory
STEM&F	Science, technology, engineering, mathematics, and finance
TA	Total assets
TI	Tenure index
UET	Upper echelon theory
UK	United Kingdom
VIF	Variance inflation factor
WOCB	Women on corporate board

Chapter 1: Introduction to the Study

1.1 Introduction

Interest in the diversity of corporate boards is partly driven by progressive social views. Regulators and policymakers in several countries worldwide have introduced initiatives to increase female participation in corporate boardrooms (Chapple & Humphrey 2014). The under-representation of female directors on corporate boards has been addressed by several countries; for example, female members must hold 40% of board positions in Norway, France and Spain, and 33% in Italy; there is a requirement for at least one female board member in Finland and India (Chapple & Humphrey 2014; Joecks, Pull & Vetter 2013; Kagzi & Guha 2018b). The justification for this approach is that female representation on boards can improve a company's governance (Adams & Ferreira 2009). Israel was the first country to recognise the importance of including female directors on corporate boards in 1991; it was made mandatory to have at least one female member in 1999, and eventually a quota of at least 50% female representation on boards was mandated in 2010. Other countries, such as the Netherlands, Kenya, Italy, Iceland, Denmark, Canada, Belgium, and Australia have all enacted legislation to ensure a female presence on corporate boards (Srivastava, Das & Pattanayak 2018).

The ASX is Australia's primary stock market index. In Australia, the Australian Securities Exchange (ASX) Corporate Governance Council amended the *ASX Corporate Governance Principles and Recommendations* to recommend gender diversity (with effect from 1 January 2011). Under the gender diversity recommendation in 2014, all listed companies were encouraged to establish and disclose a diversity policy that included requirements for boards, or a relevant committee of the board, to set measurable objectives for achieving gender diversity, and to assess annually both the objectives and the entity's progress in achieving them (ASX Corporate Governance Council 2014). There has been a significant increase in the number of female directors on the corporate boards of ASX-listed companies since implementation of the gender diversity recommendation. The measurable objective for achieving gender diversity in board composition should be 30% for organisations in the Standard & Poor (S&P)/ASX 300 Index, in accordance with the revised ASX Corporate Governance Principles and Recommendations 27 Feb 2019 (ASX Corporate Governance Council 2019).

There are inconsistencies in the results of findings of the relationship between gender diversity and firm performance in prior studies. The empirical evidence regarding board gender diversity measured in terms of the proportion of female board members and firm performance has been unconvincing, conflicting and, at times, controversial (Joecks, Pull & Vetter 2013). Some authors suggest that it would be worthwhile to study intervening variables between performance and gender diversity to understand the effect of gender diversity on firm performance (Kochan et al. 2003). Innovation can lead to the development of capabilities that may improve firm performance. As such, innovation will be used as moderating variable to study the relationship between gender diversity and firm performance.

1.2 Thesis Aims and Objectives

1.2.1 The Aim of the Thesis

The general aim of this research is to investigate the effect of gender diversity on the financial performances of listed SMEs in Australia. The primary objective is to link gender diversity and performance, with innovation as a moderating variable.

1.3 General Objectives

Following general objectives have been identified to achieve the aims of this research:

- to examine the relationship between gender diversity and innovation
- to examine the relationship between innovation and firm performance
- to examine the relationship between gender diversity and firm performance
- to test the moderating effect of innovation on gender diversity and performance of ASX-listed SMEs firms.

To achieve these research objectives, the research will address the problems of the relationships between gender diversity and financial performance in the listed SMEs in Australia by developing the following research questions. These questions are developed further in the conceptual framework outlined in Chapter 4.

1.3.1 Research Questions

RQ 1: Is gender diversity associated with the performance of listed SMEs in Australia?

RQ 2: Does innovation moderate the association between gender diversity and firm performance of listed SMEs in Australia?

1.4 Significance of the Study

Although there is extensive literature on gender diversity in corporate boards and firm financial performance, no study has investigated the relationship between board gender diversity, innovation and performance, and its association in ASX-listed SME firms. The purpose of this study is to determine whether gender diversity influences success in decision-making positions related to performance within listed SME firms in the Australian Stock Exchange.

1.4.1 The Field of Interest

The proportion of female representation is an important variable in gender diversity. However, gender diversity implies additional heterogeneity related to gender-specific experience, knowledge, and capabilities (Ruiz-Jiménez, Fuentes-Fuentes & Ruiz-Arroyo 2016).

Governance variables, such as board diversity, have received a reasonable amount of attention from scholars in the context of large corporate entities; however, much less attention has been paid to studying governance in the context of SMEs. There are currently a limited number of studies on the relationship between gender diversity and firm performance in SMEs. How governance operates in these (mostly) tightly owned and family-controlled firms is less understood than how it operates in publicly held firms, where the division of ownership and management is more pronounced. Because of this, these studies have yielded mixed results. As the same people are involved at all levels in SMEs, there is an overlap between ownership, committee membership and top management (Mustakallio, Autio & Zahra 2002). This aspect of board composition appears relevant to this study. A diverse board in a listed SME is likely to be more independent and proactive in making corporate decisions.

1.4.2 Gaps in Previous Studies

The literature review provided significant empirical and theoretical support for this study. However, some knowledge gaps in the study of gender diversity and firm performance

are identified for listed SME sectors. This study attempts to fill these gaps by adopting a quantitative research method that measures the variables and relationships to be tested, and to achieve the thesis' objectives.

There are mixed results on the number of studies conducted to measure female director influence on the performance of firms in Australia (Ali, Kulik & Metz 2011; Nguyen & Faff 2006; Vafaei, Ahmed & Mather 2015; Wang & Clift 2009). Most Australian studies found that gender-diverse boards had a positive effect on firm performance. However, Wang and Clift (2009) found no significant association between gender and ethnic diversity on a board's financial performance. Notably, some studies were undertaken prior to the ASX's diversity disclosure requirements when few firms included female directors. None of these Australian studies relates explicitly to SMEs. This justifies the current author's decision to investigate the relationship between gender diversity and firm performance with the moderating effect of innovation, focusing on Australia's listed SMEs.

1.5 Contribution of Knowledge

The findings of this study, which includes a gender diversity index (GDI), may help theorists define the right mix of females on corporate boards in SMEs to improve performance, which will significantly contribute to the Australian economy. Also, by taking input from the findings, regulators and industry can formulate policies to foster gender diversity on corporate boards in Australian industries.

1.6 Scope of the Study

This study focuses on the effect of board gender diversity on the performance of ASX-listed SMEs in Australia. It seeks to uncover when and how gender diversity improves performance by employing innovation as a moderating variable.

1.7 Definition of Key Terms

Key Terms and definitions are described in Table 1.1

Table 1.1 Key Terms and Definitions

Terms	Definition
Corporate board of directors	A board of directors is the supreme authority in the organisation that is expected to oversee the governance and overall functioning of an organisation (Carroll & Buchholtz 2014)
Board diversity	Degree of heterogeneity among board members with respect to gender, age, education, and tenure (Wiley & Monllor-Tormos 2018)
Board demographic diversity	Diversity based on demographic background, nationality, gender, age, educational, functional, and occupational background (Kagzi & Guha 2018a)
Blau's index	Considers the diversity of a board as an aggregate-level index of interpersonal similarity along one or several dimensions (Kagzi & Guha 2018b)
Gender diversity index	A composite diversity index built on gender, age, education, and tenure of female board members that treats all variables equally (Ararat, Aksu & Cetin 2015)
Small and medium enterprises (SMEs)	SME business size in Australia is categorised as having fewer than 200 employees (Bhagat & Bolton 2008; Bhattacharya 2014)
Firm performance	A composite assessment of how well an organisation executes its financial parameters
Innovation	Innovation is defined as those strategies that provide new strategic opportunities for a firm to create new services or product lines

1.8 Thesis Organisation

The empirical study of board gender diversity, innovation, and performance of AXS-listed SMEs in Australia in this thesis is organised into eight different chapters. The objective of the thesis, as outlined in this chapter, is to investigate the effect of gender diversity in corporate boards on a firm's financial performance and to test the moderating effect of innovation on the relationship between gender diversity and the performance of listed SMEs in Australia. The significance and justifications of the study are outlined in Chapter 1.

Chapter 2 provides a review of the relevant academic literature. The existing knowledge base is explored in Chapter 2 to provide a more insightful picture of the constructs and relationships that form the subject of the empirical research, and to identify the research gaps related to the topic. The opening section deals with the review of relevant theories.

There are five key theories underlying the gender diversity framework: agency, resource dependency, human capital, upper echelons, and critical mass theory. These are all considered for this study. These theories provide the framework for evaluating the relationship between gender-diverse boards and financial performance. This is followed by review of the empirical research on board gender diversity and performance that includes corporate boards, a description of board function, board composition, board gender diversity and its effect on performance. The next section describes innovation, followed by the effect of gender diversity on innovation, and the effect of innovation on performance. The final section summarises the literature review, research gaps and research methods used to study the effect of gender diversity on firm performance. This lays the foundation for a discussion of the contextual factors that affect the relationship between gender diversity and firm performance.

Chapter 3 considers the context in which the study takes place. The chapter commences with an explanation of the importance of a contextual study on gender diversity and performance. This chapter also examines some of the contextual factors at multiple levels, including demographic occupation, industry settings, and climate of inclusion, shareholder protection and gender parity, which can all influence the performance outcome of a gender-diverse board.

Chapter 4 discusses the theoretical framework, based on the theories outlined in Chapter 2 and the design of a conceptual model for the purpose of this research with the definition of the variables under investigation. Based on the theoretical framework and conceptual model outlined in the chapter, the next section identifies the relationship and association to be explored, together with a justification of why they have influenced this study and a description of the nature and direction of the relationship. The analysis and explanation of the theoretical framework is completed by addressing the research propositions and hypotheses.

The hypotheses to be tested are developed to achieve the objectives of the study; these are detailed in the next section.

The research design and methodology adopted to conduct the research are presented in Chapter 5. The methodology involves a quantitative research method to achieve the objectives of the thesis, collect baseline secondary data on the variables and explore the

research questions and four hypotheses posed. This chapter focuses on the discussion of research methods and methodology that underpins this study. Section 2 of the chapter details the research design, including the type of study, the study setting, the units of analysis, data sources and descriptions of the variables. Section 3 describes the research method, the types of data, the sample, and the analysis for modelling the association between gender diversity and firm performance. This is followed by a description of the mixed-effect model employed for the data analysis in Section 4.

Chapter 6 presents the results and analysis of the data. In this chapter, the hypotheses are tested, and the results are then reported and discussed. Descriptive statistical data, data analysis and the empirical findings related to the univariable and adjusted (multivariable) variables are then presented in turn for different industry sectors in SMEs, and as an overall set of findings.

Chapter 7 examines the study's findings as they relate to the research questions.

Chapter 8 summarises the thesis and presents the implications of this study. This is accompanied by a discussion on the lessons learnt and avenues for further study. This chapter also highlights the main findings, implications, limitations, and recommendations for future research.

Chapter 2: Literature Review

2.1 Introduction

The preceding chapter introduced the background to this thesis and its objectives, rationale, and significance. This chapter sets the theoretical context within which the study was undertaken. To reveal the existing knowledge and give a more insightful view of the constructs and relationships to be studied, a review of the literature was conducted. This chapter reviews the relevant theories and empirical work on which this study is based and discusses the relevant knowledge used to identify the research gaps. Board diversity is defined as the degree of heterogeneity among board member with respect to gender, using Blau's index. Empirical studies have identified that there is a relationship between board diversity, performance, and innovation (Cabeza-García, Del Brío & Rueda 2021; Miller & Triana 2009).

This chapter has five sections. Section 2.2 identifies the relevant theories supporting this research. There are five major theories that explain the effect of board diversity on firm performance and innovation. These theories are resource dependence theory (RDT), human capital theory (HCT), agency theory (AT), upper echelon theory (UET), and critical mass theory (CMT). The most two relevant of these are AT and RDT. The major arguments in support of using these theories is the benefit of board diversity derived from them. These theories posit that boards provide sound and timely advice to executives, and as such provide guidance, legitimacy, and access to essential resources (Wiley & Monllor-Tormos 2018).

As this thesis concerns the study of board gender diversity, the literature related to corporate boards that examines their function, female representation and composition is presented at the beginning of Section 2.3. This is followed by a review of the empirical literature on the relationship between board gender diversity and firm performance. The major research is led by the authors, which includes Muhammad Ali (Australia), Renee Adams (Australia), David Carter (USA), Amy Hillman (USA) and Siri Terjesen Norway/USA).

This chapter then reviews the literature associated with innovation, gender diversity and firm performance in Section 2.4. This section continues with an examination of the effect

of gender diversity and innovation, and the influence of innovation on performance. Using innovation as an intervening variable (mediating/moderating) in the relationship between gender diversity and firm performance, as investigated in prior research, is also described in this section.

Section 2.6 summarises the literature review and identifies the research gaps.

2.2 Theories

Researchers around the world have proposed various theories that recognise the contribution of female members on boards (Srivastava, Das & Pattanayak 2018). Some of the theories established in previous research on gender diversity and firm performance are shown in Table 2.1 (Kagzi & Guha 2018b). However, some theories on intergroup relationships envisage that diversity might have an unsettling role on in-group dynamics in boardrooms. Dysfunctional group dynamics that are due to gender diversity might be explained through social identity theory (SIT), similarity–attraction theory and self-categorisation theory. According to SIT, individuals try to maintain a positive self-identity by surrounding themselves with similar in-group individuals (Tajfel 2010). Similarity–attraction theory, as proposed by Byrne (1997), states that individuals are positively inclined towards similarly minded members, which results in enhanced social interaction and the formation of coalitions among a group, but also leads to conflict with individuals in different groups. Self-categorisation theory (Turner et al. 1987) assumes that people create social categories based on visible characteristics, which may initiate the formation of gender-based groups in corporate boards. These subgroups, without the critical mass of female board members, have the potential to generate distrust across female and male directors and might dilute the benefits of gender diversity.

Table 2.1: Theories Used to Support Diversity in Previous Studies

Author	Theory	Rationale	Research Question
Kılıç and Kuzey (2016)	Resource Dependence Theory (RDT)	Board's function of providing critical resources to the firm	How does gender diversity facilitate a broad range of internal and external resources to enhance firm performance>
Kılıç and Kuzey (2016)	Agency Theory (AT)	Monitoring management on behalf of the shareholders which can help to reduce agency cost.	How does board gender diversity influence firm performance?
Post and Byron (2015)	Upper Echelons Theory (UET)	Director differs in the cognitive frame that influences performance.	How does director heterogeneity in terms of gender influence firm performance?
Liu, Wei and Zie. (2014)	Critical Mass Theory (CMT)	Desire level of critical mass influence performance.	What minimum number of women is needed to influence firm performance?
Zona, Minichilli and Zattoni (2013)	Contingency Theory (CT)	Specific conditions and factors that include intensity of innovation legal systems that have gender quotas in corporate boards and societal beliefs towards diversity and how these can influence firm performance.	How is board diversity pronounced in the presence of some specific contextual factors, such as firm size?
Miller and Triana (2009)	Signalling Theory (ST)	Diverse board communicate visible signals that influence stakeholders.	Does board diversity provide signals to the stakeholders of the firm?
Miller and Triana (2009)	Behavioural Theory (BT)	Demographic attributes of directors influence the decision-making process	What is the connection between board racial and gender diversity and innovation?
Singh (2007)	Human Capital Theory (HCT)	Director's expertise acquired in different roles and different field can influence firm performance.	How does a board's expertise influence firm performance?

Singh (2007)	Social Capital Theory (SCT)	Emphasis on social ties of the directors with other sources of external influence.	How do a board's social networks influence firm performance?

No single theory predicts the nature of the relationship between board diversity and financial performance, as different theories typically examine different dimensions of corporate boards (Carter et al. 2010). RDT examines the beneficial effects of board diversity from the perspective of resources. In contrast, AT examines the positive effects of board diversity from the perspective of the independent monitoring function of the board (Kagzi & Guha 2018b). This study will build on these theoretical views that support gender diversity on boards and will closely link them with the functioning of the board to explain the relationship between two variables of interest by integrating them with HCT. This will provide a thorough understanding of the relationship between gender diversity and firm performance. The strengths and weaknesses of each theory that influence performance are discussed below, followed by a summary of the leading researchers and their pioneering work.

2.2.1 Resource Dependence Theory

RDT offers a logical explanation for the board functions of managing the external environment, acquiring the necessary external resources, reinforcing organisational legitimacy, preserving a company's image, and thereby providing critical resources to the firm (Hillman, Shropshire & Cannella 2007; Kagzi & Guha 2018b; Wiley & Monllor-Tormos 2018). RDT proposes that boards of directors link their firms to other external organisations, thus addressing environmental dependencies and enabling exchange and the acquisition of resources necessary for survival (Kılıç & Kuzey 2016). The basic principle of RDT is the effective management of uncertainty in the firm's environment. Firms need board members with experience, and with networking and collaboration capabilities, to engage agreements and secure resources at an optimum cost (Dalton & Dalton 2010). A gender-diverse board has the potential to gain access to a broader range of stakeholder groups (Siciliano 1996), boost organisational legitimacy (Hillman & Dalziel 2003) and information exchange (Larcker, So & Wang 2013); in turn, this may enhance customer and employee relations (Hillman, Shropshire & Cannella 2007). It might also result in enhanced reputation and credibility with stakeholders (investors and customers), perceptions of legitimacy and trustworthiness, which can then subsequently improve a firm's profitability and value (Carter, Simkins & Simpson 2003; Erhardt, Werbel & Shrader 2003; Perrault 2015).

Pfeffer and Salancik (1978), as cited in Carter et al. (2010), suggest that the primary benefits of external connections related to acquiring resources include the facility of information and expertise, the creation of channels of communication, the commitment of support from organisations in the external environment, and the creation of acceptability for the firm in the external environment. These benefits can be translated into characteristics, and types of directors that provide resources to the firm as insiders, business experts, support specialists, and have a dominant role in the community. In turn, this should produce better firm performance (Hillman, Cannella & Paetzold 2000). Diverse directors bring different perspectives and approaches to solving corporate board problems (Carter et al. 2010). Board gender diversity helps to improve a board's reputation, and the quality of board decisions can help to broaden channels of communication. Female directors can also help a company maintain a good relationship with female clients, consumers and connect with female employees. Accordingly, they are in a position to obtain increases in commitment from female employees, reducing turnover costs and increasing firm profitability (Liu, Wei & Xie 2014). Thus, it can be said that RDT supports the benefits of gender diversity in improving a firm's financial performance.

A summary of the work by different researchers using RDT as their lead theory, along with other theories, is detailed in Table 2.2. This clearly demonstrates the positive effect of gender diversity on the performance of firms.

Table 2.2: Summary of Resource Dependence Theory

Leading Authors	Key Literature	Propositions (Hypothesis)	Strengths	Limitations
Carter, Simkins, Simpson, and D'Souza (2010).	The gender and ethnic diversity of us boards and board committees and firm financial performance	The purpose of this empirical analysis is to explore the relationship between the gender and ethnic minority diversity of the board and the financial performance of the firm.	The study did not find a significant relationship between the gender or ethnic diversity of the board, or important board committees, or the financial performance for a sample of major US corporations.	This study only used firms that could identify the ethnicity of all the directors.
Kılıç and Kuzey (2016).	The effect of board gender diversity on firm performance: evidence from turkey	H1. The presence of female directors on a board significantly and positively affects firm performance. H2. The proportion of female directors on a board significantly and positively affects firm performance. H3. Gender diversity (as measured by the Blau index) significantly positively affects firm performance.	This study shows that the inclusion of female directors is positively related to the financial performance of firms, as measured by the return on assets (ROA), the return on equity (RO) and the return on sales (ROS).	There are only a small number of females participating on Turkish boards to date. Thus, future studies should re-examine the relationship between gender diversity and firm performance after the legislation regarding gender quotas has been implemented.
Lückerath-Rovers (2013).	Women on boards and firm performance	To investigate the relationship between women directors and	The results show that firms with women directors perform better	Although a relationship between the presence of women on the board and

Leading Authors	Key Literature	Propositions (Hypothesis)	Strengths	Limitations
		company performance in the Netherlands.	than those without women on their boards.	firm performance can be found, it is more difficult to prove a causal relationship.
Vafaei, Ahmed and Mather (2015).	Board diversity and financial performance in the top 500 Australian firms	H1: The presence of women on corporate boards is positively associated with firm financial performance.	The results also show that board diversity is positively associated with financial performance after controlling for several firm-specific, ownership and governance characteristics and potential endogeneity with the 2-stage least square tests (2SLS).	A potential limitation is that a sample of the top 500 ASX-listed firms means that the findings of this study may not be generalisable to smaller ASX-listed firms.

2.2.2 Agency Theory

AT emphasises that managers might pursue their self-interest at the expense of profit maximisation when there is a separation between ownership and control, which normally generates agency costs. A corporate board has the potential to reduce agency costs and improve the financial performance of an organisation (Dobbin & Jung 2011; Hillman & Dalziel 2003). Other authors suggest that a diverse board may demand better monitoring of managers and may adopt an ethical corporate culture that will be effective in controlling fraud and reducing agency costs (e.g. Carter, Simkins & Simpson 2003; Jurkus, Park & Woodard 2011).

Traditionally, problems between principals and agents in AT focus on the separation of ownership and management, where principals are shareholders and agents are company directors. AT explains the relationship between principals and agents in the business and emphasises the board's control function and prescribed roles; in particular, the independence of the board from the duality of management and leadership structures (Hafsi & Turgut 2013). In the context of the agency framework, the board of directors is concerned with resolving problems that can exist between managers and shareholders. Board independence is one of the most important features of AT, where it enables a board to function in the best interests of shareholders and enhance management monitoring. Thus, the underlying argument of this theory is that gender diversity will be effective in the monitoring process and may eventually lead to an improvement in financial performance. Improved board monitoring is dependent on expanding the perspectives of the board, increasing board independence, eroding the dominance of male groups in boardrooms, and improving attendance behaviour among board members (Hillman, Shropshire & Cannella 2007; Kagzi & Guha 2018b; Wiley & Monllor-Tormos 2018).

Several studies have supported the positive effect of having female members on a board's monitoring function. For example, directors of different backgrounds (gender, culture, and ethnicity) might ask unique questions (Campbell & Minguez-Vera 2008) that may not be asked by 'traditional' directors. They can also integrate a wider variety of perspectives that can improve a board's decision-making processes and increase board independence (Carter et al. 2010). Female members on a board represent a greater heterogeneity of opinions, which may help erode the boardroom dominance of male

groups. Bart and McQueen (2013) and Burgess and Tharenou (2002) found that female directors employ distinctively superior decision-making framework and process skills and are better able to fulfil a board's fiduciary responsibility to shareholders. Adams and Ferreira (2009) suggest that female directors have a better attendance record than male colleagues, are less prone to miss board meetings and are more likely to join monitoring committees.

Overall, AT indicates the possible benefits of gender diversity but does not support gender diversity's effect on a firm's financial performance, when compared with RDT (Carter et al. 2010; Gallego-Álvarez, García-Sánchez & Rodríguez-Dominguez 2010).

A summary of the work by different researchers using AT as a lead theory, along with other theories, is detailed in Table 2.3. This clearly demonstrates the positive effect of gender diversity on company performance.

Table 2.3: Summary of Agency Theory

Leading Authors	Key Literature	Propositions (Hypothesis)	Strengths	Limitations
Terjesen, Couto, and Francisco (2016).	Does the presence of independent and female directors affect firm performance? a multi-country study of board diversity	H1: The greater the firm's proportion of independent directors on its board, the better its performance. H2: The greater the firm's proportion of female directors on its board, the better its performance. H3: *Ceteris paribus*, the positive effect of independent directors on firm performance is higher when the board comprises a greater proportion of female directors.	The results suggest that female directors send a positive signal to the public regarding a firm's ethical behaviour. Firms with female directors have better financial performance.	Four limitations: First, given the cross-sectional data, panel studies with longer time spans would provide greater insights into the proposed relationships. Second, further research should classify female directors as independent and non-independent Third, the findings would benefit from considering different types of governance models Fourth, while many important controls have been included, several of which were omitted in prior studies, other factors may influence financial performance.
Wiley and Monllor-Tormos (2018).	Board gender diversity in the STEM&F sectors: the critical mass required to drive firm performance	H1: Board gender diversity (GD) is expected to have a U-shaped significant effect on financial performance (FP). H2: The effect of GD on FP is expected to be positively moderated by a critical mass of 30%.	The findings show that GD is beneficial for FP in the STEM&F sectors when there is a critical mass of women on corporate board (WOCB). The benefits of gender diversity are found to be subject to the existence of a critical mass, as delineated by	Future studies should continue to empirically explore the effect that female directors have on board processes, dynamics, and behaviours in addition to financial outcomes.

Leading Authors	Key Literature	Propositions (Hypothesis)	Strengths	Limitations
			the U-shaped significant relationship.	
Martinez-Jimenez, Hernández-Ortiz and Fernández (2020).	Gender diversity influence on board effectiveness and business performance	H1: The presence of women on the board of directors has a positive influence on the board's effectiveness. H2: The board's effectiveness has a positive influence on the performance of the company. H3: The presence of women on the board of directors has a positive influence on the performance of the company.	There is a positive, but not statistically significant, relationship between gender diversity and firm performance	The study has a small sample size, and most of the boards of directors analysed are unequal with only a few companies achieving gender parity
Gallego-Álvarez, García-Sánchez and Rodríguez-Dominguez (2010).	The influence of gender diversity on corporate performance	H1: The presence of a higher percentage of women on boards of directors exhibits a positive and significant association with financial performance and corporate value. H2: The presence of a higher percentage of women in top management exhibits a positive and significant association with financial performance and corporate value. H3: The presence of female	The overall results show a non-significant or a rather negative influence of female presence on corporate performance.	Given that Spanish boards show low rates of female presence, it would appear appropriate to conduct further studies in some years' time, when boards will presumably be more diverse.

Leading Authors	Key Literature	Propositions (Hypothesis)	Strengths	Limitations
		stockholders with significant ownership exhibits a significant association with financial performance and corporate value.		

2.2.3 Upper Echelon Theory

UET is a supporting theory that recognises the importance of women in strategic decision-making (Srivastava, Das & Pattanayak 2018). This management theory states that an organisational outcome is dependent on the background characteristics of the executives in the top-level management team. Consequently, the experiences, values and personalities of executives affect the decision-making abilities of the team (Hambrick 2007; Hambrick & Mason 1984). Gender, as part of one's personal traits and specificities, is an important factor that top management teams need to consider, as it can influence the organisation's management and performance (Nishii 2013). This suggests that the gender diversity of the top-level management team can influence the quality of strategic decisions made by that team (Luanglath, Ali & Mohannak 2019). A more gender-diverse board with a wide range of perspectives, skills and knowledge will have a more effective problem-solving capacity (Roberson & Park 2007; Smith et al. 1994). A board's cognitive variety is increased with the introduction of qualified women, when compared with a board with only male members (Oppong 2014). An increase in cognitive variety results in a likely consideration of more options and a greater likelihood of debating these options (Klein 2017). This leads to more effective decisions (Dezsö & Ross 2012). An organisational structure with gender-diverse human capital has the potential to add more value and may prove comparable or superior to male-controlled structures (Adams & Ferreira 2009; Rose 2007). However, most studies have not established the effectiveness of theoretical arguments that link these specific characteristics and diversity in corporate hierarchy with firm outcomes (Jeong & Harrison 2017; Post & Byron 2015). The rationale proposed for this is that although gender differences exist in the general adult population, there might not be any differences between male and female members in the upper echelons of corporate boards (Klein 2017). As a result, there may not be a desirable improvement of cognitive variety in a corporate board from gender diversity (Jeong & Harrison 2017).

A summary of the work by different researchers using UET as a lead theory, along with other theories, is given in Table 2.4. This clearly demonstrates positive support for the effect of gender diversity on firm performance.

Table 2.4: Summary of Upper Echelon Theory

Leading Authors	Key Literature	Propositions (Hypothesis)	Strengths	Limitations
Moreno-Gómez, Vaillant and Lafuente (2018).	Gender diversity in the board, women's leadership, and business performance	H1: gender diversity in the boardroom positively affects business performance. H2: gender diversity in the top management team – i.e., CEO and top management positions – positively affects business performance.	The results support that gender diversity is positively associated with subsequent business performance.	First: The data do not permit the direct analysis of the ways through which women create or contribute to the organisation's strategy making. Second: cultural contexts, different regulatory frameworks, and variations in the development of markets might affect the impact of gender diversity on performance.
Post and Byron (2015).	Women on boards and firm financial performance: a meta-analysis	H1: Female board representation is positively related to firm financial performance. More specifically, female board representation is positively related to (a) accounting returns and (b) market performance. H2: The relationship between female board	The results suggest that board diversity is neither wholly detrimental nor wholly beneficial to firm financial performance. In contrast, diversity on boards promotes activities related to boards' primary responsibilities.	Meta-analyses are always constrained by the population of studies available for a given research question. In this meta-analysis, we relied on country level variables (i.e., shareholder protections, gender parity) to test our theoretical model, because none of

Leading Authors	Key Literature	Propositions (Hypothesis)	Strengths	Limitations
		representation and firm financial performance is moderated by shareholder protection strength. Specifically, the relationships between female board representation and (a) accounting returns and (b) market performance are more positive in countries with stronger shareholder protections. H3: The relationship between female board representation and firm financial performance is moderated by gender parity. Specifically, the relationships between female board representation and (a) accounting returns and (b) market performance are more positive in countries with greater gender parity.		the board, firm, or industry characteristics we considered to operate through our proposed theoretical mechanisms were adequately reported by a large enough number in the primary studies in our sample
Talke, Salomo and Rost (2010).	How does top management team	Task-oriented top management team	TMT diversity has a strong effect on the	The study is limited to manufactured goods

Leading Authors	Key Literature	Propositions (Hypothesis)	Strengths	Limitations
	diversity affect innovativeness and performance via the strategic choice to focus on innovation fields?	diversity (TMT) enhances firm performance by facilitating an innovation strategy that increases new product portfolio innovativeness.	strategic choice of firms to focus on innovation fields. Such focus then drives new product portfolio innovativeness and firm performance	industry only. Needs to be extended to other industry sectors.

2.2.4 Human Capital Theory

Human skill refers to the knowledge, skills and education of an individual that can be used to benefit an organisation. HCT focuses on the expertise of directors in an organisation. Gender differences result in directors having unique human capital (Terjesen, Sealy &Singh 2009). Female directors are more detail-focused and risk-averse (Post & Byron 2015) and have diverse networks of suppliers and consumers (Terjesen, Couto & Francisco 2016). Integrating the different skills, knowledge and perspectives of male and female directors will help organisations to make more effective decisions and access resources from suppliers and serve a wide range of consumers (Ali, Ng & Kulik 2014). HCT complements some concepts associated with board diversity that are derived from RDT. The evidence regarding the human capital of women suggests that women are just as well-qualified as men in terms of several important qualities, including education level, but that women are less likely to have experience as business experts (Terjesen, Sealy & Singh 2009). Different roles on the board are possibly tied to their unique human capital (based on advanced educational degree, greater expertise, experience, and range of workplace and social connections). The net result is that HCT predicts that board diversity will affect board performance because of the diverse and unique human capital; however, the effect could be either positive or negative from a financial performance perspective (Carter et al. 2010; Taljaard, Ward & Muller 2015). Valenti and Horner (2020) and Nguyen et al. (2017) provide empirical evidence to confirm that the human capital of directors is a significant determinant of a firm's innovation and outcomes.

A summary of the work by different researchers using HCT as a lead theory, along with other theories, is given in Table 2.5. This clearly demonstrates that gender diversity is supportive of company performance.

Table 2.5: Summary of Human Capital Theory

Leading Authors	Key Literature	Propositions (Hypothesis)	Strengths	Limitations
Nguyen, Nguyen, Locke, and Reddy (2017).	Does the human capital of board directors add value to firms? Evidence from an Asian market.	There is a statistically significantly positive relationship between the human capital of board directors and financial performance of Vietnamese publicly listed companies.	The human capital of directors is a significant determinant of firm outcome.	This study focused on education component of human capital and on a small sample size of Vietnam market
Taljaard, Ward and Muller (2015).	Board diversity and financial performance: a graphical time-series approach.	1. Gender: There is no/an association between the ratio of female to male representation on boards and company financial performance. 2. Race: There is no/an association between the level of racial diversity on boards and company financial performance. 3. Age: There is no/an association between the average age of boards and company financial performance.	The results show that racial diversity within boards is not associated with financial performance. However, increased gender diversity and younger average board age are shown to have strong associations with improved share price performance.	Future research needs to include increasing the sample size both longitudinally and in cross-section.

Leading Authors	Key Literature	Propositions (Hypothesis)	Strengths	Limitations
		4. Gender and age There is no/an association between the level of combined gender and age diversity on boards and company financial performance.		
Valenti and Horner (2020).	The human capital of boards of directors and innovation: an empirical examination of the pharmaceutical industry.	Research question examines the relationship between the human capital of the corporate board of directors and the firm's tendency to innovate.	The findings are generally supportive of this thesis's theory that board human capital is associated with firm innovation.	This study is limited to pharmaceutical industry only. As with any single industry study, results may not be completely generalisable and are subject to interpretation based on the economic conditions of the time.

2.2.5 Critical Mass Theory

CMT refers to the nature of group interactions that are dependent upon subgroup size. The degree of effective influence of a subgroup increases when its size reaches a certain threshold, or critical mass. Thus, CMT suggests that qualitative changes in the nature of group interactions will be noticed when the minority group enters a critical mass (Torchia, Calabrò & Huse 2011). CMT states that the right number of personnel is needed to form an influential body, not acting just as a token, to make changes that may affect outcomes (Moss 1977; Torchia, Calabrò & Huse 2011). Thus, in a gender-diverse board, a critical number of female members will result in a significant difference in the effective influence on board processes and performance.

According to Konrad and Kramer (2006), a board with one female member might experience the bias and limitations of tokenism. The presence of three (female) members on a board has the effect of normalising the situation by removing the focus from gender to talent (Konrad, Kramer & Erkut 2008). This also results in a lower out-group bias for female members (Torchia, Calabrò & Huse 2011). The existence of at least three women on a board ensures they are comfortable in indicating their concerns, feel less pressured to prove themselves, and are more confident of their talent (Konrad & Kramer 2006). CMT claims that unless a certain threshold, or critical mass, of female board members is maintained, gender barriers are not broken down, and the benefits of gender diversity are difficult to achieve (Wiley & Monllor-Tormos 2018).

A summary of the work by different researchers using CMT as a lead theory, along with other theories, is detailed in Table 2.6. This clearly demonstrates that gender diversity, with a critical number of female board members, is beneficial to company performance.

Table 2.6: Summary of Critical Mass Theory

Leading Authors	Key Literature	Propositions (Hypothesis)	Strengths	Limitations
Joecks, Pull and Vetter (2013).	Gender diversity in the boardroom and firm performance: what exactly constitutes a 'critical mass?'	To explore the relationship between gender diversity in the boardroom and firm performance based on critical mass theory (CMT).	Evidence for gender diversity to at first negatively affect firm performance and—only after a 'critical mass' of about 30 % women has been reached—to be associated with higher firm performance than completely male boards.	Further studies may want to concentrate on longitudinal panel data covering a longer time span and should incorporate cross-country analyses.
Torchia, Calabrò and Huse (2011).	Women directors on corporate boards: from tokenism to critical mass.	Does an increased number of women corporate boards result in a build-up of critical mass that substantially contributes to firm innovation?	Boards of directors need to have 'at least three women' to enable them to interact and exercise an influence on a board's working style, processes, and tasks, in turn positively impacting on the level of firm organisational innovation.	This study is focused on the Norwegian context only. However, it may be useful to implement cross-country analyses to investigate women directors' contributions to innovation in different political and institutional contexts.
Arena, Cirillo, Mussolino, Pulcinelli, Saggese and Sarto (2015).	Women on board: evidence from a masculine industry.	H1. Within masculine industries, a negative relationship exists between gender diversity on board and firm performance H2. Within masculine industries, there exists a relationship between critical	The critical mass, rather than the simple presence of women, has an incremental benefit on firm performance. In addition, results show that the educational level of women directors negatively affects firm performance, as it	Hypotheses are tested using information on European publicly listed firms in the construction industry only and the study does not allow drawing strong inferences on

Leading Authors	Key Literature	Propositions (Hypothesis)	Strengths	Limitations
		mass of women directors and firm performance. H3. Within masculine industries, there exists a relationship between the educational level of women on board and firm performance.	might affect the dynamics within the boardroom	behavioural processes and dynamics in and around the boardroom

2.3 Empirical Research on Board Gender Diversity and Firm Performance

2.3.1 The Corporate Board

A board of directors is considered the highest authority in an organisation, responsible for corporate management and general operations, including monitoring and providing the guidance and advice necessary to improve performance (Hillman 2015). The board of directors offers strong leadership coupled with clear directions and a sense of purpose, playing a dynamic role in articulating its vision, team values, mission, and formulating strategic plans (Liao, Luo & Tang 2015). The development of a supporting strategic plan is necessary to ensure success in both internal and external environments, as it bridges the gap between where a company is today and where it wants to be in the future.

2.3.2 Function of the Board

According to the Australian Institute of Company Directors, in accordance with the organisation's aims and objectives, the board of directors is responsible for governance, management, strategic direction and accountable corporate performance. A board ensures that to achieve the goals set out in its constitution, an organisation will create and implement strategies and supporting policies. (Liao, Luo & Tang 2015). The board will monitor and support management (Post & Byron 2015). With the support of a diverse set of talents, expertise and experience, the board must strike a balance between these roles and devote adequate attention to both (Campbell & Mínguez-Vera 2008). These roles include: 'Strategic expertise, Accounting/Financial literacy skills, Legal skills, Risk Management skills, Human resource skills, skills and experience in Marketing and Communications, Industry knowledge, Information and Communication technology skills and Capital markets experience in capital raising and mergers and acquisitions' (Australian Institute of Company Directors 2016).

Thus, the important functions of the board of directors include providing supervision and guidance to managers, complying with relevant laws and regulations, and connecting the corporation to the external environment. These functions are influenced by the composition of boards, which in turn affects the performance of the company (Carter et al. 2010). The demographic diversity of board members influences how the board

functions (Post & Byron 2015). It adds value to discussions in board meetings when making strategic choices (Heyden et al. 2015), and also to firm performance (Hillman 2015). Gender diversity within the board of directors has increasingly become relevant because female representation is increasing from a generally very low level, increased involvement of government on mandatory female representation and the discussion around the topic shifting from an issue of equal opportunity to a question of superior performance.

2.3.3 Female Representation on Boards

The effect of gender composition on the effectiveness of a board can be explained in the context of gender-based differences in leadership behaviour in men and women (Nielsen & Huse 2010a). The characteristics of gender differences that are important in understanding leadership behaviour are related to agentic and communal attributes. The characteristics and behaviour of these attributes in a work setting are detailed in Table 2.7 (Eagly & Johannesen-Schmidt 2001).

Table 2.7: Gender Difference Characteristics

Attribute	Agentic	Communal
Characteristics	Assertive, ambitious, aggressive, independent, self-confident, daring, and competitive.	Describes primarily a concern with the welfare of other people and being affectionate, helpful, kind, sympathetic, interpersonally sensitive, nurturing, and gentle.
Behaviour in work setting	Speaking assertively, competing for attention, influencing others, and making problem-focused suggestions.	Speaking tentatively, not drawing attention to oneself, accepting others' positions, supporting, soothing others, and contributing to the solution of relational and interpersonal problems.

Agentic characteristics are ascribed more commonly to men than women, and communal characteristics are more commonly ascribed to women than men. Thus, women are seen as less hierarchical and more democratic, participative, cooperative, and collaborative, and more oriented towards enhancing others' self-worth (Eagly & Johannesen-Schmidt

2001). This gender difference in leadership may not affect the general effectiveness of a board but it can affect the performance of certain board tasks.

The board's tasks can be broadly divided into operational control tasks and strategic control tasks. Operational control tasks are more routine and refer to board decisions concerning a company's skills. Strategic control tasks are more complex and creative, and require a broader range of perspectives, these can be the monitoring of board decisions concerning firm strategy, as well as organisational practices and policies. Strategic control tasks demand more analytical and visionary skills (Nielsen & Huse 2010a). Women have the ability to present different perspectives, which can result in improvements in the quality of decision-making related to strategies and organisational practices; as such, they may be more effective in the performance of strategic control tasks (Diaz-Garcia, Gonzalez-Moreno & Saez-Martinez 2013). Researchers have found that the presence of women directors, expressed as a percentage of total board size, is positively associated with board strategic control and effectiveness. Also, the positive effect of women directors' presence on board effectiveness is mediated through development activities and a decrease in the level of conflict (Nielsen & Huse 2010a).

It has been suggested that there are two main advantages of having women on a board. First, women are not part of a male network, which increases their level of independence. Second, regardless of age and education, women may bring to the board new managerial practices that can prove efficient in complementing existing ones, thus improving the board's functioning (Adams & Ferreira 2009; Joecks, Pull & Vetter 2013). In general, more heterogeneous boards are likely to have superior knowledge and various perspectives; they may consider a more comprehensive array of solutions to specific problems, thus enhancing the quality of strategy making (Hillman, Shropshire & Cannella 2007). Although gender differences operate at the individual level, from a board-level perspective, the presence of more women directors, expressed as a percentage of total board size, will enable the characteristics usually aligned with women directors. Thus, board-level processes and effectiveness can be influenced by gender diversity (Nielsen & Huse 2010a), and board composition is a crucial factor in the functioning of a corporate board.

2.3.4 Board Composition

The composition of the board influences a company's performance because the board has the most influential role in the strategic decision-making related to acquisitions, mergers, executive appointments, and organisational structure (Levi, Li & Zhang 2014). The characteristics of board members determine the decision-making capacity of that board. A gender-diverse board has been defined in literature as a board with at least one female director (Adams & Ferreira 2009; Campbell & Mínguez-Vera 2008). A small minority of female representation on the board may not have any effect on the decision-making process. When there is a sole female member, this can be seen as a stereotype representative of a feminine role, or a token representation, by internal and external stakeholders with limited input in corporate decision-making (Liu, Wei & Xie 2014). It becomes difficult for individuals to be effective and command respect on an equal basis with other board members. This situation can improve only with the presence of more than one female member. Real change happens with the presence of three or more female members on a board. This can create a critical mass that will then influence firm performance (Kagzi & Guha 2018b). At a critical mass, female members feel more comfortable, positive and have a greater effect on corporate decision-making processes (Terjesen, Sealy & Singh 2009). Several researchers have discovered that increasing the number of female directors on a board of directors has a beneficial influence on a company's performance. (Arena et al. 2015; Liu, Wei & Xie 2014).

Current trends in gender diversity data, according to investigations undertaken by different authors, show that a higher proportion of female directors is found in consumer-related demand sectors, such as retail, finance, healthcare and, consumer goods, while heavy industries such as resources, engineering and business services have significantly fewer female directors (Joecks, Pull & Vetter 2013). It may be argued that it is not the gender of directors, rather it is the distinctive resources that individual female directors bring, which may facilitate them in exercising their influence on the work of corporate boards (Nielsen & Huse 2010b). It is possible that larger companies are more likely to have a higher proportion of females on their boards compared with smaller companies (Dezsö & Ross 2012).

2.3.5 Board Gender Diversity

Board diversity indicates corporate heterogeneity in corporate board composition with respect to attributes related to structural diversity, such as size, leadership structure, board model (Nguyen & Faff 2006) and demographic diversity (Kagzi & Guha 2018b; Srivastava, Das & Pattanayak 2018). Demographic diversity can be defined in terms of some noticeable measures that include gender, age, nationality, alongside some relatively less noticeable ones, such as occupational background related to education, technical ability and professional experience (Ararat, Aksu & Cetin 2015; Martín-Ugedo & Minguez-Vera 2014). The demographic attributes of board members in terms of gender, age, educational level, and experience have a direct effect on how a board function (Johnson, Hill & Schnatterly 2013; Post & Byron 2015). From a broader perspective, it is important to study the influences of demographic diversity on company performance. (Kagzi & Guha 2018b). In addition, regulators and society are embracing an environment of equality and inclusion, where females are entering the workforce in positions previously dominated by males (Srivastava, Das & Pattanayak 2018).

A more diverse board has the potential to make improvements and provide better solutions with accumulated confidential information collected from its members (Lückerath-Rovers 2013). The inclusion of female directors in a board needs due consideration as a significant component of corporate governance. Boards will gain better monitoring function as the board's independent thought processes are enhanced by diversity (Adams & Ferreira 2009). However, diversity may create conflict and division, which can result in an increased cost of time and money for decision-making (Adams et al. 2015). Adams, Licht and Sagiv (2011) examined director appointments and found that the stock market reacts more favourably to the appointment of female than male directors.

Understanding the nature of the relationship between gender diversity and company performance is important for policy implementation as well governance of firms. As such, much attention has been focused on the study of gender diversity (Carter et al. 2010; Hillman 2015). Research on gender diversity is described in terms of ethics, the business case, and theoretical perspectives. Gender diversity in corporate boards is ethically perspective because it promotes corporate social responsibility, spending and firm reputation (Bear, Rahman & Post 2010). Female members on a board can influence firm performance in several ways, including making appropriate decisions regarding

acquisitions because they may be more concerned about shareholders (Levi, Li & Zhang 2014). Gender-diversified boards invest more in innovation (Zona, Minichilli & Zattoni 2013) and an increase in gender diversity levels is reported to result in higher firm performance in terms of ROA, ROE, and Tobin's Q of the firms (Erhardt, Werbel & Shrader 2003; Sabatier 2015). The presence of women directors on boards seems to have a complementary effect on debt and a positive effect on investment in R&D (Rossi, Hu & Foley 2017b).

Gender diversity, from a business perspective, has the potential to enrich problem-solving and decision-making by considering more alternatives (Campbell & Mínguez-Vera 2008). Some examples of better decisions include those related to acquisitions (Levi, Li & Zhang 2014) and investment in innovation (Zona, Minichilli & Zattoni 2013). Gender diversity fosters a firm's competitive advantage by creating a positive reputation for a firm and having a positive effect on customers (Miller & Triana 2009). From a theoretical perspective, RDT and AT are used by researchers who argue that gender diversity improves board functioning and firm performance (Kagzi & Guha 2018b). This can lead to more monitoring (Adams & Ferreira 2009), but a lower stock value with the increase in gender diversity (Dobbin & Jung 2011).

Summary of the Literature on Gender Diversity is shown in Table 2.8.

Table 2.8: Summary of the Literature on Gender Diversity

Literature	Measurement	Proposition	Theory	Conclusion	Limitation
Does board demographic diversity influence firm performance? Evidence from Indian-knowledge intensive firms. (Kagzi & Guha 2018b)	This study considers the following four aspects of board demographic diversity: gender, age, tenure, and education, and it uses Blau's diversity index to measure diversity in two ways. First, total board diversity index (TDBI) has been computed, which combines the following four demographic criteria: gender, age, tenure and education. Second, it examines each of the following diversity variables (Blau's index) separately: gender index (GI), age index (AI), tenure index (TI),	H1. There will be a positive linear relationship between board demographic diversity (gender, age, tenure, and education) and firm performance. H2. There will be a negative linear relationship between board demographic diversity (gender, age, tenure, and education) and firm performance. H3. There will be an inverted U-shaped relationship between board demographic diversity (gender, age, tenure and education) and firm performance.	RDT, CMT, AT, ST	The findings show a positive linear link between business performance and the overall board demographic diversity index (board gender, age, tenure, and education). Among the effects of individual board diversity factors, the authors discovered that board age diversity has a positive effect on firm performance, whereas board education diversity has a negative effect.	Gender, age, tenure, and degree of education are the demographic parameters used in this study. Other demographic characteristics such as nationality and language were not considered by the researchers.

Literature	Measurement	Proposition	Theory	Conclusion	Limitation
	and education index (EI).				
The effect of board gender diversity on firm performance: evidence from Turkey (Kılıç & Kuzey 2016)	The representation of female directors is the independent variable; three proxies are used to measure gender diversity on boards of directors. First, a dummy variable is used that takes a value of 1 when at least one female director is present on the board. In this case, each dummy variable is coded as 1 if the board had at least one female or 0 otherwise. Second, the proportion of female directors is calculated as the number of total females divided by the total number of directors on the board. Third, Blau's index is used to	H1. The presence of female directors on a board significantly and positively affects firm performance. H2. The proportion of female directors on a board significantly and positively affects firm performance. H3. Gender diversity (as measured by Blau's index) significantly positively affects firm performance.	RDT & AT	According to the findings, these companies in Turkey the boards of directors are dominated by the males. Further, the findings suggest that having female directors is connected with a company's financial performance as measured by return on assets (ROA), return on equity (ROE), and return on sales (ROS).	There has been a minimal empirical study on the association between board gender diversity and firm success in emerging economies. As a result of the varied and sometimes contradictory outcomes of previous research, there is still no consensus on the link between board gender diversity and corporate financial performance.

Literature	Measurement	Proposition	Theory	Conclusion	Limitation
	measure the diversity of a board.				
Gender diversity in the boardroom and firm performance: what exactly constitutes a 'critical mass? (Joecks, Pull & Vetter 2013).	Four dummy variables were created reflecting the different group types: uniform board (assuming the value '1' if a board has no woman; '0' otherwise), skewed board (assuming the value '1' if a board has at least one woman but less than 20 % women; '0' otherwise), tilted board (assuming the value '1' if the ratio of women in the boardroom is at least 20 %, but less than 40 %; '0' otherwise), and balanced board (assuming the value '1' if the ratio of women is at least 40 %). and then gender diversity was	To explore the relation between gender diversity in the boardroom and firm performance based on critical mass theory	CMT	Based on CMT, the relationship between gender diversity in the boardroom and corporate performance was investigated in this study.	This study has several limitations. First, with a period of five years, analysis is based on a quite short time. Further studies may want to concentrate on longitudinal panel data covering a longer time span. Second, the link between board diversity and performance within one special national context. The institutional and cultural context might be of importance when analysing board diversity and its effects. Hence, further studies should incorporate cross-country analyses.

Literature	Measurement	Proposition	Theory	Conclusion	Limitation
	measured by using Blau's index of diversity.				
Gender diversity in the boardroom and firm financial performance (Campbell & Mínguez-Vera 2008).	Gender diversity has been measured by the percentage of women on the board and by the Blau and Shannon indices.	The objective of this article is to examine the impact on firm performance of the presence of women on the board of directors.	AT	Board gender diversity has a positive and significant impact on firm value, while firm value has an insignificant effect on diversity.	Low proportion of women occupying responsible positions in business

2.3.6 Gender Diversity and Performance

Considering the policy development for gender diversity, the question arises as to whether the recommendation of gender diversity has had any positive effect on the performance of firms and whether empirical evidence exists for its justification. Empirical evidence regarding board gender diversity and firm performance has been unconvincing, conflicting and, at times, controversial (Joecks, Pull & Vetter 2013). Previous studies as discussed in next sections have shown mixed results regarding the effect of gender diversity on company performance. Theoretically, it can be argued that the resulting effect is positive, as performance might improve with a gender-diverse board, as it may make more effective decisions by considering the different perspectives that come from diversity (Lückerath-Rovers 2013).

2.3.7 Review of Gender Diversity on Performance

Some academics have claimed that there is a positive link between gender diversity and corporate performance (Carter, Simkins & Simpson 2003; Kagzi & Guha 2018b; Kılıç & Kuzey 2016; Liu, Wei & Xie 2014; Moreno-Gómez, Vaillant & Lafuente 2018; Noamene et al. 2021; Srivastava, Das & Pattanayak 2018; Vafaei, Ahmed & Mather 2015). A negative relationship between gender diversity and firm performance has also been reported (Adams & Ferreira 2009; Haslam et al. 2010; Joecks, Pull & Vetter 2013; Shehata, El-Helaly & Salhin 2017). Rose (2007) determined that no significant relationship existed between board gender diversity and firm value in a sample of Danish firms. Other authors also found no significant relationship (Ali, Ng & Kulik 2014; Arena et al. 2015; Carter et al. 2010; Chapple & Humphrey 2014; Rose, Munch-Madsen & Funch 2013).

The conflicting results of prior studies highlight that a link between women on a board and financial performance as a measure of performance is difficult to determine. Study results are not easily comparable because of mixed outcomes and the variation in statistical methods employed, the types of data and the periods of investigation. Thus, deriving an overall meaning from the body of research depends on the effectiveness of the research methodology employed in each study (Carter et al. 2010). Conflicting outcomes of previous studies may be ascribed to variations in the period studied (Campbell & Mínguez-Vera 2008), differences in legislative and regulatory backgrounds

(Sabatier 2015), inadequate choice of control variables (Terjesen, Couto & Francisco 2016), partial and incoherent measures of performance (Terjesen, Couto & Francisco 2016), and the oversight of potential endogeneity issues between gender diversity and firm performance (Campbell & Mínguez-Vera 2008).

The academic literature on gender diversity has not equivocally employed any theoretical framework to provide a clear link between gender diversity and firm performance, in support of a positive or negative effect (Kagzi & Guha 2018b). For example, RDT and HCT do not explicitly envisage a relationship between gender diversity and a firm's financial performance. Still, these theories are highly indicative of a positive relationship (Carter et al. 2010). AT does suggest a link, but the empirical results are still too mixed to clearly support a specific direction (Adams & Ferreira 2009; Carter et al. 2010). On the other hand, stakeholder theory (ST) suggests that gender diversity will indicate the presence of a stakeholder management style that is associated with higher firm performance (Harrison & Wicks 2013). Contingency Theory suggests that the link between board diversity and firm performance may vary significantly across different contexts because of changes in circumstances and over time (Carter et al. 2010). Miller and Triana (2009) explain the connection between gender diversity in a board and company performance with the help of behavioural theory.

Clearly, more research is needed to better understand the relationship between gender diversity and corporate performance. Various academics have suggested that some intervening variables between firm performance and gender diversity should be investigated to better understand the effect of gender diversity on firm performance (Kochan et al. 2003). Researchers have found that innovation can lead to the development of capabilities that improve firm performance (Zahra & Garvis 2000) and have employed innovation as mediating variable to examine the effect of gender diversity on performance (Miller & Triana 2009).

2.3.8 Effect of Gender Diversity on Performance

According to Carter, Simkins and Simpson (2003), corporate diversity has a positive effect on a firm's value for the following reasons. First, diversity in a company matches the diverse marketplace of potential customers and suppliers, which results in better appreciation of the marketplace and helps companies increase their ability to enter

markets. Second, creativity and innovation will increase with diversity. Third, although heterogeneity may produce some initial conflict, eventually with broader perceptions on diverse boards, it will become more effective in problem-solving by evaluating more alternatives. Fourth, the effectiveness of a leadership team will improve, resulting in more judicious decisions as a diverse top management takes a broader view and better understanding of the complex environment. Finally, diversity will be beneficial for global relationship development when dealing with diverse cultures. However, some authors report a non-significant and negative effect. Based on the above discussion, and from the background of RDT, AT and HCT, it is essential to examine how demographic diversity in the boardroom influences firm performance.

Researchers have used financial performance as a measure of firm performance. ROA, ROS, ROE, ROCE, and cost of equity (COE) are used as accounting-based measures (Kılıç & Kuzey 2016; Liu, Wei & Xie 2014; Rose, Munch-Madsen & Funch 2013; Srivastava, Das & Pattanayak 2018), and Tobin's Q is used as a stock-based measure (Kagzi & Guha 2018b; Rossi, Hu & Foley 2017b). There is a significant body of literature globally that explores gender diversity and its effect on the performance of a company. Some studies have found a positive association of gender diversity with various performance measures, and some have found a negative association. Other studies find that a board's gender diversity does not have a significant relationship with performance. A brief description of some of these studies is presented in the next sections.

2.3.9 Positive Effects

Noamene et al. (2021) examined the relationship between gender diversity on corporate boards and financial performance. A panel dataset of 100 companies listed on the United Kingdom (UK) Financial Times Stock Exchange (FTSE) 100 from 2009 to 2018 was used for this study. Financial data were collected from the Financial Analysis Made Easy database. The information related to corporate governance and director characteristics and was collated from company annual reports. The accounting metrics ROA, ROE and the market performance indicator Tobin's Q used as a measure of financial performance were the dependent variables in this study. Corporate governance characteristics such as board size, board independence, and number of board meetings per year, and firm characteristics such as size, sector, leverage, and sales growth indicator were used as control variables. The independent variable gender diversity was measured by the

proportion of female directors on the corporate board. Hypotheses were tested using general method of moment (GMM) longitudinal panel data analysis. The study found a positive link between the proportion of female directors and all financial measures. The results also show that the positive consequences of female directorship are driven by their role in enhancing the board's advisory and monitoring activities. The limitations of this study, as identified by the authors, include its small sample size; larger studies that consider contextual factors such as institutional and cultural aspects that might be significant when scrutinising board diversity and its effect on firm performance, are recommended.

Board gender diversity and its effect on the performance of Brazilian firms was investigated by Mastella et al. (2021). The authors examined a sample of 150 Brazilian publicly traded companies from 2010 to 2018, with different measures of firm performance, firm risk, and women's presence on the board. Data for the study were collected from the Brazilian Financial exchange B3 which provides financial statements data—assets, liabilities, income, and cash flow. The authors use GetDFPData, which is open and free software, to access corporate data from B3. They created dependent variables that were represented by three different financial measures: ROA, ROE, and Tobin's Q. The presence of women in the board of directors was measured by the absolute number of women on boards (management council) and the absolute number of women in directorships. Control variables included the company's size, age, leverage, tangibility (the ratio of fixed to total assets) and industry type. This group of binary variables took the value '1' if the firm belonged to the sector in question, and '0' otherwise, according to the Brazilian stock exchange classification. They also used dummies to control for ownership (private or state-owned), calendar years and corporate governance listing segments.

The study approach was based on a set of ordinary least squares, quantile, and panel data regressions. The presence of women on the board was found to have a positive effect on all accounting and market performance measures. However, the influence on risk was inconclusive. The study also found that the number of females on the board had a more significant effect at the lower levels of firm performance measured by ROE, but at the higher levels when measured by Tobin's Q. Regarding ROA, a more significant effect occurred on the extremes of the performance distribution. The study findings indicate that

market investors place more value on a female presence in boards, rather than in director positions. The authors note that the limitations of the study include the small number of companies in the sample (because the variables used in their model lacked available public information), and the small number of listed companies. In addition, the low number of female CEOs prevented them from having more dependent variables and gaining a better understanding of the role of women in company management. These limitations underline the need for more studies that adapt international models to emergent country economies, such as Brazil.

The influence of board gender diversity on the financial performance of listed companies in Nigeria was examined by Sani et al. (2019). They analysed 400 firm-year observations for 2012 to 2016 listed in Nigerian Stock Exchange. Data on financial performance, tangibility and leverage were generated from the Thomson Reuters data stream, while data regarding board gender and auditor type were extracted from annual reports of the sampled companies. The dependent variable ROA was used as a measure of firm performance. Board gender diversity was defined as the number of female directors on the board; this was used as an independent variable. The study included auditor type, firm size, leverage, and tangibility (proportion of property, plant, and equipment to the total assets of the firm) as control variables.

The data were analysed using panel corrected standard error. The study found that gender diversity (with female directors) influenced the financial performance of companies listed on the Nigerian Stock Exchange. The findings support the argument that gender diversity is positive and significantly related to a company's financial outcomes. Consistent with RDT, the result implies that female directors are provide additional skills that contribute to the upper echelons of a firm's decision-making. These findings can inform regulators and other stakeholders about the role female directors can play in corporate financial outcomes. Although the study evaluated the effect of a board's gender diversity on financial performance in emerging countries, the study was limited to non-financial companies in Nigeria. Another limitation is that both accounting and market-based measures could be used to measure performance

Kagzi and Guha (2018b) examined the relationship between a board's demographic diversity and performance in knowledge-intensive firms (KIFs) in India. Sample data from 126 high-technology manufacturing service companies in the top-200 National

stock exchange (NSE)-listed firms in India from 2010 to 2014 were collected for this study. Data on demographic variables were collected from NSE's database, and accounting variables came from the Centre for Monitoring Indian Economy Prowess database. Tobin's Q was used as a measure of performance. The combined effects of diversity (using Blau's index of diversity), which include board gender, age, education, and tenure, as well as each specific attribute of diversity, were measured as independent variables. Hypotheses were tested using a longitudinal panel data model and regression analysis. The combined effect of diversity was found to have a positive linear relationship with firm performance. However, the individual diversity variables had mixed effects on the performance of the firm. Board age diversity had a positive effect and education diversity had a negative effect on firm performance. Board gender and tenure diversity had no significant influence on firm performance. The study was based on India's KIFs; thus, the results cannot be generalised.

The significance of gender diversity on corporate boards in India, in light of the mandated requirements of at least one female board member for listed firms, was examined by Srivastava, Das and Pattanayak (2018). This study analysed the relationship between gender-related variables of corporate boards, with COE and ROA as firm-specific financial characteristics. The study was based on panel data from 300 firm-year observations of 20 blue-chip firms listed in CNX Nifty, a major financial market index in India. The study covered 15 years from 2001 to 2015. Two regression models were used to analyse the effect of gender diversity on the firms' COE and ROA. The findings revealed that the influence of female members was negative for COE and positive for ROA. The negative association with COE could help the firm raise capital at a cheaper rate. This study has the limitation of a small sample size and cannot be generalised, as it is specific to India's emerging economy.

Wiley and Monllor-Tormos (2018) investigated the effect of gender diversity on the performance of Fortune 500 US firms in the science, technology, engineering, mathematics, and finance (STEM&F) sectors covering seven years from 2007 to 2013. The study focused on STEM&F sectors where female board members might have a greater influence on performance (Adams & Kirchmaier 2016). Data were sourced from Institutional Shareholder Services Directors Data, which includes corporate governance data on each director of S&P 1500 and Mergent online data, which covers the financial

data of the firms. An unbalanced sample of 1,605 firm-year observations representing 236 Fortune 500 firms in the STEM&F sectors was used in this study. A GMM regression analysis with year fixed effects and firm-cluster robust standard errors, small sample adjustments, orthogonal deviations and a set of different models were used to assess robustness. The different models considered financial performance measured by Tobin's Q as the dependent variable, the proportion of female directors on boards as the independent variable, and critical mass (30% of a female board member) as a moderating variable. The firm-specific control variables included firm age, firm size, degree of firm internationalisation (percentage of foreign sales), and several business segments (SIC code). The second set of control variables included governance variables, and the characteristics of the board and its members, such as board size, board independence, board ownership, director's age, director's tenure, and other attributes. The findings of their study support a significant U-shaped curvilinear relationship between the number of female directors and financial performance in the STEM&F sector. The effect of gender diversity is positive and higher when there is a critical mass of 30% female members on the board. This finding suggests that boards that have reached a critical mass of 30% of women present a favourable environment for capitalising on the innovative ideas that arise from gender diversity. The positive effect of gender diversity on performance in this study is characterised by complex tasks and innovative output in STEM&F sectors; more studies on other sectors are necessary to generalise the results.

Moreno-Gómez, Vaillant and Lafuente (2018) investigated the effect of gender diversity in the board room and within top management on the business performance of 54 Colombian public businesses from 2008 to 2015. Accounting and organisational data were obtained from annual financial statements, available at the Colombian Superintendence of the Stock Market. Information on the composition of both the board of directors and top management teams was obtained from the annual reports available at the websites of the sampled firms. The performance measured was linked to ROA and ROE. The independent variables used were the proportion of women on the board of directors and women in top management positions. A dummy variable was used, which had the value of '1' if a woman held the position of CEO, and '0' otherwise. A panel data regression technique was used to estimate the proposed model, emphasising the relationship between gender diversity and performance. The authors found that gender diversity in top management and board rooms positively affected the subsequent

performance, measured as ROA and ROE. ROA is positively affected when women are in CEO or top management positions, whereas a positive effect on ROE is shown where women are represented as board members. The study is limited to a developing economy.

In a study of 41 listed Italian companies, Rossi, Hu and Foley (2017b) investigated the relationship between women directors on a board, firm performance and corporate decisions made from 2005 to 2013. The data on financial and corporate governance indicators were obtained from DataStream, the Calepino dell'azionista (Mediobanca), the report on corporate governance and financial statements of the company websites and CONSOB websites. The number of women on a board, measured as the percentage of women, was the independent variable and Tobin's Q was used as an outcome variable, a measure of firm value. The amount of investment on R&D, the standard deviation on ROA as a measure of risk-taking, and the ratio between total debts to total assets as a measure of debt were all considered to examine the effect of the corporate decision-making process. A regression model with the GMM technique was used to analyse the data. The overall results suggest that a critical mass of women directors on boards affects performance positively and also influences finance and investment decisions. The presence of women directors on boards seems to create a complementary effect on debt and a positive effect on investments in R&D. However, there is a corresponding negative effect on some business and operational risks. This study was limited to listed Italian companies.

Conyon and He (2017) investigated the relation between firm performance and boardroom gender diversity using the annual data from over 3000 US firms between 2007 and 2014. They used GMI-rating data for corporate governance information and COMPUSTAT data to construct corporate performance measures and other control variables. The final data set consists of 18,549 firm-year observations and 3634 unique firms. The paper used both ROA and Tobin's Q as accounting market-based performance measures as the dependent variables. The percentage of women on boards was used as an independent variable. Board size, institutional control shares, market leverage, firm size and firm age were also used as control variables. The authors employed quantile regression methods to analyse the data.

The data findings show that gender diversity positively affects firm performance, and that this effect varies at different points of the performance distribution. Female directors have

a considerably greater positive influence in high-performing than in low-performing enterprises, according to the quantile regression results. The gender diversity effect is not as homogeneous as prior research suggests. The authors argue that the unique perspectives and experiences of female board members are less likely to be used in low-performing firms because of group dynamic changes in reaction to the threats posed by declining performance; this undermines women's contributions to firm performance.

Kılıç and Kuzey (2016) assessed the effect of gender diversity on the financial performance of firms in Turkey. The study was conducted on a sample size of 149 firms from non-financial firms listed in the Borsa Istanbul from 2008 to 2012. The financial and board-related data of the companies obtained from annual reports were used to examine the association between board gender diversity and firm performance. ROA, ROE and ROS were used because, according to the authors, these performance measurements generally indicate the ability of a company to produce accounting-based earnings and returns to shareholders in Turkey. The independent variables used were the proportion of female directors on the board, and boards with at least one female as the dummy variable. Correlation and regression analysis were employed as tools for data analysis. The results of this study indicate that gender diversity in the boardroom has a significant positive effect on firm performance. The study did not consider the effect of other diversity measures—such as age, education, experience, and culture—on firm performance.

Solakoglu and Demir (2016) investigated the effects of gender diversity on firm performance and evaluated the influence of some firm-specific characteristics on this relationship in Turkey. The board size, age, size, and a duality dummy (as measured by the dual role of top manager and board chair) were the firm-specific factors considered as control variables in this study. The proportion and the number of women on the board, along with a dummy variable which equates to '1' when the CEO/GM is a woman were used as measure of gender diversity. Three measures of firm performances based on ROA, ROE as accounting-based and market -based were employed in this study. The market-based measure relied on average monthly returns in a year. The average return was normalised by the total risk of return. The risk was measured by the standard deviation of monthly return in a year. The authors argue that market performance is the amount of market return per unit of risk undertaken. The data on the financial and firm-level

characteristics of the largest publicly traded firms in Borsa Istanbul (BIST-100) were collected for 2002 and 2006 from the BIST webpage and annual volumes of company information. The authors used 2-stage least squares (2SLS) in the unbalanced panel data set to eliminate the problem of endogeneity of gender diversity and firm performance in the manufacturing and finance sectors.

The findings of this study indicate some weak evidence for a positive effect of gender diversity on firm performance, as measured by ROA. There was no statistically significant association between gender diversity and firm performance under the other two performance measures. The study also explored the influence of gender diversity on the performance of industry differences, export dependence and ownership structures. Their investigation of the manufacturing and finance sectors found no significant relationship between performances when diversity was measured with the dummy variables. In contrast, gender diversity, when measured by the proportion and number of female directors, positively affected ROA in the finance sector. The authors found some evidence that gender diversity influences firm performance in the financial sector, for local market-oriented firms and for firms with family or block ownership. The authors claim that ROA is more responsive to gender diversity than the other two measures, because it represents higher economic returns due to a possible higher risk aversion in women directors. They concluded that not many firms had more than one women director in this study; as such, a threshold number of female directors might be necessary for new perspectives that can improve performance.

Vafaei, Ahmed and Mather (2015) examined the association between gender diversity and performance in the corporate boards of a large sample of listed top-500 commercial companies in Australia. The sample size of the study comprised data from 1101 firm-year during from 2005 to 2011. Data were obtained from Connect 4 database, company annual reports and the DatAnalysis data base. The authors employed ROA and ROE, Tobin's Q, ratio cash flow from operations (CFO) and total assets (TA) at the balance sheet as performance measures. They used the number of female members on the board, measured by a dummy variable that indicated their presence, and a continuous variable indicating the percentage of female members on the board as two different models for performance estimation. Board size, FS, LEV, block holder ownership and managerial share ownership were used as control variables in 2SLS models. The result show that board diversity was

positively associated with firm performance. However, the findings of the study could not be generalisable to smaller ASX-listed firms.

The effect of gender diversity on listed firms in the Shanghai and Shenzhen stock exchange in China from 1999 to 2011 was investigated by Liu, Wei and Xie (2014). The sample size comprised 16,964 firm-year data from over 2000 firms. Financial and board composition data were obtained from the Chinese Securities Market and Accounting Research organisation. Firm ROA and ROS were used as performance measures. The percentage and number of women directors were used as a measure of gender diversity. A regression model was used as the estimation method. The results of this study reveal that the presence of women directors had a significant and positive effect on firm performance. In alignment with CMT, the findings establish that the presence of three or more women on a board has a stronger effect on firm performance, compared with having two or fewer women. This study will help to establish better corporate governance practices in China.

Carter, Simkins and Simpson (2003) claim to have provided the first empirical evidence of a relationship between board diversity and financial performance for publicly traded Fortune 1000 firms. They define board diversity as the percentage of women and minorities (African Americans, Asians, and Hispanics) on the board of directors. Tobin's Q was used to estimate firm value. Board of director data for 638 firms was obtained from Significant Data for Directors 1999, Board Policies and Governance database and financial data obtained from the COMPUSTAT database. Dummy variables indicating the presence of women/minorities and the percentage of women/minorities on the board were used as measures of board of director diversity trends. Using mean and 2SLS analysis, and after controlling for size, industry and other corporate governance measures based on board of director characteristics, a significant positive relationship between diversity and performance of firms was established.

2.3.10 Non-significant Effect

In subsequent studies, Carter et al. (2010) examines the business case for the inclusion of women and ethnic minority directors on the board, through an unbalanced panel of 641 unique firms and 2,563 firm years in the S&P 500 Index for the five years from 1998 to 2002. Data were collected from the Investor Responsibility Research Center (IRRC) and

COMPUSTAT database. Board diversity was defined as the percentage of women and minorities (African Americans, Asians, and Hispanics). ROA and Tobin's Q were used to measure financial performances. TA and number of directors were used as control variables. Data analysis was undertaken using 3-stage least square estimates. The study indicates an absence of any significant effect on firm performance by the presence of gender or ethnic minority on the board. Thus, the outcome did not support the business case for the presence of women and ethnic minorities on boards. However, the results found no signs of any negative effect on performance. The authors suggest that the board appointment of women and minority should not be based on financial performance alone and that other criteria needs to be considered.

Ali, Ng and Kulik (2014) tested the relationship between board diversity and firm performance by focusing on the board age and gender of 288 large organisations listed on the ASX. Data on age and gender diversity obtained from the Orbis database, operating revenue and ROA from Osiris database and data on the number of employees were obtained from the DatAnalysis database. Other industry data were obtained from ASX websites. Firm size, firm age and industry type were the control variables. Employee's productivity and ROA were used as performance measures. Mean, standard deviation and correlation coefficient of all the variables were estimated, followed by regression analysis. The results indicate that gender diversity has a non-significant relationship with ROA, but a positive relationship with productivity. This positive effect on productivity supports RDT, because a diverse board provides the resources necessary to improve operating revenue, and this leads to improvement in productivity. Age diversity was found to have an inverted U-shaped curvilinear relationship with ROA. This study was limited to ASX-listed large organisations.

Rose, Munch-Madsen and Funch (2013) studied the effect of female board representation, as well as citizenship, on the corporate performance of the largest listed samples from the leading stock indices in Denmark, Sweden, Finland, Norway, and Germany. Information about the composition of the board was obtained from each company's annual accounts, where data on the real number of board members, the number of men and women, as well as non-nationals and nationality were available. Information on board members' nationality in some companies was not available because of non-disclosure policies. Data were collected from a sample of 117 companies in 2010. Firm size, industry effect and

country were used as control variables. ROA, ROE, and ROCE were used as a measure of firm performance. Cross-sectional regression analysis was employed for data analysis. It was found that the presence of nationals among the non-national board members had a positive effect on performance. However, no link was found between female board representation and superior performance, and the composition of large boards had a negative effect on the performance.

The influence of gender diversity on the performance of the largest 300 ASX-listed firms was examined by Chapple and Humphrey (2014). The data on returns, book-to-market, and market values of 287 firms listed on the S&P/ASX 300 over eight years were extracted from the Datastream database. An aggregate (market-level) approach was taken, and this compared the performances of firms with boards with no gender diversity. The effects on industry and firm performance were also investigated on boards with multiple women. An analytical model was developed with return on the portfolio, the market portfolio, and risk-free assets to measure performance. No evidence was found of any relationship between board diversity and firm performance. The results could not be generalised because of lack of sufficient data from every sector of the business.

Arena et al. (2015) investigated the effect of gender diversity on firm performance in relation to critical mass and female director education levels. The hypotheses were tested on construction industry data from 211 European Union listed companies from 19 different countries using least square regressions analysis. The percentage of women directors was used for gender diversity and the presence of at least three members on the board as critical mass. The percentage of women directors without a masters' degree, MBA and/or PhD was used as a proxy of education of women. Board size, LEV, the prior performance of the firm and size of the firm were used as control variables. ROA was used as a measure of performance. The study findings indicate that performance is not affected by the presence of women directors on a board. It was the critical mass rather than just the presence of women directors that had a positive effect on firm performance. On the other hand, a higher educational level of women directors had negative effects on firm performance, because of emotional conflicts. The outcome of this research was based on the masculine construction industry and as such could not be generalised.

2.3.11 Negative Effects

Shehata, El-Helaly and Salhin (2017) investigated the relationship between board diversity and firm performance using a large sample of 34,798 SMEs in the UK, from 2005 to 2013. Gender, the percentage of females and a GDI were used as independent variables. ROA was used as a measure of performance. Control variables used in the regression model included firm age, firm size, number of directors and firm risk. The findings revealed a substantial negative relationship between each gender and age diversity with the business performance. The findings do not support increases in board diversity and provide insights to SME entrepreneurs on how to manage their performance.

The link between gender diversity and firm performance of 151 listed German firms for the years 2000 to 2005 was investigated by Joecks, Pull and Vetter (2013). Firm performance as a dependent variable was measured by ROE. The data on gender diversity as a fraction of female/male board members were collected from annual reports of the firms. Firm market value, board size and multiple directorship data were used as control variables. The information on these variables was taken from Thomson Financial Datastream, Deutsche Borse 2010, and firms' annual reports. Multivariate regression analysis was used to analyse the link between gender diversity, measured by Blau's index of gender diversity, and ROE. The evidence of a U-shaped link between gender diversity on the board and firm performance was shown in the result. Gender diversity with a lower percentage of women on a board had a negative effect on firm performance. Firm performance had a significant positive effect where the board had reached a critical mass of about 30% of women, rather than having only male members. The authors identified the time frame of the study and Germany's two-tier board structure as the limitations in their study.

Haslam et al. (2010) presented an analysis of the relationship between the presence of women on company boards and performance through a sample of 126 companies included in the FTSE 100 Index from 2001 to 2005. The authors used accountancy-based measure (ROA and ROE) and a stock-based measure (Tobin's Q) to measure companies' performance. The data of board composition and company characteristics were sourced from female FTSE Index records and Thomas ONE banker database. Bivariate correlations were examined to study the relationship between the presence of women on company boards and company performance. The board size, number of employees and

business type were used as control variables. The results revealed no relationship between the presence of women on corporate boards and the accountancy-based measure of performance. However, they found a negative relationship between the presence of women on the boards and the stock-based measure of performance. On detailed analysis, it was found that a valuation premium of 37% was achieved by male-only boards compared with companies with one female member on the board. This result could support the claim that women on boards are associated with poor performance in companies and their presence might lead to a devaluation by investors. The limitation of this study is that it is based on correlational analysis; as such, further qualitative and quantitative analysis are needed to establish the relationship between company performance and board composition conclusively.

Adams and Ferreira (2009) studied the effect of women in the boardroom on governance and performance in US firms. A sample of 1939 firms consisted of 86,714 director-level observation data for S&P's 500, S&P MidCaps, and S&P SmallCap firms. Data were collected from the IRRC Director Data and ExecuComp sources from 1996 to 2003. Several variables for firm characteristics, board characteristics and director characteristics were used to investigate the effect on firm outcomes. ROA and Tobin's Q were employed as measures of firm performances. Correlation and regression analyses measured the effect of board inputs and firm outcomes. The findings suggest that gender-diverse boards allocate more effort to monitoring and have some influence on board structure but show a negative effect on performance.

In 2003, the Norwegian government introduced a law to increase the quota of female directors in firms from 9% to 40%. Ahern and Dittmar (2012) presented the effect of this mandated representation of female board members on firm values before and after the law's introduction. The sample consisted of 1,230 firm-year observations of 248 Norwegian firms that traded on the Oslo stock exchange from 2001 to 2009. Data were collected from the companies' annual reports, Boardex database and registers of business enterprises. The quota of women directors was used as an input variable, along with other board characteristics. Board size and firm size were control variables. Tobin's Q was computed as a measure of the firm value. The effect of the gender quota on firm value was estimated by employing regression analysis. The authors reported significant reductions in stock prices when the law was first introduced, as well as a large drop in

Tobin's Q during the following years, indicating that female representation had a detrimental effect on business value.

2.3.12 Summary of the Effects of Gender Diversity on Performance

The variables used to study the effect of gender diversity on the performance of firms in different countries are summarised in Table 2.9.

Table 2.9: Summary of the Literature Survey

Author (Year)	Sample Data and Country	Diversity Independent (variables)	Control Variables	Dependent Variables	Impact of Diversity on Firm Performance
Positive effect					
Noamene et al. (2021)	100 UK firms listed on FTSE 100 in the period 2009–2018	Proportion of female directors on the corporate board.	Board size, board independence, number of board meetings per year, firm size, firm sector, leverage, and sales growth indicator.	ROA, ROE, and Tobin's Q	Positive link between the proportion of female directors and all financial measures. The results also show that the positive consequences of female directorship are driven by their role in enhancing the board's advisory and monitoring activities.
Mastella et al. (2021)	150 Brazilian publicly traded companies from 2010–2018,	Absolute number of women in boards (management council) and absolute number of women in directorship.	Company size, age of the company, leverage, tangibility, and industry type. used dummies for controlling for ownership (private or state-owned), calendar years and corporate governance listing segments	ROA, ROE, and Tobin's Q.	Number of females on the board has a more significant effect at the lower levels of firm performance measured by ROE, but at higher levels when measured by Tobin's Q. Regarding ROA, the more significant effect happened on the extremes of the performance distribution. The study findings indicated that market investors place more value in female presence on the board than in director positions
Sani et al. (2019)	400 firm-year observations for the period of 2012–2016 listed in Nigerian Stock Exchange	Number of female directors on the board.	Auditor type, firm size, leverage, and tangibility	ROA	The findings supported the argument that gender diversity is positive and significantly related with financial outcomes of firms

Author (Year)	Sample Data and Country	Diversity Independent (variables)	Control Variables	Dependent Variables	Impact of Diversity on Firm Performance
Kagzi and Guha (2018b)	126 high-tech manufacturing firms in India over the period of 2010–2014.	Combined as well as individual attribute of board members (gender, age, education, and tenure).	Firm size, leverage, board size and firm age.	Tobin's Q	1. Overall board demographic diversity index (gender, age, tenure, and education) is positive. 2. Board age diversity is positive. 3. Education diversity is negative. 4. Gender diversity and tenure diversity do not have significant influence.
Srivastava eta, Das and Pattanayak (2018)	Panel data of 20 firms for 15 years in India.	Board composition without female director and Board composition with female director.	Leverage and firm size.	COE and ROA.	Female directors have a negative association with COE and have a positive association with the ROA.
Wiley and Monllor-Tormos (2018)	236 US Fortune 500 firms	Proportion of female board member and Critical Mass (30% of female board member) as moderating variables.	Firm age, firm size, internationalisation, business segments, board size, board independence, board ownership, director age, director tenure and others.	Tobin's Q	The effect of gender diversity is positive and higher when there is a critical mass of 30% female members on the board.
Moreno-Gómez, Vaillant and Lafuente (2018)	54 firms in Colombia	Proportion of female directors and Female CEO.	Board size, leverage, and firm size.	ROA and ROE.	Gender diversity on the board is positively associated with performance.
Rossi, Hu and Foley (2017b)	41 listed firms in Italy.	Percentage of Women on Board.	Firm age, leverage, board size and firm size.	Tobin's Q	Presence of women on board has a positive effect.
Conyon and He (2017)	3634 US firms	Percentage of women on boards.	Board size, leverage, firm size, institutional control shares and firm age.	ROA and Tobin's Q	Gender diversity improves firm performance; however, the benefit varies depending on where it is in the performance distributions.

Author (Year)	Sample Data and Country	Diversity Independent (variables)	Control Variables	Dependent Variables	Impact of Diversity on Firm Performance
Kılıç and Kuzey (2016)	149 firms in Turkey.	Proportion of female directors on the board.	Board size, firm size and leverage.	ROA, ROE, and ROS.	Gender diversity on the boardroom has a significant positive effect.
Solakoglu and Demir (2016)	100 largest publicly traded firms in Turkey	The proportion and the number of women along with a dummy variable	Board size, firm age, firm size, and a duality dummy variable	ROA, ROE, and a market-based measure	Some weak evidence of the positive effect of gender diversity on firm performance as measured by ROA. There was no statistically significant association between gender diversity and firm performance under the other two performance measures.
Vafaei, Ahmed and Mather (2015)	500 top listed firms in Australia	Presence of female members, percentage of female member on the boards.	BHO, MSO, board size, firm size and leverage.	ROA and ROE, Tobin's Q and CFO/TA.	Board diversity is positively associated with performance.
Liu, Wei and Xie (2014)	2000 listed firms in Shanghai and Shenzhen stock exchange, China.	Percentage and number of women directors on board.	Percentage of independent director, board size and CEO-chair duality.	ROA and ROS	1. Percentage of women directors has a significant and positive effect. 2. Supports CMT.
Carter, Simkins and Simpson (2003)	Publicly traded Fortune 638 US firms.	Presence of women/minorities and percentage of women/minorities on the boards.	Board size, firm size and characteristics of the directors.	Tobin's Q.	Positive significant relationship.
Non-significant Impact					

Author (Year)	Sample Data and Country	Diversity Independent (variables)	Control Variables	Dependent Variables	Impact of Diversity on Firm Performance
Arena et al. (2015)	211 European Union listed companies from 19 different countries.	Percentage of women used as gender diversity, presence of three members on board as critical mass and percentage of women without postgraduate and/or a PhD was used as proxy of education of women.	Board size, leverage, prior performance of the firm and firm size.	ROA	1.Women directors have no positive affect 2. Critical mass has incremental benefits on performance 3. Educational level has negative effect on performance.
Chapple and Humphrey (2014)	Largest 287 Australian firms listed in ASX.	Portfolios of firms with and without women on board.	SMB, HML and UMD.	Return on portfolio-based on the market portfolio and risk-free asset.	Overall, they found no indication of a link between gender diversity and firm performance in general.
Ali, Ng and Kulik (2014)	288 large Australian firms listed in ASX.	Age diversity and gender diversity.	Firm size, firm age and industry type.	ROA and productivity	1. Non-significant relationship with ROA. 2. Positive linear relationship between gender diversity and employee productivity. 3. Negative linear relationship between age diversity and return on assets. 4. Inverted U-shaped curvilinear relationship between age diversity and return on assets.
Rose, Munch-Madsen and Funch (2013)	117 firms from Denmark, Sweden, Finland, Norway and Germany.	Female board members, nationality, and board size.	Firm size, industry, and country.	ROA, ROE ROCE	1. Nationals from non-national board members has a positive effect. 2. Female board representation is not associated with superior performance. 3. Large boards have a negative effect.
Negative Effect					

Author (Year)	Sample Data and Country	Diversity Independent (variables)	Control Variables	Dependent Variables	Impact of Diversity on Firm Performance
Shehata, El-Helaly and Salhin (2017)	34,798 SME firms in UK.	Gender, percentage of female member and gender diversity index.	Firm age, firm size, number of directors and firm risk.	ROA	Significant negative association between each of gender diversity and age diversity, and firm performance.
Haslam et al. (2010)	126 FTSE 100 companies in UK	Presence of women and percentage of women.	Board size, number of employees and nature of business.	ROA, ROE and Tobin's Q.	Negative relationship.
Joecks, Pull and Vetter (2013)	151 listed German firms.	Fraction of female/male board members.	Board size, market value and multiple board membership	ROE	U-shaped link with performance (At first negative and then positive at critical mass).
Adams and Ferreira (2009)	1939 firms' data from Standard & Poor's (S&P) 500, S&P MidCaps, and S&P SmallCap firms in US.	Fraction of female directors.	Board size.	ROA and Tobin's Q.	Average effect of gender diversity on firm performance is negative.
Ahern and Dittmar (2012)	1,230 firm-year data of 248 Norwegian firms	Percentage of female directors.	Board size and firm size.	Tobin's Q	Negative effect of gender quota on firm value.

2.4 Gender Diversity and Innovation

2.4.1 Innovation

Innovation can be defined as ‘a new or improved product or process (or a combination thereof) that differs significantly from the unit’s previous products or processes and that has been made available to potential users (product) or brought into use by the unit (process)’ (OECD/Eurostat 2018). This definition uses the generic term ‘unit’ to describe the actor responsible for innovations. It refers to any institutional unit in any sector, including households and their individual members.

Innovation provides firms with a strategic orientation to overcome problems they may encounter by developing opportunities to adopt new ideas or behaviours and create products or services. It can be viewed as the application of better solutions that meet new requirements, unstated needs, or existing needs. It can be conceived as the transformation of knowledge to commercial value because it has the potential to increase efficiency and improve the profitability of firms (Gunday et al. 2011). The function of innovation could be classified broadly as technical and administrative. Technical innovations include the adoption of a new process and new products or services, whereas administrative innovations refer to new procedures, policies, and organisational forms. Innovation is one of the key drivers of long-term success in business, because it helps a firm to cope with dynamic external environments. Thus, innovative firms can respond to challenges faster and exploit new products, services, and market opportunities better than non-innovative firms (Jiménez-Jiménez & Sanz-Valle 2011). It is an indispensable component of corporate strategies, because of its application in improving manufacturing processes and marketing performance, and in seeking a positive reputation in customer perceptions; as a result, innovation can enable a sustainable competitive advantage (Gunday et al. 2011).

Introducing new processes and products through innovation helps a firm create new areas of profit or reductions in cost and thus helps the sustainability of that firm (Sharma 2016). Innovation is imperative in maintaining a competitive edge and it is found in the knowledge developed or acquired and held by a firm (Ruiz-Jiménez, Fuentes-Fuentes & Ruiz-Arroyo 2016). It is essential for a firm to gain competitive advantages and create opportunities to open new markets through innovation (Diaz-Garcia, Gonzalez-Moreno & Saez-Martinez 2013). Further, Damanpour, Walker and Avellaneda (2009) reported a

detrimental effect from innovation in UK public service organisations who adopt a specific type of innovation (service/technological process/administrative) every year; a more balanced approach is recommended as necessary to accomplish the positive effect of innovation on performance. Researchers have introduced many conceptual typologies of innovation. The four most widely studied types of innovation are described as: product, process, organisation, and marketing. Instead of focusing on adopting one type, an organisation needs to exploit the synergy across all types of innovation so it can introduce and deliver services to clients and meet multiple demands. The four types of innovation are detailed in Table 2.10 (Atalay, Anafarta & Sarvan 2013; Gunday et al. 2011; Karabulut 2015).

Table 2.10: Types of Innovation

Innovation Types	Description
Product	Product innovation is the introduction of a goods or services that are new or significantly improved with respect to the performance characteristics for end users. It can be achieved by significant improvements in technical specifications, components and materials, built-in software, user friendly or other functional characteristics. New and/or existing knowledge or technology is employed in product innovation and requires continuous research and development to remain competitive in the market. Involvement of strong interaction within the firms as well as with customers and suppliers are essential for its success so that the stakeholders easily recognise it.
Process	Process innovation is the implementation of a new or significantly improved production or delivery methods and may include significant changes in techniques, equipment, human resources, working methods, software, or a combination of these. Thus, a firm may adopt new technologies, acquire new equipment, train employees, reorganise processes and use process innovation as a tool to improve efficiency by decreasing the unit cost of production, improving quality, and producing or delivering improved products.
Marketing	Marketing innovation is the application of a new marketing method that involves significant changes in design or packaging, placement, promotion, or pricing of the product. Marketing innovations intent to increase firms' sales by addressing improvement of customer needs, opening new markets, or newly positioning a firm's product on the market.
Organisational	Organisational innovation in the firm involves introduction of significantly changed organisational structures, application of advanced management techniques and employment of new or substantially changed corporate strategic orientations. It is the implementation of a new organisational method in the business practices, workplace organisation and external relations. It is strongly connected to all the administrative efforts of renovating routines, procedures, and other organisational tasks to encourage teamwork, sharing of information, coordination, collaboration, learning outcomes and innovation. Reduction of administrative and transaction costs, improvement in workplace satisfaction and reduction in cost of supplies due to organisational innovations tends to increase firm performance.

Innovation is broadly seen as an essential component of competitiveness, embedded in the organisational structures, processes, products and services within a firm that are vital to build market reputation and thereby increase market share. However, Simpson, Siguaw and Enz (2006) noted that innovation can lead to increased exposure to market risk, increased costs, employee dissatisfaction or unwarranted changes. Although innovation is risky, researchers have proposed two theoretical arguments to support its positive effect on firm performance. First, innovation leads to a first or early mover advantage for a firm, enabling it to exploit a competitive environment that has a positive effect on performance. Second, managers are motivated to adopt innovations to create change in an organisation and so reduce the perceived performance gap (the difference between actual achievement and potential level of achievement) (Damanpour, Walker & Avellaneda 2009). The evidence of a relationship between gender diversity, innovation activity and firm performance in prior studies is detailed in the next section.

2.4.2 Effect of Gender Diversity on Innovation

Gender diversity and innovation are linked, because the innovative ideas generated by the strategic direction of a firm are influenced by the diverse human capital on boards (Miller & Triana 2009). Gender diversity leads to the detailed processing of information with a due consideration of divergent views. This is particularly valuable for tasks requiring creative solutions, such as an innovation process that depends on the insightful and distinctive recombination and reapplication of existing resources (Dezsö & Ross 2012). Findings from various authors indicate that gender diversity is positively associated with innovation (Diaz-Garcia, Gonzalez-Moreno & Saez-Martinez 2013; Galia & Zenou 2013; Midavaine, Dolfsma & Aalbers 2016; Østergaard, Timmermans & Kristinsson 2011; Saggese, Sarto & Viganò 2021; Sharma 2016). The results of a study by Torchia, Calabrò & Huse (2011) show that a firm's level of innovation is enhanced by attaining a critical mass of at least three female board members.

Saggese, Sarto and Viganò (2021) provide insight into the effects of innovation due to gender diversity on company boards. The effects of critical mass and expert power among female directors, as well as the moderating role of female CEOs, are investigated in this study. The selection of sample firms was based on the complete set of financial and governance data, and available information on the R&D spending of the firms. A final

sample of 149 Italian firms in high-tech industries and 596 firm-year observations from 2012 to 2015 were considered in this study. Data on innovation input and the presence and characteristics of women directors were extracted from the AIDA database. The authors integrated and double-checked the information using triangulation by manually collecting data from the CVs of women directors, a professional networking website (LinkedIn), company websites, corporate governance reports and annual reports of the firms. The R&D intensity measured by ratio of total annual R&D spending and total sales was used as innovation input. The primary explanatory variables were related to the presence of women directors on the board, which were related to both the percentage of women and the critical mass (a board with at least three women members). The expert power of women directors was measured by the average member of the women appointed to the board, which reflects their experiences and maturity. The control variables included the proportion of independent directors, board size, CEO duality, firm size, leverage, firm profitability, and firm age. They used pooled ordinary least squares (OLS) regression analyses to investigate the hypotheses and reported robust standard errors for each regression coefficient. Women on boards had a positive effect on innovation input, as assessed by R&D intensity, according to the study, but only when they reach a critical mass. This research indicates how having a critical mass of female directors can minimise the biases of other board members and increase women's ability to influence innovation. The results also suggest that women directors' expert power has a favourable outcome on R&D spendings. Women who are mature and more powerful can contribute to better board decision-making by introducing new ideas and perspectives, which can lead to business innovation. Finally, having a woman as CEO helps to control the links between innovation input and critical mass, as well as the expert power of women. As a result, the findings support the hypothesis that CEO-board gender similarity may increase women directors' engagement and enhance firm innovation. The drawback of the study is that it focuses on medium and large businesses, because they have the capabilities and financial resources needed for innovation, which is a major competitive factor in technology-based environments.

Midavaine, Dolfsma and Aalbers (2016) analysed a cross-section of firms in high-tech industries over several years on corporate governance and innovation management. They investigated the effect of board diversity on the firm's inclination to invest in R&D. According to the authors, diversity among board members can be related to the sources

of information for the board. A sensible weighting of various components of information, depending on what information is relevant at the board level, leads to superior decisions. When shared within the board, the availability of diverse perceptions and knowledge benefits the overall knowledge base and enhances the performance of the board (Midavaine, Dolfsma & Aalbers 2016).

Data from 25 US firms listed in the Fortune 500 involved in pharmaceutical, chemical, machinery and aerospace industries (classified by the Organisation for Economic Co-operation and Development as high-tech industries) were collected for seven years from the COMPUSTAT database. The dependent variable in this study was R&D investment, measured as the firm spending on R&D. Independent variables were gender, age, education and tenure (experience at the firm). Firm size, age of the firm and a measure for the business cycle in the form of percentage change in GDP (compared with the previous year) were used as control variables. OLS regression methods were used to analyse the data. The findings indicate that educational diversity and gender diversity are positively related, while tenure is negatively related to innovation. Age diversity had a negligible effect on innovation and negatively moderated the most (positive) effect of education diversity. However, it did not negatively moderate the effect of tenure diversity. In addition, the effect of gender diversity positively moderated the main effect of educational diversity. The authors concluded that innovation is not limited to the R&D department, and that sustained firm innovation depends on diversity in the top management team.

Sharma (2016) examined the diversity in corporate boards and their contribution to innovation. The author classified diversity in terms of ascribed and achieved characteristics of board members. The former characteristic includes gender, age, nationality, and ethnicity, whereas the latter includes qualifications and experience. The introduction of new processes and products through innovation helps the firm to create new areas of profit or reductions in cost and thus helps the sustainability of the firm. It was noted that innovation was a long-term process with a high failure rate and could be risky. The positive role of diversity on innovation has been confirmed by other authors (Richard et al. 2004). The data used in this study were compiled from a sample of 5432 US firms spanning 2000 to 2006, and were collected from Boardex, Risk Metrics, NBER patent data project and COMPUSTAT databases. A total of 1216 firms applied for patents

during the sample period. Innovation was measured as the number of patents applied for by a firm each year and citations were used to capture the quality of innovation. Several variables were used to capture board diversity, which included the percentage of male directors, percentage of foreigners as directors on boards, percentage of non-Caucasian directors on boards, age range of directors and average educational qualifications of the directors. Board size, percentage of independent directors, time in directorship, leverage, ROA, R&D expense/TA were used as control variables. OLS regression was used to analyse the data. The findings in the paper show that ethnicity and nationality together have a positive effect, and age dissimilarity and the lack of women have a negative effect on innovation. The qualifications and experience of the board members were found to contribute to higher levels of innovation.

Ruiz-Jiménez, Fuentes-Fuentes and Ruiz-Arroyo (2016) examined the influence of gender diversity on the relationship between knowledge combination capability and innovation performance in technology-based SMEs in Spain. Knowledge combination capability was considered part of the innovation process that allows individuals in an organisation to absorb, collaborate and access critical information to find the best ways to transfer and combine useful knowledge for achieving creative solutions and improving firm effectiveness and functioning (Carmeli & Azeroual 2009). This study focused on the influence of gender diversity in the top management on the innovative results of a firm. Gender diversity implies additional heterogeneity related to gender-specific experience, knowledge, and capabilities, and when combined with different management styles, it has the potential to stimulate the relationship between knowledge combination capability and innovation performance (Ruiz-Jiménez, Fuentes-Fuentes & Ruiz-Arroyo 2016). The study population included 998 technology-based Spanish SME firms. Data were collected from the SABI database of Spain in May 2010. Information on the study variables was obtained from the CEOs of firms with the help of specially designed questionnaires on innovation performance and knowledge combination capability. All responses were recorded on a 1–7 Likert scale. Blau's index of heterogeneity was used to measure gender diversity. The firm size, age of the firm and the firm's investment in R&D were used as control variables. Innovation performance was the dependent variable, and knowledge combination capability and gender diversity were the independent variables. The relationship was studied with the use of hierarchical linear regression analysis. The findings of this study show that gender diversity has a positive moderating effect on the

relationship between knowledge combination capability and innovation performance, and this relationship is stronger at higher levels of gender diversity in the top management team. The limitation of this study is that it is cross-sectional, and it avoids reaching a firm conclusion on the direction of causality between the variables.

Diaz-Garcia, Gonzalez-Moreno and Saez-Martinez (2013) addressed the effect of gender diversity from R&D teams on the innovation of Spanish firms engaged in technological innovation. According to the authors, innovations can be described as incremental and radical. Incremental innovations relate to developments in products or production processes. Radical innovations are based on significant customer benefits and advancements in technology. This involves sweeping changes related to uncertainty in technology and markets, which has effects on the knowledge base of firms. Radical innovations are essential to gain competitive advantages and create prospects for firms to open new markets. It is associated with higher risks and more management challenges. Consequently, in addition to research knowledge, radical innovation requires more financial and human resources. Additionally, organisational structures and human resource management practices affect the motivation of individuals in a team. In a team environment, gender diversity with diverse knowledge or the perspectives of individuals with different skill sets can be combined to enrich the extant knowledge base, which will lead to a rise in outputs. These outputs in R&D teams are further benefitted by the group dynamics generated: the united efforts of mixed genders and improvements in workplace relations create better solutions that lead to radical innovation (Diaz-Garcia, Gonzalez-Moreno & Saez-Martinez 2013).

Diaz-Garcia, Gonzalez-Moreno and Saez-Martinez (2013) used data from a sample consisting of 4,277 Spanish firm innovation activities and employment characteristics in 2007 were drawn from the database Technological Innovation Panel (PITEC), which is a statistical instrument for studying the innovation activities of Spanish firms. Blau's index for gender diversity was used to measure gender diversity. Innovation performance was measured in terms of radical and incremental innovation. Radical innovation relates to innovations that are new in the market and that have been conducted in the last two years. This was measured as a dummy variable. Incremental innovations are innovations that are new for the firms in the last two years, measured as a dummy variable. Dummy variables have the value '1' when the firm has carried out innovations and '0' otherwise.

The firm size as the log of employee numbers, industry group membership, team size as the log of number of full time R&D employees, technology intensity of the environment, two categories-of business services (high knowledge-intensive and low knowledge-intensive) and external expenses in R&D were used as control variables. Two logistic binary regressions methods were used to analyse how gender diversity influenced the degree of novelty of innovation.

The authors found a strong positive relationship between gender diversity in R&D teams and radical innovation. However, there were no significant effects of gender diversity on incremental innovations. Incremental innovations were found to be related positively to firm size and group membership. The limitation of this study is that it is cross-sectional, which means there is no certainty that causality among variables could be generalised.

Galia and Zenou (2013) studied the relationship between diversity (gender and age) and different types of innovations. According to the authors, women on boards with different knowledge, skills and ideas bring different perspectives, experiences and management styles when compared with their male colleagues, which helps to identify new innovative opportunities. Four different types of innovations (product, process, organisational and marketing) were used as dependent variables to explore the relationship between diversity and innovation. The independent variables of board diversity were defined in terms of the percentage of women directors on the board and the number of women on the board. Control variables included R&D expenditure, training investment and cooperation of innovation with other firms, sources of innovation, board size, firm size, and the percentage of independent directors.

Galia and Zenou (2013) used information on innovation from the 6th Community Innovation Survey (CIS 6) carried out by SESSI (Ministry of Economics, Finances, and Industry) in 2008, covering the 2006 to 2008 period. Data on board composition were gathered from a 2005 report to analyse the effect of board composition on innovation, which indicates board composition at the start of 2006. The CIS data came from firm-level surveys in which companies were asked to report on the level and type of innovation they were involved with. Descriptive statistics and regression analysis were used as statistical tools for data analysis. The findings revealed that gender diversity was positive for marketing innovation, was not significant for organisational innovation but was negative for product innovation. The findings show that women on boards have a greater

influence in terms of recognising and targeting customer wants and markets than they do in terms of introducing new products or services. This is in contrast with the previous findings of Østergaard, Timmermans and Krisrinsson (2011), which found a positive relationship between gender diversity and innovation on a sample of Danish firms, where innovation was defined as the introduction of a new product or service by the company. However, this study found significant evidence of a positive relationship between age diversity and product innovation. This research is affected by country-specific dimensions and as such needs some international comparison for generalisation.

A theoretical model was developed by Dezsö and Ross (2012) to explain how and under what circumstances the performance of a firm is improved by female representation in top management. According to the authors, gender diversity leads to the detailed processing of information with due consideration of different opinions. This is specifically valuable for innovation processes that require creative solutions for different tasks that require a perceptive and distinctive use and application of existing resources. They argue that female representation in top management brings informational and social diversity benefits to a top management team, enriches the behaviours exhibited by managers throughout the firm, and motivates women at all levels. This would be mostly beneficial where women managers are heavily involved in innovation-related tasks. Thus, it was anticipated that the management style of female members in the top levels was especially useful to firms for which innovation was a vital part of their strategy. The authors studied the moderating effect of innovation on the performance of firms with gender diversity in the top management (Dezsö & Ross 2012).

The source for the size and gender composition of top management teams was S&P's ExecuComp database, which contains information on senior managers from proxy statements and other filings of the S&P 1,500 firms, a widely used index of public companies designed to reflect the broad US equity market (S&P's, 2010). The samples cover data for 1992 to 2006. S&P's COMPUSTAT database, which collects financial information from firm public filings, was used as a source of financial information, and the Centre for Research in Securities Prices was used for a firm's initial public trading date. Female representation in top management was used as a dummy variable. Tobin's Q was used as a measure of performance. Innovation intensity as the ratio of R&D expense to assets from the prior year was used as a control variable in the analysis.

Additional control variables commonly found in research on top management teams were also used in this study. These control variables included firm size, firm age, leverage, capital expenditure intensity (CapEx), marketing intensity, age of capital stock and number of managers on the top management team. The firm size, innovation intensity, CapEx, marketing intensity and age of capital stock were log transformed to reduce skewness. Descriptive statistics, correlation and OLS regression methods were employed in data analysis.

In this paper, the authors developed a theoretical model to explain how and under what circumstances female representation in top management improves firm performance. The theory was tested using 15 years of data on a large and comprehensive sample of public US corporations. The findings can be described as supporting that female participation in senior management contributes to higher business success, but only to the extent that a firm's strategy includes innovation.

Torchia, Calabrò and Huse (2011) explored the relationship between gender diversity on corporate boards and the firm's level of innovation achieved, through the direct relationship of gender diversity to board strategic tasks. Board strategic tasks were referred to as the degree of involvement of board members, from launching to the execution phases of strategic processes in the organisation. From the broad definition of innovation as the creation and introduction of new products, processes, and organisational systems (Zahra & Garvis. 2000), the authors addressed the organisational innovation considered to be the output of different intervening psychological processes. Organisational innovation, being more people focused and influenced by the individual characteristics of female directors with different knowledge, values, and expertise, was considered appropriate for this study. The effects of gender diversity were represented by the number of female members on the board and their influences on organisational innovation. This was analysed when they reached a critical level of at least three members (Torchia, Calabrò & Huse 2011).

The study was based on a survey conducted among Norwegian companies during winter 2005/2006 and the first half of 2006. Data were gathered from a questionnaire sent to 2954 firms in different categories from the Oslo stock exchange and other public limited firms. The final sample consisted of 317 firms. Organisational innovation as a dependent variable was measured with responses to four questions in a 7-point Likert scale regarding

board member perceptions of firm innovation. The mean value of these four responses was used to construct the organisational innovation. The number of women on the board was treated as an independent variable. Board strategic tasks, as a mediating variable, were measured with responses of four questions about the involvement of board members in a 7-point Likert scale.

Board size, firm size, CEO tenure, chairperson's tenure, CEO gender, chairperson's gender and duration of board meeting were used as control variables that influence the level of firm organisational innovation. Directors' knowledge and competence as assessed by the CEOs was also considered as a control variable in this study. The effects of the different numbers of female board members on organisational innovation and the mediating role of board strategic tasks were tested using a multiple linear regression model. The result of the study shows that a firm's level of innovation is enhanced by attaining a critical mass of at least three female board members. The relationship between critical mass of female directors and organisational innovation is mediated by board strategic tasks. A limitation of this study is that it focuses on the Norwegians context and only organisational innovation was considered. Further study is needed to understand the effect of critical mass on a firm's product, process, and marketing innovation.

The relationship between employee diversity in terms of gender, age and ethnicity and a firm's innovative behaviour was investigated by Østergaard, Timmerman and Kristinsson (2011). According to the authors, innovation is a collaborative process that frequently encompasses communication and exchange information among employees and that brings out their distinctive qualities at all levels. It is frequently dependent on the types of individual knowledge in a group to generate new knowledge or ideas. Consequently, the structure of individuals within a firm is a vital factor to understand innovation, as diversity in knowledge based in human capital depends on the contribution of diversity of firms' employees to the structure. To experience an effect of diversity it is necessary to have interaction between diverse knowledge bases in the firm to stimulate the innovation process. As a result, it is not adequate to investigate the relationship between diversity and innovation, focusing only on top management teams, as the composition does not necessarily reflect all human capital resources in the firm (Østergaard, Timmerman & Kristinsson 2011).

Two types of data sets were merged to obtain the required information in Østergaard, Timmerman an Kristinsson's (2011) investigation. One type of data set, which contained detailed employee information on all Danish companies, was collected from the Integrated Database for Labour Market Research. The other set of questionnaire-based innovation survey data from 1648 out of 4136 Danish manufacturing and service firms for 2003 to 2005 and focusing on technical and organisational changes, was collected in 2006. The diversity measures based on gender, age, ethnicity, and education were used as independent variables. The introduction of a new product or services during the period 2003 to 2005 as an innovation was used as the dependent variable. Important organisational changes were considered a vital factor for innovation. Additional dummy variables were created in relation to the firm's collaboration with external agencies. Type of industry, size and the age of the firms were used as control variables.

A logistic regression analysis model was used to test the relationship between diversity and innovation. According to the authors, the results indicate that gender diversity and education are positively associated with the possibility of introducing an innovation, whereas age diversity shows a significant negative effect. There is no significant effect of ethnicity on the possibility of introducing an innovation. Further analysis did not reveal any curvilinear relation between diversity and innovation. This study is based on a cross-sectional analysis of 1648 firms. It was difficult to identify the specific structure and innovation processes of any firm and as such, the authors recommend a longitudinal analysis approach in future studies.

2.4.3 Summary of the Studies on Gender Diversity, Innovation and Performance

The variables used to study the relationship of gender board diversity, innovation and firm performance from different countries are summarised in Table 2.11 below.

Table 2.11: Summary of the Literature Survey on Gender Diversity, Innovation and Performance

Author (Year)	Sample Data and Country	Diversity Independent (variables)	Control Variables	Dependent Variables	Impact of diversity on innovation/firm performance
Saggese, Sarto and Viganò (2021)	149 Italian firms over the period 2012–2015	Percentage of women on the board and critical mass	Proportion of independent directors, board size, CEO duality, firm size, leverage, firm profitability and firm age	R&D intensity	Women on boards had a positive effect on innovation input as assessed by R&D intensity, but only when a critical mass of women was reached. This research indicates how having a critical mass of female directors can lessen the prejudices of other board members while also increasing women's ability to influence innovation.
Midavaine, Dolfsma and Aalbers (2016)	7 years of data of 25 US firms listed in the Fortune 500.	Education, experience at the firm, gender and age of the members.	Firm size, leverage, board size and firm age.	Firm spending on R&D investment	1. Educational diversity is positively related to innovativeness by the firm. 2. Diversity in tenure is negatively related with innovativeness. 3. Effect of age on innovativeness is statistically negligible. 4. Effect of gender is positive and positively moderates the main effect of educational diversity. (OLS regression analysis)
Sharma (2016)	5432 US firms spanning from 2000 to 2006.	Percentage of (male, foreigners, non-Caucasian), age range, average education level.	Leverage and board size. Percentage of independent directors, time in role, ROA and (R&D/total asset).	Innovation and Citations.	1. Ethnicity and nationality mix has a positive impact on innovation. 2. Age dissimilarity and lack of women has a negative impact on innovation. 3. Qualifications and experience also contribute to higher innovation. (OLS regression analysis)
Ruiz-Jiménez, Fuentes-Fuentes and Ruiz-Arroyo (2016)	998 Spanish SMEs in 2010.	Gender diversity and knowledge combination capability.	Firm size, firm age, and investment in R&D.	Innovation outcomes.	Gender diversity positively moderates the relationship between innovation performance and knowledge combination capability. (Hierarchical linear regression analysis)

Author (Year)	Sample Data and Country	Diversity Independent (variables)	Control Variables	Dependent Variables	Impact of diversity on innovation/firm performance
Diaz-Garcia, Gonzalez-Moreno and Saez-Martinez (2013)	4277 Spanish firms in 2007.	Gender diversity.	Firm size, group membership, team size, technology and external R&D expense.	Innovation: radical & incremental	Positive relationship between gender diversity in R&D team and radical innovation (Logistic binary regressions).
Galia and Zenou (2013)	Innovation Info of 176 French firms 2006–2008	Percentage of women directors in the board and number of women in the board.	R&D (expense), training (investment), openness—source of innovation board size, firm size and percentage of independent directors.	Product, process and Marketing innovation.	1. Positive impact on marketing. 2. Positive impact on organisation. 3. Negative effect on product. (Regression analysis)
Dezsö and Ross (2012)	S&P 1,500 firms in US, covers data from 1992 to 2006.	Female in top management.	Innovation intensity, firm size, firm age, leverage, capital expenditure intensity, marketing intensity, age of capital stock and number of managers on the top management team.	Tobin's Q	Female representation in top management leads to better firm performance but only to the extent that a firm is focused on innovation as part of its strategy. (OLS regression analysis)
Torchia, Calabrò and Huse (2011)	317 sample firms in Norway.	Number of female members in the board. .	Firm size, board size, CEO tenure, chairperson tenure, CEO gender, chairperson gender and duration of board meetings.	Organisational innovation	Firm's level of innovation is enhanced by attaining critical mass of at least three female board members. (Board strategic tasks used as mediating variable). (Multiple linear regression model)
Østergaard, Timmermans and	1648 Danish manufacturing and service firms for the	Gender, age, ethnicity and education.	Industry, size and age of the firm.	Introduction of new product or services.	Gender diversity and education are positively associated with the likelihood of introducing an innovation whereas age diversity shows a significant negative effect and there is no significant effect of ethnicity on the likelihood of introducing an innovation.

Author (Year)	Sample Data and Country	Diversity Independent (variables)	Control Variables	Dependent Variables	Impact of diversity on innovation/firm performance
Kristinssen (2011)	period 2003–2005.				(Logistic regression analysis)

2.4.4 Effect of Innovation on Performance

The synergy effects among four different types of innovation activities (product, process, marketing, and organisational innovation) on the performance of a firm was investigated by Lee, Lee and Garrett (2019). The authors examined the effect of strategic orientation of firms by considering the role of exploration and exploitation orientations on innovation activities undertaken to obtain superior performance. The exploration orientation, which is associated with the experimentation of new alternatives, and an exploitation orientation, which includes improvement enhancement of extant competences, technologies, and paradigms, were investigated as precursors to product and process innovation activities.

A sample of 856 firms undertaking innovation from 2011 to 2013 was obtained from the Korean Innovation Survey (KIS) 2014, which is the translated version of the Community Innovation Survey (CIS) based on the Oslo Manual (OECD/Eurostat 2005). The authors employed a subject approach, largely based on the self-evaluation of respondents, as it is advantageous to collect comprehensive data on innovation activities and outputs at the decision-making level of a firm (Mairesse & Mohnen 2010, pp. 1129–55). The measurements of firm exploration and exploitation orientation, product innovation activity, process innovation activity, marketing innovation activity and organisation activity are the outcomes from responses received against specific dimensions of these activities. The firm performance measurement was based on the estimate of the percentage of turnover in 2013 caused by product innovation activities of the previous three years due to the lagged effect of innovation activities. Reliability and the respective underlying dimensions were tested through principal component analysis because most of the measures were composed of multiple items. The author employed path analysis, which is a subset of SEM that involves only single indicators (i.e., observed variables), to provide each variable that consists of dichotomous items with ordinal scales.

According to the authors, an exploration orientation focuses on new knowledge, skills, and processes, helps the firm to introduce both radical and incremental product innovation and thus has a positive effect on product innovation. In contrast, exploitation orientation aims to increase efficiency and the use of existing resources, increases the likelihood of process innovation, and has a positive effect on process innovation. Process innovation

boosts both radical and incremental product innovation. The moderating effects of marketing and organisation innovation have shown that the effect of a new product on firm performance is enhanced with the introduction of marketing innovation in high-tech firms, while process innovation has direct and positive effect on a firm's performance with organisational innovation in low-tech firms. The limitation of this study is that the innovation measure is subjective; its measurement was based on the responses in relation to activities of the previous three years and is cross-sectional in nature.

Lin et al. (2018) explored the relationship between organisational characteristics, innovation intensity and performance of US firms operating in three distinct service sectors. The authors define service innovation as the services and processes that are new or substantially improved with respect to the market, and new or substantially improved only with respect to a firm. The organisational characteristics related to innovation intensity included firm size, market position, past performance, and diversification. The innovation intensity was measured in terms of expenditure per employee on R&D, machines, and equipment during the period 2001 to 2003. The supplier-dominated sector, the production-intensive sector and the science-based and specialised sector are the three service sectors considered in this study. The services in supplier-dominated sectors are mostly associated with the personal services offered in restaurants and hotels, such as laundry, repair services, barbers, and beauty services, and in public or collective services such as healthcare and public administration. The services in the production-dominated sectors consist of firms involved in large-scale administrative tasks or ones that are dependent on physical or information networks, such as transport and travel services, wholesale trade and distribution, banks, insurance, and telecommunication. Business services closely related to R&D, software, design services, development, and the application of information technologies; other knowledge-intensive business services are included in the science-based and specialised sectors.

The data consists of 606 US firms (195 supplier-dominated sector, 204 production-intensive sector and 207 science-based and specialised sector) from the period 1997 to 2006, which were obtained from S&P's COMPUSTAT database. The sample consists of firms in 195 supplier-dominated sector, 204 production-intensive sector and 207 science-based and specialised sectors. Measurements of organisational characteristic on firm size were conducted using a logarithm of the number of employees in 2000 (a year prior to

the innovation-measured year), and market position by the percentage of market shares in 2000 compared with the industry groups. The level of diversification was measured as the numbers of business segments operated under a single firm based on the year 2000. Past performance was measured by ROA during 1997 to 2000 (four years prior to innovation-measured year). Sales productivity and gross profit margin during 2004 to 2006 were used as measure of firm performance. ANOVA, multiple regression, and path analysis were used as analytical procedures for testing mediator effects and were applied to examine the proposed relationships between organisational characteristics, innovation intensity and firm performance among the three types of service firms. The study results provide empirical support for the increasing importance of organisational characteristics and innovation intensity as enhancing factors for firm performance. The authors suggest that a service firm might well outperform competitors if it carefully reflects on its organisational characteristics to adjust its innovation intensity. According to the authors, the limitation of this study is that innovation intensity, as measured by R&D activities and expenditure on machines and equipment, is a simple indicator of investment in fixed capital. Investment on human capital by retaining well-trained and knowledgeable personnel needs consideration in future research for the measurement of innovation intensity.

Karabulut (2015) investigated the effect of four types of innovations (product, process, organisational and marketing) on the performance of manufacturing firms in Istanbul. The author used a balanced scorecard approach to measure firm performance. The measure of firm performance included financial performance, customer performance, internal business processes performance and learning and growth performance. A questionnaire-based survey was conducted covering types of innovation as well as performance. There were seven questions to determine product innovation, four questions to determine process innovation, five questions to determine marketing innovation and four questions to determine organisational innovation. There were seven questions determining financial performance, four questions determining customer performance, nine questions determining internal business processes performance and six questions determining learning and growth performance. A 5-point Likert scale was used for both measures.

The population base for the collection of data was 12500 manufacturing firms that are members of the Istanbul Chamber of Industry. The sample data for this study were the responses received from the general managers of 197 firms. The restricted time frame limited the number of responses. The Cronbach's alpha values of the dimensions of both measures were calculated for the reliability of the scales. Factor analyses were conducted to determine factor loadings for each dimension and multiple regression analyses were conducted to explore the effects of the independent variables of innovation types on the dependent variables of firm performance.

The findings of this study show that product innovation, process innovation and organisational innovation have positive effects on financial performance, customer performance, internal business processes performance, and learning and growth performance. Marketing innovation has positive effects on financial performance, customer performance and internal business processes performance. However, marketing innovation has a negative effect on learning and growth performance. The author concludes that the innovation type of Turkish manufacturing firms leads them to improve customer performance. Additionally, an innovation strategy leads these firms to improve their internal business processes performance, financial performance, and learning and growth performance. Firms should choose the appropriate innovation type to reach high-level performance. This study is expected to make contribution to academicians and firms in the field of innovation. The limitation of this study is that more data needs to be collected to generalise the results.

The relationship between innovation and firm performance in the context of 113 firms operating in the automotive supplier industry in 2011 was investigated by Atalay, Anafarta and Sarvan (2013). This study addresses the effect of product, process, marketing and organisational innovation on firm performance. The authors adapted a subjective measure of performance for this study because of the difficulty of gathering data from private companies in absence of any publicly available objective data. The perceived performance measures relative to those of competitors were used as performance indicator in this study. The data were collected through a questionnaire conducted through face-to-face interviews with the top-level managers of 113 automotive supplier firms from March to December 2011. The data obtained from the questionnaires

were analysed through the SPSS statistical package program and the hypotheses were tested through regression analysis.

The results analysed by the authors demonstrate that product and process innovation have significant and positive effects on firm performance, but no evidence was found for a significant and positive relationship between organisational and marketing innovation and firm performance. According to the authors, the insignificant effect of marketing innovation on firm performance may be due to most of the automotive supplier firms in the sample not having a corporate marketing department; therefore, marketing innovation was not well recognised by these firms. The insignificance of organisational innovation on firm performance was similarly explained by most of the firms in the sample being family owned and having less need for reorganisation. These findings indicate that firms in the automotive and supplier industry should emphasise product and process innovations, as these types of innovation are important instruments for achieving sustainable competitive power.

The effects of the organisational, process, product, and marketing innovations on the different aspects of firm performance (innovative, production, market and financial) on manufacturing firms in Turkey were investigated by Gunday et al. (2011). The different dimensions of firm performance investigated include innovative performance, production performance, market performance and financial performance. Innovative performance encompasses overall organisational achievements, because of efforts from the various aspects of firm innovations, namely processes, products, and organisational structure. A theoretical framework was developed to test the relationships among innovations and firm performance through an integrated innovation–performance analysis.

A questionnaire was developed that included 311 individual questions designed to assess a firm's business strategy, innovativeness efforts, competitive priorities, market and technology strategy, in-firm atmosphere, market conditions and corporate performance, to explore empirically what the main innovation drivers are and what the effect of innovations is on a firm's performance. The survey was conducted in the years 2006/2007 on a sample of 184 manufacturing firms within a period of 7 months, with a response rate of 11%. A multivariate statistical analysis via SPSS v13 software package was conducted to validate the research framework.

The correlation analysis and a single-step SEM analysis was performed with the simultaneous estimation of both measurement and structural models by AMOS v4 and was analysed according to goodness-of-fit indices. The findings indicate that higher product, process, marketing, and organisational innovation capabilities are associated with increased innovative, production and market performances.

The findings reveal that all individual innovation types are positively and significantly associated with some aspects of firm performance. The authors observed that organisational innovations play a fundamental role for innovative capabilities as they have the greatest regression coefficient with innovative performance. Although the study did not involve longitudinal data analysis, the authors conclude that the findings support that innovation strategy is an important major driver of firm performance and should be developed and executed as an integral part of the business strategy.

Jiménez-Jiménez and Sanz-Valle (2011) explored the relationship between organisational learning, innovation, and performance. Organisational learning is described by the authors as the process by which a firm develops new knowledge and insights from the common experiences of people in the organisation, with the potential to influence behaviours and improve a firm's capabilities. Three types of innovation (product, process and administrative)—with six items for each type of innovation, covering the number of innovations, the proactive or reactive character of those innovations, and the resources the firm invests in innovation—were used in this investigation. Organisational performance measure was based on the organisational effectiveness of human relations, internal processes, open system, and the rational goal models. The questionnaire used in this study asked firms about the evolution of their performance during the previous three years.

The data for this study were collected from a research project supported by FEDER funds. The sample included 1600 firms located in a southeast region of Spain with more than 15 employees. Of these, 55% belong to the manufacturing sector and 45% to the service sector. The study employed a personal interview, using a structured questionnaire, to collect data. The number of valid questionnaires was 451, which yielded a response rate of 25.2%. SEM was employed to test the hypotheses.

The findings show that organisational learning and innovation have positive and significant effect on business performance, which supports the widespread idea that innovation can be a key driver of the success of an organisation. It was also found that innovation is positively influenced by organisational learning affects. The positive relationship between innovation and performance is found to be stronger when firms are bigger, older and belong to the manufacturing industry. The relationship between organisational learning and performance was found to be always positive but stronger for smaller and younger firms and in the service sector. The findings show that the effect of organisational learning on innovation is stronger than its effect on performance. According to the authors, this implies that organisational learning influences performance mainly by facilitating innovation. The limitation of this study is its cross-sectional design and its use of a broad measure of organisational performance, which was subjective.

Rosenbusch, Bausch and Brinckmann (2011) applied a meta-analysis technique to synthesise the findings of empirical research on innovation and performance relationship in SMEs. This was done to obtain evidence regarding whether and especially under which circumstances smaller, resource-scarce firms benefit from innovation. The meta-analysis techniques were applied to aggregate prior empirical research on the innovation–performance relationship of a sample of 42 empirical studies on 21,270 firms. This technique also allowed the authors to present evidence of the effect of moderators on the innovation–performance relationship. In the absence of any commonly used construct measuring innovation variables, the authors considered different innovation measures that included innovation orientation indicators (e.g., innovation strategy), internal innovation input indicators (e.g. R&D intensity), external innovation input indicators (e.g. R&D alliances), and output indicators (e.g. number of new products). The authors focused on studies that measured performance along three dimensions: accounting returns, growth, and stock market performance. The performance variables included accounting return/profit-based (e.g., ROA, ROS, growth-oriented [sales growth, market share growth] and stock market-based measures of financial performance, e.g. Tobin's Q, market-to-book value). Firm age and national culture as two contextual factors referring to internal and external characteristics of firm were used as moderator variables. The findings show that innovation has a positive effect on the performance of SMEs. The findings also suggest that the innovation–performance relationship is context dependent.

The contextual factors that affect this relationship (to a large extent) include firm age, innovation type and cultural context.

This study also uncovered different factors that influence the strength of the relationship between innovation and SME performance. The first factors that affect the innovation–performance relationship is that fostering an innovation orientation has more positive effects on firm performance than creating innovation process outcomes such as patents or innovative products or services. They found that SMEs benefitted significantly more from a strategic innovation orientation than from just focusing on developing innovative products. Second, when comparing the performance implications of dedicating more resources to innovation process inputs (e.g., R&D spending) with innovation process outcomes, they found that the innovation process outcomes lead to a greater increase in SME performance. Third, innovation has a stronger effect in younger firms than in more established SMEs. This finding suggests that the often-cited liability of 'newness' in younger firms can also be an asset for new firms, because they possess unique capabilities to create and add appropriate value through innovations. Fourth, they found that internal innovation projects increase performance substantially, while innovation projects that involve external collaborations have no significant effect on performance. Following their findings, entrepreneurs and small business owners are advised to consider developing innovation internally. Fifth, their findings illustrate that the cultural context in which firms operate affects the innovation–performance relationship. They found that innovation has the strongest positive effect in cultural environments characterised by collectivism, such as those found in many Asian countries. In contrast, in more individualistic cultures such as the US, the relationship between innovation and performance is weaker.

Liao and Rice (2010) developed a mediated model to examine the effect of innovation on the performance of Australian manufacturing SMEs, mediated through a firm's market engagement and transformation strategies. The data for this study on SMEs were obtained from the BLS information available from the Australian Bureau of Statistics. BLS data provided information for four financial years on economic and structural aspects of growth and performance for the firms. It contains panel data on financial reports, employment and managerial practice information, profiles on training and development, and other key data related to the firms. The study considered 449 firms operating in a

financially sustainable and ongoing manner. Sales growth and expected sales growth were two variables obtained from the BLS within two financial years from 1996 to 1997 and 1997 to 1998, used as performance measures. Whereas R&D intensity, training intensity and production technology intensity were used as a measure of innovation engagement of the firms, reported expenditure on those activities divided by total annual sales was used as a measure of expenditure intensity on each of the three activities. Expenditure intensity measures were averaged over both the financial years 1996 to 1997 and 1997 to 1998. Transformation outcomes as a mediating variable were considered based on changes in range of products or services, changes in distribution of products or services, and changes in market targets. The authors considered that these activities could reasonably be conceptualised as a flow of time-patterned transformations that reflect the organisation's knowledge, resources, and competences. The control variable included firm age, firm size, and prior period firm performance from the survey year 1996 to 1997.

SEM was employed as primary analytical tool for validating and testing the theoretical model (undertaken with AMOS 7.0 with the ML method). SPSS 15.0 was used to conduct some tasks relating to linear regression and other analyses. The authors report that innovation affects firm performance only when mediated through the transformation outcomes and innovation-related activities could only influence competitive advantages when they occurred concurrently with actual changes in the market position and offerings of firms. This study is limited to Australian manufacturing SMEs with the data gathered during 1996 to 1998, to gain the most complete set of variables of relevance to this study. Consequently, the findings may not be suitable to other non-related industries and to non-SMEs and as such could not be generalised.

Damanpour, Walker and Avellaneda (2009) studied the effect of different types of innovation activity on the organisational performance of public service organisations in UK that had experienced fundamental changes over recent decades. They analysed the innovative activity in a panel of 428 public service organisations in the UK over four years. This study focused on the significance of adopting three types of innovation (service, technological process, and administrative process) in service organisations. Service innovations are defined as the introduction of new services to existing or new clients and offering existing services to new clients. Technological process innovation is primarily associated with information technology and focuses on the modification of

internal organisational processes and systems to increase effectiveness and efficiency. Administrative process innovations relate to changes in the structure of an organisation, administrative systems, knowledge employed in performing the work of management, and managerial skills that facilitate an organisation to function and succeed through effective use of its resources.

The dependent variable (organisational performance) was measured by the core service performance score constructed by the Audit Commission for the years 2002 to 2005. Organisational size, urbanisation, service needs and service diversity in the data obtained from the 2001 UK census were used as control variables. Three types of innovation were measured by the perceptual data obtained from a survey of the management reform regime called 'Best Value', conducted annually from 2001 to 2004, and used as independent variables. Service innovation was measured by responses on how an organisation provided new services to new users, new services to existing users and existing services to new users. Two items reflecting the adoption of new information technology and new management information systems were measured technological innovation. Administrative innovation was measured by three items that reflect an organisation's new approaches to service planning and budgeting, improvement by quality management and re-engineering, and management processes. GLS and STATA's xtreg command were used in regression models to analyse cross-sectional time-series data. This study examined the significance of adopting innovation types over time and found support for the positive effect of innovation on organisational performance. However, the findings suggest that focusing on adopting a specific type of innovation every year has negative effect on organisational performance. The authors argue that service organisations who innovate incrementally and take a balanced approach to the adoption of innovation gain the greatest performance benefits. The limitations of this study are that the measures of innovation types were based on few items, the scales used a greater number of items than required to accurately operationalise innovation types and the findings may be peculiar to English local governments and particular practices promoted by government policies. In addition, multiple measures of performance representing different stakeholders are necessary to assess the true effect of innovation on performance.

2.4.5 Summary of the Studies on the Effect of Innovation on Firm Performance

The variables used to study relationship of innovation with the performance of firms from different countries are summarised in Table 2.12.

Table 2.12: Summary of the Literature Survey: Effect of Innovation on Firm Performance

Author (Year)	Sample Data and Country	Innovation Independent (variables)	Control Variables	Dependent Variables	Impact of innovation on firm performance
Lee, Lee and Garrett (2019)	A sample of 856 firms obtained from the Korean Innovation Survey (KIS) 2011–2013	Exploration and exploitation orientation focus, product, process, marketing, and organisational innovation	N/A	Performance measured by percentage of turn over caused by product innovation activities of the previous three years	1. Exploration orientation has positive impact on product innovation. 2. Exploitation orientation, has a positive impact on process innovation. 3. Process innovation boosts both radical and incremental product innovation. 4. The moderating effects of marketing and organisation innovation show that the effect of a new product on firm performance enhanced with the introduction of marketing innovation in high-tech firms while process innovation has direct and positive effects on a firm's performance with organisational innovation in low-tech firms
Lin et al. (2018)	A sample of 606 Firms in US service industries in 1997–2006	Organisational characteristics and innovation intensity	N/A	Sales productivity and gross profit margin	Organisational characteristics and innovation intensity act as enhancing factors for firm performance
Karabulut (2015)	197 Turkish manufacturing firms	Product, process, organisational and marketing innovations	NA	Financial performance, customer performance, internal business processes performance and learning and growth performance	1. Product innovation, process innovation and organisational innovation have positive effects on financial performance, customer performance, internal business processes performance and learning and growth performance. 2. The marketing innovation has positive effects on financial performance, customer performance and internal business processes performance. However, the marketing innovation has a negative effect on learning and growth performance
Atalay, Anafarta	113 firms operating in	Product, process,	N/A	Perceived performance	1. Product and process innovation has significant and positive effect on firm performance.

Author (Year)	Sample Data and Country	Innovation Independent (variables)	Control Variables	Dependent Variables	Impact of innovation on firm performance
and Sarvan (2013)	the Turkey automotive supplier industry in year 2011	marketing, and organisational innovation		measures relative to those of competitors were used as performance indicator in this study.	2. No evidence was found for a significant and positive relationship between organisational and marketing innovation and firm performance.
Gunday et al. (2011)	184 manufacturing firms in Turkey in the year 2006/7	Product, process, marketing, and organisational innovation	N/A	Innovative, production and market performances	Higher product, process, marketing, and organisational innovation capabilities are associated with increased innovative, production and market performances.
Jiménez-Jiménez and Sanz-Valle (2011)	1600 firms located in a southeast region of Spain	Product, process, and administrative innovation	N/A	Organisational effectiveness on the human relations, internal process, open system, and the rational goal models	1. The organisational learning and innovation have positive and significant effect on business performance. 2. Innovation is positively affected by organisational learning affects organisational effectiveness on the human relations, internal process, open system, and the rational goal models.
Rosenbusch, Bausch and Brinckmann (2011)	42 empirical studies on 21,270 firms.	Innovation strategy, R&D intensity, R&D alliances, and number of new products.	Firm age and national culture were used as moderator variable	ROA, ROS, Tobin's Q	1. Innovation has a positive effect on the performance of SMEs. 2. Innovation–performance relationship is context dependent. The context factors that affect this relationship to a large extent includes firm age, innovation type and cultural context.
Liao, Luo and Tang (2015)	449 Australian manufacturing	Sales growth and expected sales growth	Firm age, firm size, and prior	R&D intensity, training	1. Innovation affects a firm's performance only when mediated through the transformation outcomes.

Author (Year)	Sample Data and Country	Innovation Independent (variables)	Control Variables	Dependent Variables	Impact of innovation on firm performance
	SMEs from 1996–1998		period of firm performance	intensity and production technology intensity and transformation outcomes as a mediating variable	2. Innovation-related activities could only influence competitive advantages when they occur concurrently with actual changes in the market position and offerings of firms.
Damanpour, Walker and Avellaneda (2009)	428 public service organisations in UK	Service, technological, and administrative innovation	Organisational size, urbanisation, service needs and service diversity	Core service performance score	1. Positive effect of innovation on organisational performance. 2. Focus on adopting a specific type of innovation every year has negative effect on organisational performance

2.4.6 Effect of Innovation as Intervening/Moderating Variable

The findings of gender diversity's effect on innovation in prior studies are mostly positive, as detailed in the next section. However, the results of previous studies on the relationship between gender diversity on innovation and its effect on firm performance are not conclusive. This inconsistency in findings has led researchers to suggest that this relationship is affected by intervening variables and these need to be studied to establish a clearer link between gender diversity and performance. Miller and Triana (2009) found a positive relationship between board gender diversity and innovation but there were no mediating effects of innovation, as the relationship between gender diversity and firm performance was found to be no longer significant. Manita et al. (2019) found a negative effect of board gender diversity on innovation. In addition, the authors found no evidence of a mediating role for innovation within the board gender diversity and firm performance relationship. Investigations by other researchers indicate that board gender diversity leads to better firm performance, but only to the extent that a firm is focused on innovation as part of its strategy (Diaz-Garcia, Gonzalez-Moreno & Saez-Martinez 2013). The literature review suggests that to enhance the outcomes of a firm's innovation strategy, it is essential to focus on gender diversity along with the technical issues, such as patenting and R&D investment (Midavaine, Dolfsma & Aalbers 2016). The results of the panel data analysis performed by Cabeza-García, Del Brío and Rueda (2021) suggest that a critical mass of women directors positively affects firm performance and that there is an increase in this effect with the increase in innovation activity. Consequently, the level of innovation has a moderating effect on this relationship.

The effect of board diversity on the performance of a firm, using innovation and reputation as mediating variables, was examined by Miller and Triana (2009). According to the authors, both these variables were important predictors of a firm's performance. Their study focused on product innovation, which was defined as strategies that provide new opportunities for firms to create products or services. They depended on a behavioural theory of firms to describe the relationship between gender diversity and innovation, which recommends that innovative ideas are created as the strategic direction of the firm is influenced by diverse human capital on boards that provide cognitive conflicts (Hillman, Cannella & Harris 2002). The directors of boards are confronted with the task of resource allocation and provision of ideas and relationships for improving

innovation. These efforts are influenced by the human and social capital resources provided by a diverse board with a broader range of knowledge, information, and perspectives (Miller & Triana 2009).

The financial and performance data of 432 firms for 2002 to 2005 were collected through the COMPUSTAT database. Board diversity as an independent variable was defined as a degree of heterogeneity among board members and was measured by Blau's index; the data on gender and race were gathered from the IRRC. Innovation was used as the mediating variable, which transmits the effect of diversity to firm performance. R&D expenses used as a proxy for innovation were measured by R&D intensity and operationalised as a firm's reported R&D expenditure, divided by sales (Miller & Triana 2009).

Firm performance as the dependent variable was measured by Return on investment (ROI) and ROS in 2005. Demographic diversity in the boardroom was lagged by two years to allow time for the mediating effects of innovation to occur, so that returns from R&D may be translated into gains. Firm age, liquidity, firm size, and product diversification, international diversification and industry were used as control variables. OLS regression analysis was used in this study. A positive relationship between board gender diversity and innovation was found. There was no mediating effect of innovation, as the relationship between gender diversity and firm performance was found to be no longer significant. However, the authors found that innovation partially mediates the relationship between board racial diversity and firm performance (Miller & Triana 2009).

The study was limited to Fortune 500 firms and as such could not be generalised, and R&D intensity used as a proxy may not capture all innovation outcomes. The authors suggest capturing patents or product announcements in future studies. Finally, the authors acknowledge that their data collection was limited to archival sources. They did not actually collect any primary data from board members, although their study relied on the behavioural theory of the firm to infer what the decision-making processes were like in diverse boards.

Manita et al. (2019) investigated the relationships between board gender diversity, innovation, and firm performance. The article examined the role of innovation as a mediating variable to explain how gender diversity is related to firm performance. The

initial sample of this study consists of all the companies in the SBF 120 index during a 4-year period from 2009 to 2012, as identified on 31 December of each year. The SBF 120 index is a capitalisation-weighted index that comprises the 120 largest capitalisations and most-liquid French stocks traded on the Euronext Paris. The final sample consisted of 84 companies and 336 firm-year observations, which were observed between 2009 and 2012. The theoretical basis of the hypotheses was drawn from RDT. Data on corporate governance (board size, board independence, and gender of directors) were derived from the IODS database (ArteniaDataCG), and financial data were obtained from the Thomson ONE Banker database. Annual reports were used to calculate the level of diversification.

Board gender diversity, measured through Blau's index of diversity and innovation, measured by R&D intensity (reported as R&D expenditure divided by sales) were used as independent variables in this study. Tobin's Q, a market-based measure of firm performance, was used as a dependent variable. Firm age, product diversification, board size and board independence (number of independent directors divided by board size) were used as control variables. A regression-based mediation analysis (details not disclosed) was conducted with board gender diversity as the independent variable, innovation as the mediator and firm performance as the dependent variable.

The findings about the relationship between board gender diversity and innovation were negative and significant (at the 1% level). Innovation was not found to be significantly correlated with Tobin's Q. This result suggests that innovation has no effect on firm performance, as suggested by the literature. Consequently, board gender diversity is unlikely to have any effect on a firm's innovation. The authors did find support that innovation is a mediating variable of the relationship between board gender diversity and firm performance, which is consistent with the findings of Miller and Triana (2009).

Cabeza-García, Del Brío and Rueda (2021) provided the first empirical test of the presence of innovation as a moderating variable between board gender diversity and firm performance. They considered that the relation between a critical mass of women and firm performance might be influenced or moderated by the firm's innovation activity. They studied listed firms in six European countries (Norway, Spain, France, Germany, Sweden and the UK) over 2000 to 2010, resulting in a panel of 905 firms and 7065 observations. The final sample of data ended up with an unbalanced panel of 1856 observations on 231 groups. The data panel was a combination of data from corporate

good governance reports and the Thomson database, which provides financial information for most countries in Europe.

ROI is defined as the earnings or losses generated by an investment in relation to the money invested and this was used as a dependent variable. Critical mass, defined as the presence of at least three women directors, was used as an explanatory variable and R&D intensity was used as a moderating variable. Leverage, firm size, and board size were used as control variables in this study. A hierarchical regression analysis was conducted to test the hypotheses.

The results of the panel data analysis suggested that there was a positive relationship between a critical mass of women directors and performance, and that R&D expenditure has a moderating effect on this relationship. So, R&D expenditure increases the positive effect of the relationship between the presence of a critical mass of women directors and firm performance. Thus, it is innovation (measured as R&D expenditure) that moderates the above relationship, and that strengthens the effect of the presence of women directors on performance. The authors also found a positive and significant relationship between firm size and performance, and a negative effect in the case of debt. It is the moderating effect of innovation that has relevance to the present study.

Summary of the gender diversity–performance relationship using innovation as intervening/moderator variable are shown in Table 2.13 below.

Table 2.13: Summary of the Gender Diversity–Performance Relationship Using Innovation as Intervening/Moderator Variable

Author (Year)	Sample data and Country	Diversity Independent (variables)	Intervening /Moderator Variables	Dependent Variables	Effect of diversity on innovation/firm performance
Manita et al. (2019)	Total number of 84 companies in the SBF 120 index during a four-year period from 2009 to 2012 in France	Board gender diversity and innovation to test the mediation effect of innovation.	R & D intensity (R&D expenditure/ sales)	Tobin's Q	1. The relationship between BGD and innovation is negative and significant (at the 1% level). 2. Innovation has no effect on firm performance as suggested by the literature. 3. No evidence of a mediating role of innovation within the board gender diversity–firm performance relationship was found.
Cabeza-García, Del Brío and Rueda (2021)	Panel of 1856 observations on 231 listed firms in six European countries (Norway, Spain, France, Germany, Sweden and United Kingdom)	CMASS and R&D as Explanatory and moderating variables	R&D expenditure	ROI	1. A critical mass of women has a favourable effect on business performance, and this effect grows as the firm's innovation activity grows, and thus innovation (R&D expenditure) has a moderating effect on this relationship.
Miller and Triana (2009)	Financial and performance data of 432 US firms for the	Degree of heterogeneity among board members measured by Blau's index	R&D expenses and reputation scores were obtained from the 2004. Fortune	ROI and ROS.	1. Both racial diversity and gender diversity are positively related to innovation. 2. Gender diversity not related to reputation 3. There was no mediating effect of innovation as the relationship between gender diversity and firm performance was found to be no longer significant. 3. Innovation partially mediates the relationship between board racial diversity and firm performance.

Author (Year)	Sample data and Country	Diversity Independent (variables)	Intervening /Moderator Variables	Dependent Variables	Effect of diversity on innovation/firm performance
	period of 2002–2005.	(1977) on gender diversity and racial diversity.	Corporate Reputation Survey		

2.5 Summary of the Measurement/Indicators of the Variables

A summary of the definition, and measurement/indicator of the variables is detailed in Table 2.14 below.

Table 2.14: Summary of the Measurement/Indicators of the Variables

Variable		Definition	Measure/ Indicator	Reference
GD		Degree of heterogeneity among board members with respect to gender, age, education and tenure.	Blau's index in this study was dichotomised as the presence of female director as 1 and 0 for the absence of a female board member.	Kagzi and Guha (2018b) Ararat et al. (2015)
			Percentage of female members on the board	Rossi, Hu and Foley (2017b)
			Number of female members on the board	Liu, Wei and Xie (2014)
GD Attributes	Gender	Number of female directors/managers present on a firm's board of directors and TMT	Proportion of female members on the board.	Srivastava, Das and Pattanayak (2018)
	Age	Age of the board members	Age of the individual board members	Kagzi and Guha (2018b)
	Tenure	Length of time that a board member has been employed in an organisation	Number of years in the board	Kagzi and Guha (2018b)
	Education	Education level of female members	Number of years to obtain appropriate levels	Kagzi and Guha (2018b)

Variable		Definition	Measure/ Indicator	Reference
Inno		Defined as strategies that provide new opportunities for the firm to create products or services	Measured by reported research and development (R&D) intensity, and it is operationalised by firm's reported R&D expenditures divided by sales. (R&D expenditure used in this study)	Miller and Triana (2009).
Firm performance	ROA	It is accounting-based measure of performance on how profitable a company is relative to its total assets	It is the ratio of a firm's net income to its total assets obtained from annual data of the firm.	Srivastava, Das and Pattanayak (2018) Rose, Munch-Madsen and Funch (2013)
	ROE	Accounting-based measure of performance based on the return earned on the shareholder's investment in the firm	Ratio of net profit after tax before abnormal to ordinary shareholders equity	Rose, Munch-Madsen and Funch (2013))
	ROCE	It is an accounting-based measure of performance using financial ratio that measures a company's profitability and the efficiency with which its capital is employed	Ratio of earnings before interest and Tax (EBIT) to capital employed	Rose, Munch-Madsen and Funch (2013)
	Tobin's Q	It is a stock-market-based measures of firm performance that can be defined as the ratio of market value of firm assets to their replacement value.	((Book value of total assets – book value of shareholder's equity + market value of shareholder's equity)/Book value total assets)	Terjesen, Couto and Francisco (2016)
Control variables	BS	The total number of members present on firm's board of directors	Number of members present in logarithm form	Srivastava, Das and Pattanayak (2018)
	FS	The total assets of the firm as the proxy for firm size	The natural log of total assets or number of employees	Srivastava, Das and Pattanayak (2018))
	FA	Firm age is the age of the firm since its formation	Number of years since the formation of firm	Luanglath, Ali and Mohannak (2019)
	LEV	It is the ratio of the debt to assets of the firm.	Ratio of total borrowings to the total assets of the firm	Moreno-Gómez, Vaillant and Lafuente (2018)

Legend: GD = Gender Diversity; ROA = Return on Asset; ROE = Return on Equity; ROCE = Return on Capital Employed; BS = Board Size; FS = Firm Size; FA = Firm Age; LEV = Leverage; Inno = Innovation

2.5.1 Board Diversity Attributes

This model aims to provide a more gender-sensitive measure of gendered processes, instead of reducing gender to biological sex only. It does so by considering the demographic and functional gender diversity attributes (gender, age, tenure and education) of female members in board processes through developing a composite GDI (Humbert & Günther 2018).

2.5.1.1 Gender Diversity

Gender diversity is the most researched demographic attribute, as it is studied in relation to the cognitive differences between males and females, the positive relationship between gender diversity and firm value, and gender diversity and monitoring. Age diversity of a board balances the differences in generational diversity, as it has the potential to prevent 'groupthink' and can lead to better monitoring. This is achieved by balancing the enthusiasm, energy and risk appetite associated with younger members of a board, with the experience, cautiousness, and risk-averseness of older members. Educational diversity attributes act as a source of cognitive differences, and the main level of formal education rather than the type of education is more relevant. Directors with limited education may be funding entrepreneurs in younger firms and can bring intuitive skills and implicit knowledge, whereas directors with higher degree qualifications are expected to provide more analytical skills. Female members with longer tenure are likely to have more experience in coordinating the resources of a firm with regards to business activities (Lyngsie & Foss 2017).

In the conceptual model, this study has followed the lead of Ararat, Aksu and Cetin (2015) and Kagzi and Guha (2018b) to develop GDI using Blau's diversity index to measure the effect of each of the following attributes: age, tenure and education of female members on the top management team and board of directors, by creating corresponding gender index (GI), age diversity index (AI), tenure diversity index (TI) and education diversity index (EI). Each of these dimensions will be measured separately using Blau's measure of diversity. Gender will be used as a dichotomous variable whereas age, education and tenure will be measured as categorical variables. It may be noted that a higher number of categories reflects higher diversity in an attribute and more even distribution in different

categories will lead to lower values with the sum of proportion and hence result in a larger Blau's value.

Blau's index values for GI, AI, TI and EI will be determined using the diversity index:

$$GI=1-\sum_{i=1}^{k} P_i^2 \quad (1),$$

Where P_i is the proportion of the board members in each attribute and *k* represents the number of categories used. The GDI is computed by combining GI, AI, TI and EI (Ararat, Aksu & Cetin 2015; Kagzi & Guha 2018b), thus:

$$GDI = GI + AI + TI + EI \quad (2)$$

The primary exposure variable was gender diversity. Firms with at least one female member on the board of directors were considered gender-diverse boards. The primary outcome variables were performance measures, as defined in the previous chapter.

2.5.1.2 Age Diversity

Age diversity is related to the age of female members on the board. The literature has examined board age diversity and its influences on various firm dynamics and reports both beneficial effects and drawbacks of age diversity (Kagzi & Guha 2018b). Age diversity on boards helps the firm take advantage of different age groups, as a board can consider various strategic and operational aspects effectively. It encourages board development and learning, which may foster creative and innovative ideas (Galia & Zenou 2013). According to Mahadeo, Hanuman and Soobaroyen (2012), an older age group provides experience, network, and financial resources; primary executive responsibilities are with the middle age group; and the firm's knowledge of the business is developed by younger groups. This composition of a board has the potential for the development of generational misunderstandings or conflicts between the expectations and interests of members, which might be detrimental to implementing organisational changes (Galia & Zenou 2013). Age diversity in a board is associated with a higher enthusiasm for work and risk-taking abilities (Ararat, Aksu & Cetin 2015), higher firm value (Darmadi 2011; Hambrick & Mason 1984) and a higher amount of donations for non-profit organisations (Siciliano 1996).

Board age diversity is also linked with lower firm performance (measured by ROA) in the Japanese context (Mahadeo, Hanuman & Soobaroyen 2012) and with lower corporate social performance (Hafsi & Turgut 2013). Researchers have found that younger members are linked with strategic changes, whereas older board members are less willing to initiate changes (Bantel & Jackson 1989; Wiersema & Bantel 1992). On the other hand, older members are associated with less susceptibility to bankruptcy (Platt & Platt 2012). Board age diversity can lead to valuable experiences as well as to risk aversion (Miller 1991) and thus can be summed as a proxy for two constructs: namely, experience and risk aversion (Johnson, Hill & Schnatterly 2013). Board age diversity will be measured by applying Blau's index of diversity.

2.5.1.3 Tenure Diversity

Board tenure can be defined as the length of time that a board member has been employed in an organisation. Researchers have investigated the effects of a board's tenure diversity that are found useful and can lead to better firm performances (Ben-Amar et al. 2013). Organisational tenure typically reveals the social setting in which board members may influence organisational dynamics through a socialisation process where an individual understands the organisation's knowledge, learns the behaviour expected and the value systems required to work for an organisation (Sturman 2003). Thus, board members with longer tenure are in a better position to understand ongoing management practices and carry their oversight responsibilities, with greater skills to manage team performance (Bell et al. 2011). Long-term tenure makes an organisation more efficient because of the development of a common organisation-specific language used to facilitate smooth communication (Kagzi & Guha 2018b). This makes a long-term organisational tenure more efficient because experienced directors with a greater understanding of a firm's resources and operations can contribute effectively to the strategies of the firm. However, long-term tenure of board members is associated with 'groupthink', aversion to risk, greater rigidity, increased commitment to established practices and procedures, increased insulation from new ideas and less effectiveness in monitoring management activities (Bantel & Jackson 1989; Ben-Amar et al. 2013). Vafeas (2003) argues that extended tenure may reduce intragroup communications and lower the quality of a firm's decisions and thus may impede firm performance. Researchers have linked director tenure with

governance effectiveness and shareholder value and report that director tenure has a curvilinear association with shareholder value (Brown et al. 2017)**.**

Although long-term tenure is useful and leads to better performance, extended long-term tenure may lead to groupthink, which amounts to restrictions in the generation and assessment of strategic clarity alternatives (Michel & Hambrick 1992), and the tendency to suppress conflict, even at the expense of effective decisions (Ben-Amar et al. 2013). Tenure is measured in this model as the number of years that a board member has been employed in an organisation.

2.5.1.4 Education Diversity

The educational level of board members is believed to affect a board's cognition and decision-making and can thus be considered an indicator of an individual's values and cognitive preferences (Michel & Hambrick 1992). The formal education level of board members, along with their knowledge level, shapes the way they analyse things and therefore influences the execution of governing roles and on firm performance (Arena et al. 2015). The academic educational levels of board members have been found to have a positive effect on the innovation and internationalisation of firms (Barroso,Villegas & Pérez-Calero 2011). There are mixed outcomes from the empirical findings regarding the relationship between the educational backgrounds of board members and firm outcomes (Ali, Ng & Kulik 2014; Kim & Lim 2010; Mahadeo, Hanuman & Soobaroyen 2012). Kim and Lim (2010) report that educational diversity will positively influence a firm's valuation and Mahadeo, Hanuman and Soobaroyen (2012) report that boards with higher educational diversity will negatively affect firm performance. On industry specific studies, Murray (1989) reports that a homogeneously educated engineering board can perform better in the oil industry than a heterogeneous one, and Bantel (1993) reports that greater educational diversity of boards' results in better decision-making in the banking industry. Researchers also report that formal education does not play an important role in firm performance and that the functioning of the board does not require any specific education (Rose 2007).

Educational diversity can be examined in two ways. The first is to measure the level of education (Ararat, Aksu & Cetin 2015), corresponding to school level, below-school level, graduation and post-graduation. The second is to measure the subject stream or the

nature of education (Rose 2007). This focuses on science, engineering, humanities, commerce and so on. This model is developed based on educational level, to measure EI using Blau's index of diversity.

2.6 The Relationships and Associations to be Explored

This research study measures whether there is a significant statistical relationship between the dependent variable (gender diversity) and four independent variables representing the financial performance of firms. One of the objectives of this research is to predict the statistically significant relationships that exist between gender diversity and financial performance.

2.6.1 A Positive Relationship Between Gender Diversity and Firm Performance

RDT postulates that firm performance is influenced by the external environment. The board of directors should act as a facilitator between the external environment (stakeholders) and the firm, to enhance performance. This theory discusses how directors enable the acquisition and use of resources to improve firm performance. Companies with diverse boards provide different types of resources to their organisations. Diverse boards are more effective in creating and developing business contacts with critical stakeholders such as customers, suppliers and banks, which reduces the uncertainties and dependencies for the business (Kagzi & Guha 2018b).

A gender-diverse board can access a more diverse consumer base and have more networking ties with stakeholders, which enables these firms to serve a wider consumer base with fewer dependencies on a small number of suppliers. These firms are able to access more comprehensive resources to develop product values for diverse and large consumer base through innovation. It also helps the organisation to attract talented human resources from diverse backgrounds (Ali, Ng & Kulik 2014).

Other benefits of diversity, as reported in the literature, include better decision-making (Adams et al. 2015), more innovation (Miller & Triana 2009) and better monitoring (Ararat, Aksu & Cetin 2015). Further, boards with age diversity enhance firm performance (Mahadeo, Hanuman & Soobaroyen 2012), because boards comprising young and old members have unique values through which firm performance can be improved (Kagzi & Guha 2018b). Boards with gender diversity consider a wider range

of decision-making criteria to improve decision-making (Campbell & Mínguez-Vera 2008; Hillman 2015; McIntyre, Murphy & Mitchell 2007). Also, the underlying argument of AT is that gender diversity will be effective in the monitoring process and eventually may lead to an improvement in financial performance behaviours on the board (Hillman, Shropshire & Cannella Jr 2007; Kagzi & Guha 2018b; Wiley & Monllor-Tormos 2018).

2.6.2 A Positive Relationship Between Gender Diversity and Innovation

There is a link between gender diversity and innovation because innovative ideas are generated as a strategic direction of a firm influenced by diverse human capital. Theoretically, directors on the board are faced with the task of allocating resources and providing necessary support to concepts and relationships that then increase the innovation of the firm. Board diversity provides strategic human and social capital resources to firms that influence these efforts, thereby increasing innovation (Miller & Triana 2009). Gender diversity leads to the detailed processing of information with due consideration of divergent views. This is particularly valuable for tasks requiring creative solutions, such as an innovation process that depends on insightful and distinctive recombination and reapplications of existing resources (Dezsö & Ross 2012). Findings from various authors indicate that gender diversity is positively associated with innovation (Diaz-Garcia, Gonzalez-Moreno & Saez-Martinez 2013; Galia & Zenou 2013; Midavaine, Dolfsma & Aalbers 2016; Østergaard, Timmermans & Kristinsson 2011; Sharma 2016).

2.6.3 A Positive Relationship Between Innovation and Firm Performance

Innovation embedded in the organisational structures, processes, products, and services within a firm is broadly seen as an essential component of competitiveness, and the competitive environment has a positive effect on performance. Managers are motivated to adopt innovations to create changes in the organisation that will reduce a perceived performance gap, or the difference between actual achievement and potential level of achievement (Damanpour, Walker & Avellaneda 2009). A positive effect of innovation on the performance of firms has been reported by many authors (Atalay, Anafarta & Sarvan 2013; Jiménez-Jiménez & Sanz-Valle 2011; Karabulut 2015; Lin et al. 2018; Rosenbusch, Bausch & Brinckmann 2011).

Thus, diverse boards will improve their strategic decisions, create broader links with stakeholders and attract talented human resources, which will facilitate better decision-making. As such, all these benefits of diversity have the potential to improve innovation and firm performance. While the majority of board diversity research focuses on the direct link between gender diversity and company performance, this study examines innovation as a potential moderator in explaining how board diversity affects firm performance.

2.7 The Research Questions

The aims of this research are to enhance our understanding of the effect of gender diversity on the financial performances of listed SMEs in Australia.

The following general objectives are identified for this study, to fill the gaps in previous studies and to achieve the aims of this research:

- to examine the relationship between gender diversity and innovation
- to examine the relationship between innovation and firm performance
- to examine the relationship between gender diversity and firm performance, and
- to test the moderating effect of innovation on gender diversity and performance of ASX-listed SMEs firms.

The research questions are outlined below:

RQ 1: Is gender diversity associated with the performance of listed SMEs in Australia?

RQ 2: Does innovation moderate the association between gender diversity and firm performance of listed SMEs in Australia?

2.8 The Hypotheses

To test the validity of the research model it is necessary that the individual relationships between variables are statistically significant in the predicted direction and of a magnitude warranting further interest. The empirical study cannot deal with all the variables and possible combinations of relationships contained in the model. Only those relationships tested in this thesis are therefore presented as hypotheses.

Diverse boards will improve strategic decisions, build stronger relationships with stakeholders, and recruit skilled employees, all of which will promote better decision-making. As a result, all of these benefits of diversity have the potential to boost innovation and company performance. While most research on board diversity examines the direct link between gender diversity and firm performance, this study explores innovation as a moderator in explaining how board diversity affects firm success.

Using the literature review, the following hypotheses of relationships were developed and later tested. The analytical methods chosen to test the hypotheses are discussed in detail in Chapter 5.

Research Question 1 relates to the effect of gender diversity in corporate boards on the performance of listed SMEs in Australia. This research question examines the existence of statistically significant relationships between gender diversity and performance. Considering the rationale for the positive relationship between gender diversity and firm performance, as detailed in Section 2.6.1, it is proposed that:

H1 Gender diversity has a positive effect on the financial performance

Research Question 2 is related to the relationship between gender diversity and firm performance. This research question examines the existence of positive relationships between gender diversity and innovation, and the positive effect of innovation on firm performance. Considering the rationale for the positive relationship between gender diversity and innovation, as detailed in Section 2.6.2, and the positive relationship between innovation and firm performance, as detailed in Section 2.6.3, it is proposed that:

H2. Gender diversity has a positive effect on innovation

H2a Innovation has positive effect on firm performance

Research Question 3 is related to the effect of gender diversity on firm performance. This research question examines the existence of an association between gender diversity and firm performance. Considering the rationale for the relationship between gender diversity and firm performance, as detailed in Section 2.6.1, it is proposed that:

H3 Gender diversity is independently associated with financial performance

2.9 Summary of the Literature Review Chapter

The empirical evidence regarding board gender diversity and firm performance has been unconvincing, conflicting and at times controversial (Joecks, Pull & Vetter 2013). A literature review of this field suggests that the relationship between gender diversity and the performance of firms need further investigation. Previous studies, to be discussed later in this thesis, have shown mixed results regarding the effect of gender diversity on firm performance. Theoretically, it can be argued that the effect is positive as performance might improve with a gender-diverse board and will arrive at a better decisions by considering different perspectives (Lückerath-Rovers 2013). A positive relationship between gender diversity and firm performance is reported by some authors (Ali, Ng & Kulik 2014; Carter, Simkins & Simpson 2003; Kagzi & Guha 2018b; Kılıç & Kuzey 2016; Liu, Wei & Xie 2014; Moreno-Gómez, Vaillant & Lafuente 2018; Rose, Munch-Madsen & Funch 2013; Rossi, Hu & Foley 2017a; Srivastava, Das & Pattanayak 2018; Vafaei, Ahmed & Mather 2015). However, other results have shown that the relationship between gender diversity and firm performance is insignificant or even negative. A negative relationship between gender diversity and firm performance is reported by some authors (Adams & Ferreira 2009; Haslam et al. 2010; Joecks, Pull & Vetter 2013; Shehata, El-Helaly & Salhin 2017). Rose (2007) determined that no significant relationship existed between board gender diversity and firm value in a sampling of Danish firms. There are other authors who could not find any significant relationship (Arena et al. 2015; Carter et al. 2010; Chapple & Humphrey 2014).

There are also research findings suggesting a quadratic relationship between the two variables, giving rise to so-called CMT: gender diversity can have a negative effect on firm results at first, but only after a critical mass of women on the board is reached does the relationship turn positive. This critical mass amounts to having three female members on a board (Joecks, Pull and Vetter 2013).

The conflicting results of prior studies highlights the link between women on a board and financial performance, as a measure of performance, are difficult to deduce. The results are not easily comparable because of mixed outcomes along with the variations in statistical methods employed, types of data and periods of investigation. Thus, a complete meaning of the body of research depends on the effectiveness of the research methodology employed in each study (Carter et al. 2010). The conflicts in the previous

literature may be attributed to differences in time frames (Campbell & Mínguez-Vera 2008), different institutional (regulatory and legislative) contexts (Sabatier 2015), lack of control variables (Terjesen, Couto & Francisco 2016), limited and non-harmonised measures of performance (Terjesen, Couto & Francisco 2016) and the omission of possible endogeneity between gender diversity and firm performance (Campbell & Minguez-Vera 2008). It is obvious that more studies are needed to improve understanding of the relationship between gender diversity and firm performance.

The academic literature on gender diversity has not unequivocally employed any theoretical framework to provide a clear link between gender diversity and firm performance that supports a positive or negative effect (Kagzi & Guha 2018b). For example, RDT and HCT do not explicitly envisage a relationship between gender diversity and the financial performance of a firm, but these theories are highly indicative of a positive relationship (Carter et al. 2010). AT does suggest a link, but the empirical results are still too mixed to clearly support a specific direction (Adams & Ferreira 2009; Carter et al. 2010). The main principle of UET is that the organisational outcome (performance) is dependent on the background characteristics of the executives of the top-level management team.

There are currently a limited number of studies on the relationship between board diversity and firm performance in the context of SMEs, when compared with studies on large corporate entities. Shehata, El-Helaly and Salhin (2017) studied the association between board diversity (measured by gender and age diversity as two dimensions of diversity) and financial performance of SMEs in the UK. The results show a significant negative association between each of gender diversity and age diversity, and firm performance. Martín-Ugedo and Mínguez-Vera (2014) studied the relationship in the Spanish market from 2003 to 2008, finding that board gender diversity had a positive relationship with firm performance. The results drawn from the Spanish study cannot be generalised because of market differences that enforce different corporate governance systems. This Spanish study is particularly relevant to the context of SMEs where the monitoring function of boards is not prevalent, because the conflict of interest between shareholders and management is usually mitigated in family-based SMEs.

These mixed results on the studies of SMEs are due to the issue of governance in these firms being closely held and based on family law and are less established than in publicly

held firms where separation of ownership and management is more obvious. There is overlapping of ownership, board membership and top management in these SMEs because of the involvement of the same people at all levels (Mustakallio, Autio & Zahra 2002). This aspect of board structure seems to be important in this study, as a diverse board will probably be freer and more proactive in settling on corporate choices. As indicated in prior studies, research on governance would benefit from a study that investigated the effect of gender diversity on the firm performance of publicly listed companies where ownership issues are separated from the board and management (Mustakallio, Autio & Zahra 2002). Palangkaraya, Spurling and Webster (2015) found that SME firms that introduced innovation saw their (total factor) productivity rise by 2.7 percentage points annually over subsequent years, relative to other firms in their industry. Those firms that accompanied their innovations with an innovation-oriented collaboration raised their productivity by an additional 3.3 percentage points.

There is an increasing interest in small businesses coming from policymakers, as they recognise the importance of SMEs. SMEs comprise of 97% of all Australian businesses, produce one-third of the total gross domestic product, and employ 4.7 million people. In general, SMEs in Australia employ 200 or fewer people. Over one-third of all Australian business operators are women, which means there is considerable concern regarding support for new venture creation and the business growth of women entrepreneurs. Several studies have measured the influence of female directors on the performance of companies in Australia (Ali, Ng & Kulik 2014; Nguyen & Faff 2006; Vafaei, Ahmed & Mather 2015; Wang & Clift 2009). The results of these studies are mixed. The majority of Australian studies have found that a gender-diverse board has a positive effect on the performance of firms. However, Wang and Clift (2009) found that there was no significant association between gender and ethnic diversity on the financial performance of a board. It may also be noted that none of these Australian studies are specifically related to SMEs.

Gender diversity and innovation are related because diverse human capital on boards influences the strategic direction of a company. Findings from various authors indicate that gender diversity is positively associated with innovation (Diaz-Garcia, Gonzalez-Moreno & Saez-Martinez 2013; Galia & Zenou 2013; Midavaine, Dolfsma & Aalbers 2016; Østergaard, Timmermans & Kristinsson 2011; Sharma 2016). Mostly, there is a

positive effect of innovation on performance, as reported by the authors detailed in Section 2.4.5.

The literature review has established mixed results regarding gender diversity and firm performance. It is obvious that the influence of board gender diversity on firm performance may not be simple and direct but is rather complex and indirect. As such, researchers need to explore more precisely the role of intervening processes on the relationship between gender diversity and performance. Forbes and Milliken (1999) consider that the relation between performance and diversity (in a broad sense, not necessarily referring to gender diversity) might be indirect. Several academics have suggested that some intervening variables between performance and gender diversity should be investigated to better understand the nature of the relationship between gender diversity on firm performance (Kochan et al. 2003). Two of the research papers published discuss employing innovation as a mediating variable in the relationship between gender diversity and firm performance. Miller and Triana (2009) hypothesise that innovation mediates the relationship between gender diversity on the board and firm performance. There is no significant relationship between board gender diversity and firm performance and thus, the hypothesis is not supported.

Manita et al. (2019) hypothesises that innovation functions as a mediating variable and interacts with the effect of gender diversity and firm performance. Their findings conclude that an indirect effect of innovation on the board gender diversity and firm performance relationship was not significant for each year in their 4-year study period. They did not find support for innovation as a mediating variable of the relationship between gender diversity and firm performance.

Investment in R&D has been found to moderate different kinds of relationships, such as that between internationalisation and firm performance, between the acquisition of external technology and firm performance, and between organisational learning and innovation performance. Bausch and Krist (2007) found that R&D intensity positively moderates the relationship between internationalisation and firm performance. Kotabe, Srinivasan and Aulakh (2002) found that R&D intensity also positively moderates the relationship between multinationality and performance in a cross-sectional analysis of firms belonging to 12 different industries. Tsai and Wang (2008) have shown that the acquisition of external technology does not, in itself, make a significant contribution to

firm performance; but the positive effect of the acquisition of external technology on firm performance increases as the degree of internal R&D efforts increases. Ghasemzadeh et al. (2019) found a moderating role of the innovation culture in the relationship between organisational learning and innovation performance, based on the results of 625 questionnaires completed by pharmaceutical companies.

Cabeza-García, Del Brío and Rueda (2021) investigated the moderating effect of innovation on the gender diversity and performance relationship through the panel data of 231 European listed firms in six countries. They show that a critical mass of women positively affects firm performance, and that this effect increases as the firm's innovation activity increases. This is the first empirical evidence for a moderating effect of innovation in the relationship between firm performance and the presence of a critical mass of female directors on a board. Similar to Cabeza-García, Del Brío and Rueda (2021), this study intends to tackle the moderating effect of innovation on the gender diversity and performance issue. However, this study focuses on ASX-listed SME companies over a 4-year period from 2014 to 2018, with the presence of at least one female board member on the corporate board.

In summary, the literature review has highlighted the complex and indirect relationship between gender diversity and performance within organisations. This study is built on supporting the moderating role of innovation between the board gender diversity and firm performance relationship.

This chapter has also defined the variables to be studied in this research and provided an exposition of the relationships and associations of these variables as identified from the previous research, together with a justification for why they influenced this study, and a description of the nature and direction of the relationship. The hypotheses were developed to test different relationships between the variables. The primary dependent variables identified for the study are the accounting-based and financial-based measures of performance. Independent variables to be measured that may influence the dependent variables include individual attributes such as gender, to develop a GDI. This study also measures whether there is a significant statistical relationship between the four dependent variables and one independent variable representing gender diversity.

The next chapter outlines the context of the study and provides a basis for the research conducted into specific objectives for this thesis; namely, to find the possible relationship between gender diversity on the performance of SMEs in Australia.

2.9.1 Summary of Methods

A summary of the statistical methods used in prior studies is provided in Table 2.15.

Table 2.15: Summary of the Research Methods used in Prior Studies

Author (Year)	Research Design	Sample Size	Statistical method
Kagzi and Guha (2018b)	Knowledge-intensive Indian firms for the period 2010–2014.	Panel data of 126 firms	Dynamic longitudinal panel data model using Generalised method of moment (GMM) technique in regression model.
Srivastava, Das and Pattanayak (2018)	Observations of Indian firms for the period 2001–2005.	Panel data of 300 firm-year	Pooled OLS model in Regression analysis.
Moreno-Gómez, Vaillant and Lafuente (2018)	Colombian public businesses for the period 2008–2015.	Panel data on a sample of 54 (432 firm year)	OLS estimation with fixed-effects panel data models.
Rossi, Hu and Foley (2017b)	Italian listed companies for the period 2005–2013.	Panel data on 41 ((369 firm year)	GMM technique in regression model.
Shehata, El-Helaly and Salhin (2017)	UK firms for the period 2005–2013.	Panel data of 34,798 SME firms	Pooled OLS regression analysis.
Terjesen, Couto and Francisco (2016)	Listed companies in 47 counties in 2010.	Cross-sectional data of 3,876	Correlation coefficient, GMM regression analysis.
Kılıç and Kuzey (2016)	Turkish firms for the period 2001–2005.	Panel data of 149 firms	Instrumental variable regression analysis using 2SLS, with limited information maximum likelihood (LIML) and GMM techniques.
Vafaei, Ahmed and Mather (2015)	Australian firms for the period 2005–2011.	Panel data of 1101 firm year	OLS and 2SLS regression analysis.
Arena et al. (2015)	European construction firms in 2012.	Cross-sectional data of 211 firms	Correlation coefficient, OLS regression analysis.
Liu, Wei and Xie (2014)	China public businesses firms for the period 1999–2011.	Panel data on a sample of 2000 firms (16,964 firm year)	Correlation coefficient, panel regression with fixed effect approach (firm fixed effect and year fixed effect included in regression model).
Chapple and Humphrey (2014)	Australian firms for the period 2004–2011.	Panel data of 287 ASX300 firms	OLS regression analysis and dynamic panel model with firm fixed effect.
Rose, Munch-Madsen and Funch (2013)	Firms in Denmark, Sweden, Finland, Norway and Germany in 2013.	Cross-sectional data of 117 companies	Correlation coefficient, OLS regression analysis.
Joecks, Pull and Vetter (2013)	Listed German firms for the period 2001–2005.	Panel data of 151 firms	Correlation coefficient, OLS regression analysis.

Author (Year)	Research Design	Sample Size	Statistical method
Ali, Ng and Kulik (2014)	ASX-listed Australian in 2012.	Cross-sectional 1 year time lag data of 288 organisation	Correlation coefficient, hierarchical multiple regression analysis.
Adams and Funk (2012)	Swedish firms in 2005.	Cross-sectional data of 288 firms	OLS regression analysis.
Haslam et al. (2010)	FTSE 100 for the period 2001–2005.	Panel data of 126 companies	Bivariate correlational analysis.
Carter et al. (2010)	US firms (1998–2002).	Panel data of 641 (2,563 firm years)	3SLS regression analysis with firm and time fixed effects.
Miller and Triana (2009)	Fortune 500 firms in 2003.	Cross-sectional data of 432 firms	Correlation coefficient between the variables, OLS regression analysis.
Adams and Ferreira (2009)	US firms for the period 1996–2003.	Panel data of 1,939 firms (8,242 firm year)	Firm fixed effect OLS regression analysis.
Carter, Simkins and Simpson (2003)	US firms in the year 1997.	Cross-sectional data of 797 firms	Two stage least square (2SLS) regression analysis.

2.9.2 Measure of Association

As demonstrated in Table 2.15 above, there are some similarities and differences in the use of research methods in this and prior studies regarding the relationship between gender diversity and the performance of firms.

Most studies have generally employed a correlation coefficient to reveal any correlation between the gender diversity variables and the performance of firms. The main difference in research methods can be identified by what form of linear relationship will best forecast the dependent variables from the values of independent variables. Different types of regression analysis have been employed.

Hierarchical regression analyses have been used by some authors (Ali, Ng & Kulik 2014; Erhardt, Werbel & Shrader 2003). Hierarchical regression is a way to show if the variables of interest explain a statistically significant amount of variance in the dependent variable after accounting for all other variables. This is a framework for model comparison rather than a statistical method. In this framework, several regression models are built by adding variables to a previous model at each step; later models always include smaller models than previous steps. In many cases, the intent is to determine whether newly added variables show a significant improvement in R^2 (the proportion of explained variance in dependent variables by the model) (Virginia University Library). This type of analysis is employed to study the extent of variation of the regression coefficients across different subpopulations. Hierarchical regression analyses are not employed in this study as GDI, being the only independent variable, is the main area of interest in this study.

This study uses a quantitative methods model to assess the association between GDI and outcomes, and for potential effect modification by R&D as a moderating variable. The next chapter will provide the context of the study.

Chapter 3: The Context of the Study

3.1 Introduction

The preceding chapter provided a review of the literature related to the key variables to be studied. It included an examination of the literature associated with gender diversity, innovation, and firm performance. The chapter also considered the research related to the empirical measurement of those variables and constructs.

This chapter considers the practical context of the study and identifies the conceptual factors that might influence the research. Context is described here as a complex set of causes, characteristics, processes, or events that have an effect on the phenomenon being studied. Context can be used and conveyed in a variety of ways. Rather than considering context as an external, easily definable, and observable object that affects what is being studied, it can instead be interpreted as a multidimensional entity that both influences and is influenced by the phenomenon (Michailova 2011). Context can set specific constraints and opportunities that either improve or diminish the direct effects of gender diversity on performance (Joshi & Roh 2009).

The way gender diversity affects firm outcomes is highly dependent on the context in which it is studied, making it critical to collect and analyse data, both quantitative and qualitative, that captures this complex reality, rather than relying solely on an incomplete understanding of what gender diversity means. Considering this, the question to ask is not whether gender diversity improves results, but whether companies are cultivating an inclusive culture that allows them to capitalise on the advantages of gender diversity. Gender diversity has a positive, negative or no effect on firm results, depending on the nature of the data available, the methodology used and the context of the assessment. There is still a shortage of definitive research on the subject, necessitating a deeper examination of the topic to gain better understanding of gender diversity and firm results (Rhode & Packel 2014).

3.1.1 The Importance of Context in Evaluating Gender Diversity and Performance

Notably, the issue of gender diversity in the workplace is reduced to a simple numbers game, despite the importance of considering data, methodology and outcome measures

when deciphering findings. Board gender diversity, on the other hand, goes far beyond a male-to-female ratio, and it must be acknowledged that when, where and how women engage in the workplace matters. There is mounting evidence that the wider context (i.e. the situational environments) in which professional working relationships and experiences take place have a significant effect on the influence of women directors on corporate boards (Rhode & Packel 2014).

Although information processing, similarity–attraction and social categorisation theory explain why gender diversity can manifest in particular workgroup or organisational outcomes, a careful analysis of the context is required to understand when, where and how it occurs. Situational environments may either minimise or intensify the direct effect of gender diversity on success by assessing the precise constraints and opportunities that affect team dynamics, thereby reconciling some mixed empirical evidence from previous studies (Joshi & Roh 2009). In general, occupational demography, industry setting, and the climate for inclusion are three main contextual factors that affect the gender diversity and firm performance relationship. Additionally, shareholder protection and gender parity are the other contextual factors that should be considered in the national context of company the operations. The contextual factors related to this study are detailed in the following sections.

3.2 Demography

Negative assumptions about under-represented groups are compounded when one ethnic group dominates an organisational environment and identifying facts about minority group members on an individual level are overlooked. Status discrepancies between the majority demographic group and minorities in the wider social context can also trickle down to team-level interactions, with over-represented individuals viewed as having more knowledge. In turn, this hinders minority ethnic group member success, has a negative effect on team interaction, and leads to low performance outcomes (Joshi & Roh 2009). Another example is when women are selected as token members of a board of directors or senior management to reflect diversity. Studies show that token participants face social alienation, increased scrutiny, and marginalisation, all of which contribute to poor outcomes. Because women when in a minority are forced to make themselves socially invisible by downplaying their unique skills, attributes, and experiences to preserve perceived cultural solidarity and alleviate any discomfort felt by the male-

dominated group, tokenism perpetuates gender stereotypes. This of course hinders their success and strengthens the myth that women do not contribute something new or better. Research is increasingly pointing to the idea that for gender diversity to have an effect on success, the work group must have a 'critical mass' of women (Rhode & Packel 2014). Joecks, Pull and Vetter (2013) report that there are negative effects on firm results when gender diversity is extremely poor. When the proportion of women in a team exceeds 30%, diverse teams outperform more homogeneous teams. Similar findings have been found at the organisational level, but the results regarding what proportion constitutes the optimum critical mass differ significantly (Frink et al. 2003).

Aside from occupational demography, the industrial setting, which refers to the business environment in which workgroups are embedded, is another important contextual factor that moderates the relationship between gender diversity and success. These factors include technological change, regulatory pressure, consumer preferences and market rivalry, among others. These factors vary by sector and have a direct influence on organisational processes. For example, the service industry—which includes industries such as education, retail trade and hospitality—is more customer-oriented than the manufacturing industry, which relies more on physical resources and machinery. Close contact and communication with customers allow workers in operating teams to participate in more discretionary behaviour, which has direct implications for performance results, such as revenue, consumer loyalty and customer retention (Datta, Guthrie & Wright 2003; Joshi 2018).

3.3 Industry Setting

Indeed, one way this background manifests in performance results is how demographic diversity can offer a company in the service industry market a competitive advantage (Joshi & Roh 2009). For example, in the retail sector, where customer loyalty and retention are more closely related to employee diversity attributes, the benefits of gender-diverse workgroups are more likely to increase performance results. When opposed to a company that fails to boost its workforce diversity and market share, a retailer who promotes gender diversity is more likely to attract female consumers and increase revenue. High-tech companies that rely on creativity and innovation to produce globally competitive short-cycle goods are similarly more likely to benefit from the diverse talents, expertise, attitudes, and networks that promoting employee diversity brings.

Manufacturing companies, on the other hand, rely more on machinery, technology, and raw materials to enhance production outcomes, and are more likely to use human resource practices that require greater employee behaviour monitoring. As a result, the effect of diversity on organisational success may be reduced (Joshi & Roh 2009). Further, different work streams in manufacturing industries suggest that there is little contact between men and women, making it difficult for companies to maximise the advantages of teamwork against higher order results, in addition to providing a lower degree of job interdependence (Dean & Snell 1991). In reality, empirical evidence supports the case for evaluating the effect of gender diversity on firm performance in the industry. Frink et al. (2003) discovered that in gender-balanced environments, firm productivity rises in the service sector but not in manufacturing, meaning that sectors differ in their ability to benefit from gender diversity. Ali, Kulik and Metz (2011) found evidence for the moderating effects according to business type in their sample of Australian companies, suggesting that the positive effect of gender diversity is greater for firms in the services industry and the negative effect is stronger for firms in the manufacturing industry.

3.4 Climate of Inclusion

Creating an empowering environment of equality for women board members is another vital factor in unlocking their productive potential. Corporate boards must look past the short-term objectives of token representation, plurality, and diversity in management to concentrate more on building an atmosphere of inclusion to realise the true potential of gender diversity in a firm's success. In assessing the board gender diversity–performance relationship, there is growing evidence to support the value of an inclusive environment. One study examined data from a survey of public managers in Texas and discovered that inclusive organisational behaviours that promoted top-level engagement and included workers in decision-making processes had a positive effect on organisational success (Sabharwal 2014). According to another study, an environment of inclusion moderates the relationship between gender diversity and workgroup dynamics, resulting in lower levels of conflict among gender-diverse groups (Nishii 2013).

It is clear that gender diversity is about more than the equal inclusion of men and women in teams. It is important to consider the context in which the diversity–performance relationship is being investigated. This has significant consequences for addressing the conflicting findings of previous research. It is not enough to wonder whether gender

diversity boosts productivity. It must be considered whether companies are cultivating the right atmosphere of inclusion to maximise the benefits of gender diversity in the workplace. Looking at the wider situational contexts allows one to do just that.

The gender diversity–firm performance relationship is also moderated by other factors in the national context of a firm. A meta-analysis was performed by Post and Byron (2015), which examined the findings of 140 studies on women board members and financial performance, to see whether the outcomes differed because of different legislative and sociocultural factors. The dominant theory behind their meta-analysis was UET. They examined board oversight and board strategy engagement as potential intermediary variables connecting board gender diversity and financial performance to see if these related to financial performance. Further, they considered the role of contextual factors such as shareholder protection and gender parity. They examined whether the relationship between female board representation and monitoring activities was moderated by the extent of shareholder protection and gender parity (Sharda 2019).

3.5 Shareholder Protection

Directors cannot easily be held accountable for breaches of fiduciary duty when shareholder protections are weak, and thus a board of directors is less motivated to make the best decisions possible. As a result, in countries with weaker shareholder protections, directors may be less likely to seek out and accept the unique expertise, skills and values of female board members, decreasing the probability that female director cognitive frames will be used in board decision-making processes. In contrast, shareholders have clear legal rights and may sue or threaten to replace a board of directors who fail to fulfil their fiduciary obligations under stronger shareholder protection laws. As a result, directors have a greater opportunity to share and draw on the expertise, skills, and principles that each brings to the board, which will increase the positive effect of female board representation on board decision-making (Post & Byron 2015). The findings reveal that in countries with stronger stakeholder protections, the relationship between women on boards and accounting returns was positive. Positive market performance was also linked to gender parity in countries with higher gender parity (Sharda 2019).

Thus, shareholder protections that are stronger tend to reinforce corporate governance, whereas those that are weaker tend to weaken governance mechanisms (La Porta, Lopez-

de-Silanes & Shleifer 1999). As a result, the degree to which a country provides shareholder protection will positively moderate the relationship between female board representation and both financial and accounting returns, as well as market performance. In situations with better shareholder rights, female board representation was found to be more positively linked to firm financial performance.

3.6 Gender Parity

Because women on corporate boards are still uncommon, and many have only recently been added (Burke & Vinnicombe 2008), the credibility of female directors can be called into question in certain situations. Female board representation will be more positively related to firm financial performance in countries where women have more equal access to resources and opportunities in terms of education, economic participation, employment, and political empowerment (Hausmann, Tyson & Zahidi 2012). Because women in countries with higher gender parity are more likely to have the types of human capital needed for board roles, these countries' boards may be more inclined to use the skills, expertise and values those female directors bring to decision-making (Wright, Baxter & Birkelund 1995). Female directors in countries with higher gender parity are more likely to have the skills and expertise necessary to contribute to and influence boards. Because female directors have more human resources and the legitimacy that comes with this, they are more likely to have a positive effect on board processes and results.

Gender parity can influence the degree to which female directors confer credibility to a firm and otherwise influence the external assessment of firms with female directors, in addition to influencing female director legitimacy within a board (Byoun, Chang & Kim 2016). In countries where gender parity is higher, market performance is also tied to it. A higher proportion of female directors is also linked to increased oversight and strategy participation (Sharda 2019).

3.7 Summary

This chapter has considered the context of the study and has highlighted some of the contextual factors that might influence gender diversity and firm performance. It may be

noted that environmental uncertainty or the level of economic development have not been considered contextual factors in this study.

Kochan et al. (2003) also suggest that context is crucial in determining the nature of diversity's influence on performance and that it is necessary to examine the conditions under which diverse boards outperform or underperform more homogenous boards. The next chapter outlines the conceptual framework of the study.

Chapter 4: Conceptual Framework

4.1 Introduction

The previous chapters (a literature survey and contextual study) provided a context for why a study of the effect of gender diversity on the performance of SMEs is important. As discussed in Chapters 2 and 3, board diversity affects the performance of an organisation. The contribution of female board members to improving performance acts as an encouragement for this study.

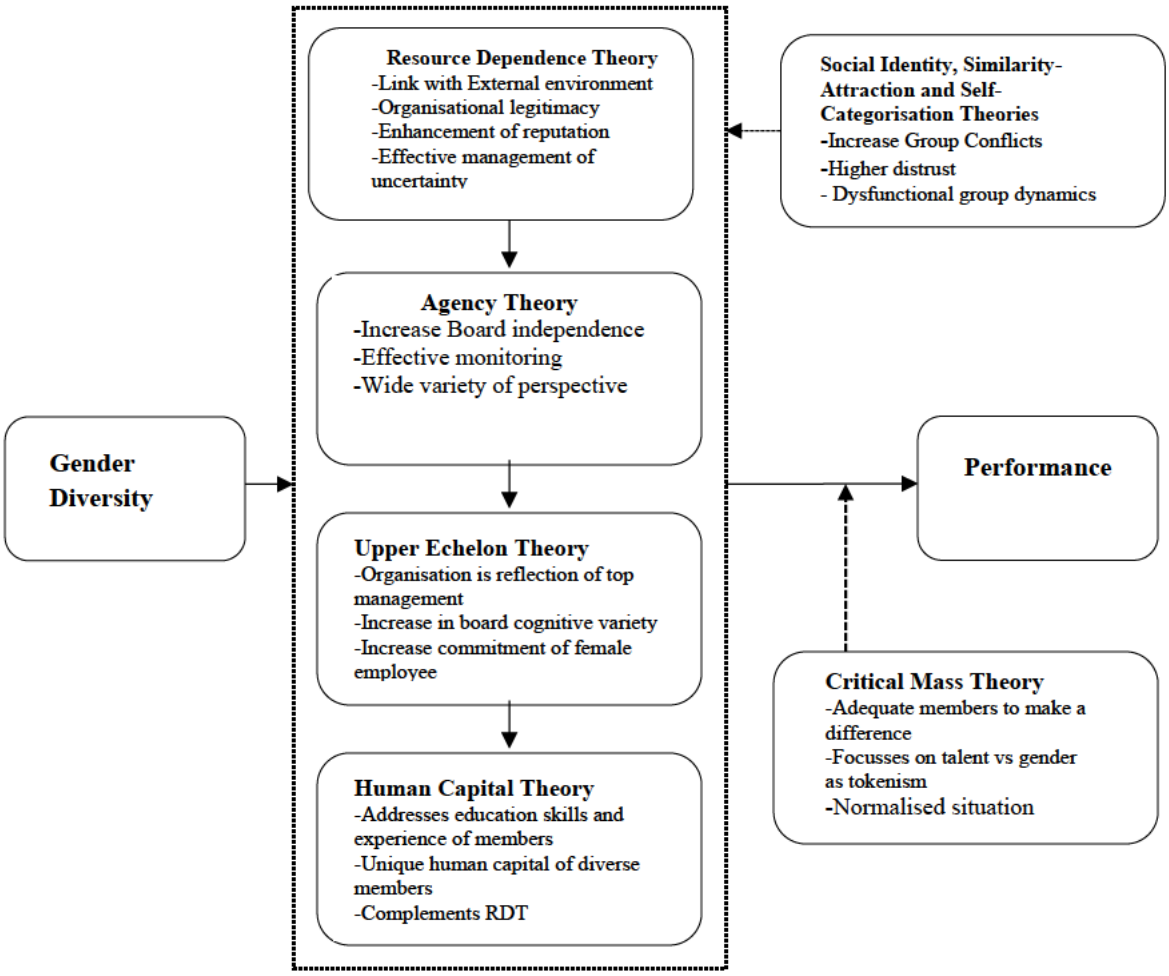
Chapter 3 develops both a conceptual and theoretical framework for this and other hypotheses to be studied. This chapter initially summarises the key theories emanating from the literature review that are relevant to this study. It defines the variables to be studied in this research. It also elucidates the relationships and associations between these variables, as identified from the previous research, together with justifying why they influence this study. It also describes the nature and direction of the relationship.

This is followed by details of the research design, which includes the derivation of the study's aims and research objectives. The chapter also outlines the formulation of the research questions and the hypotheses to test the validity of the relationships and associations suggested.

4.2 Summary of the Key Theories

This study is designed to enhance knowledge regarding the justification of female members in corporate boards, and thus the role of a diverse board in improving the performance of an organisation. Previous research has highlighted several theories that recognise the effect of female board members on financial performance. The benefits and drawbacks of gender diversity, derived from the theories outlined previously, are shown in the theoretical framework (see Figure 4.1) and are discussed in next paragraphs (Wiley & Monllor-Tormos 2018).

Figure 4.1. Theoretical Framework



Several theories have suggested that board diversity affects corporate performance. Board diversity may benefit companies in several ways that affect financial performance positively. A high degree of diversity may provide an increased variety of input to the decision-making processes and may influence the competences of a board, because it avoids excluding qualified board candidates when searching for new members (Rose, Munch-Madsen & Funch 2013). Board diversity also provides strategic human and social capital that influence the task of allocating resources and providing ideas and relationships that increase the power of innovation in a firm (Miller & Triana 2009).

This investigation will build on some theoretical views that can explain the relationship between two variables of interest by integrating some theories to provide a more thorough understanding of the relationship between gender diversity and firm performance. According to AT, a board of directors represents the principal in performing monitoring functions for management of a firm. However, because a board of directors acts in the

best interests of shareholders, it should be considered an indispensable link to the external environment. Considering other theories, RDT presents the most convincing case of diversity and an understanding of the board of directors as not only a supervising body but also as an interconnection with the external business environment so that a company remains competitive, strong and prosperous. A diverse board contributes to and facilitates the availability of additional and unique resources (Terjesen, Couto & Francisco 2016). Based on HCT, every external director with a unique and exclusive background and capability will provide support from their knowledge for the performance of a firm.

Thus, firm performance is affected by two roles: the monitoring role suggested by AT and the provision of resources role highlighted by RDT and HCT. Hence, it is important to examine the roles as complementary for the improvement of financial performance. Moreover, it may be noted that according to contingency theory, the relationship between board diversity and firm performance might be dependent on the circumstances and the context in which firms operate (Zona, Minichilli & Zattoni 2013).

The dysfunctional group dynamics due to gender diversity might be explained through theories such as SIT, similarity–attraction theory and self-categorisation theory. These subgroupings without a critical mass of female board members have the potential to generate distrust across female and male directors and might dilute the benefits of gender diversity. A critical mass helps to break the gender barrier and as such facilitate the benefits of gender diversity (Wiley & Monllor-Tormos 2018).

In this thesis, a conceptualised model is developed from the theoretical perspectives of RDT, AT and UET. These support gender diversity on boards and are closely linked with the functioning of the board. According to UET, managerial characteristics affect organisational performance as female members in the board of directors, because of differences in terms of knowledge, experience and values, shape both the content and process of board decision-making and activities that eventually affect firm performance (Post & Byron 2015). RDT and AT signify boards that deliver strong, sound, and timely advice to executives and provide guidance, legitimacy and access to essential resources. Integrating these theories with HCT will provide a thorough understanding of the relationship between gender diversity and firm performance (Wiley & Monllor-Tormos 2018).

Figure 4.2 below conceptualises the study's broad research model regarding the aspects of gender diversity and their effects on performance in an organisation. Figure 4.3 below shows the working model, as not all the data for age, tenure, and education of board members in SMEs are not available. This figure shows the predictors of ethical decision-making, as studied in this research.

Figure 4.2. Conceptual model of the aspects of the gender diversity and its impacts on the performance in an organisation

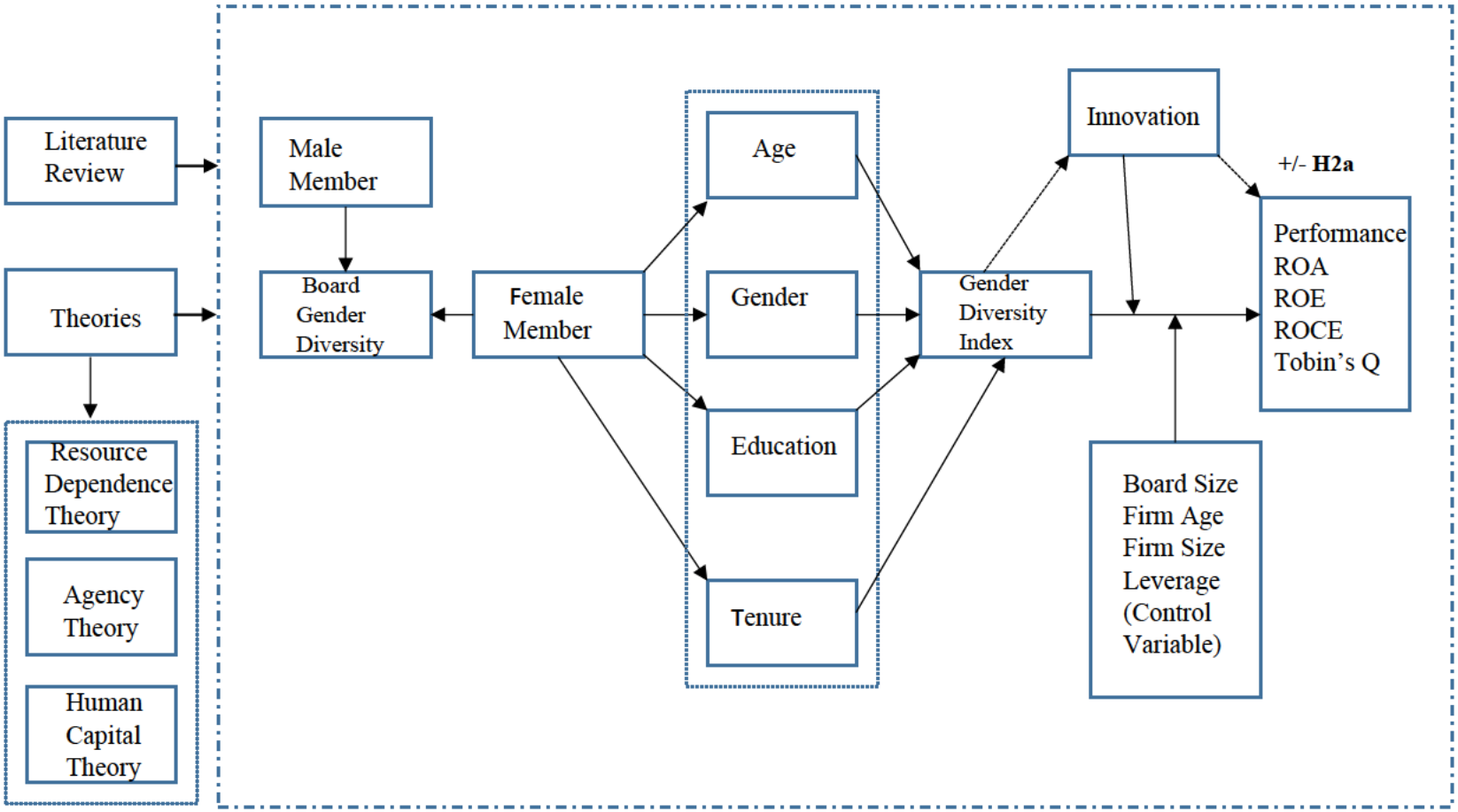
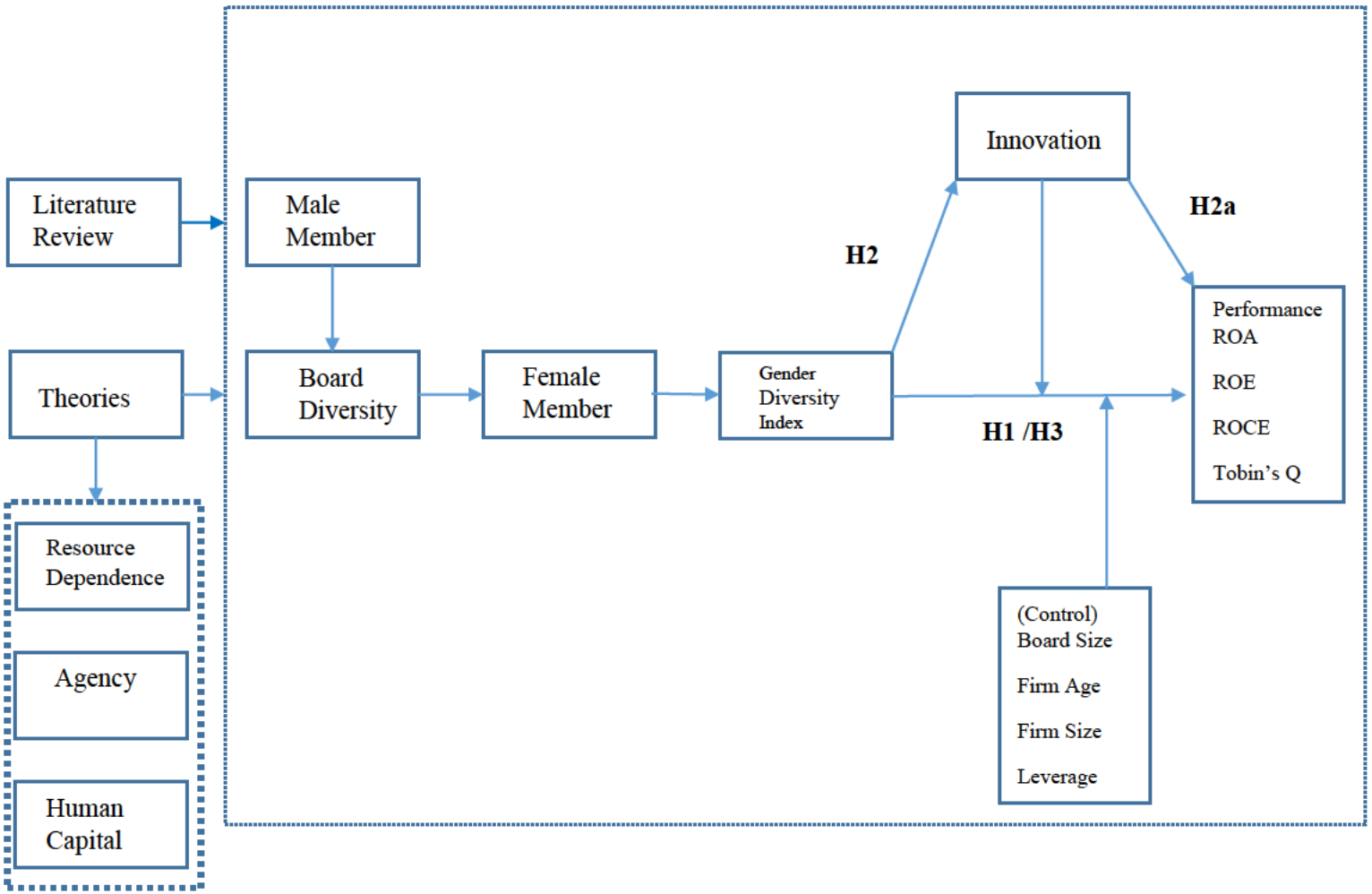


Figure 4.3. Working model of the aspects of the gender diversity and its impacts on the performance in an organisation



4.3 Summary

This chapter has outlined the conceptual and theoretical framework for the study, which attempts to fill gaps in the existing knowledge base about gender diversity and financial performance of ASX-listed SMEs in Australia. These gaps in knowledge became the primary focus of this study.

The chapter summarises the key theories emanating from the literature review, which are identified for exploration within the thesis. This study attempts to enhance understanding of these theories through the measurement of hypotheses.

This conceptual model is based on the theories and findings of prior research that suggest there are associations between gender diversity and different measures of financial performance.

Chapter 5 will describe in more detail the methodology adopted to test the conceptual framework.

Chapter 5: Research Methodology

5.1 Introduction

The previous chapter outlined the conceptual framework for this thesis and developed the research questions and hypotheses to be tested. This chapter describes the methodology used to collect and analyse the data that will help to answer the research questions. It contains a justification for the methodology. The chapter is organised into three major sections. Section 5.2 establishes the research design, including the type of study, units of analysis, data sources, time horizon and variables. Section 5.3 describes the research methods, including the data types, the sample, and an analysis for modelling the association between gender diversity and firm performance. The model used to analyse the data is described in Section 5.4.

5.2 Research Design

Research design is the overarching strategy for integrating the study's numerous components in a coherent and logical manner, ensuring that the research problems are successfully addressed; it also acts as the framework for data collection, measurement, and analysis. This section details the types of study, study settings, data sources and the interpretations of the variables.

5.2.1 Type of Study

This study is exploratory in nature and investigates the effect of gender diversity in corporate boards on the performance of different organisations. ASX-listed SMEs in Australia are the target sample for this study.

5.2.2 Study Setting

There is an increasing interest in the financial performance of SMEs coming from policymakers, as they recognise the importance of these companies to the whole economy. SMEs in Australia are defined as those employing 200 or fewer people. SMEs comprise 97% of all Australian businesses, produce one-third of the total GDP, and employ 4.7 million people.

As of 2018, there were 2100 listed firms in the ASX. Of these, 1210 are classified as SMEs. This study focuses only on ASX-listed SMEs, and it is based on archival data to test the hypotheses. The reliability, suitability and adequacy of the data were considered as described in the following sections before secondary data were also used (Kothari 2004).

5.2.3 Unit of Analysis

The major parameter being explored in the research project or study is referred to as the unit of analysis. The unit of analysis for this project used was at the individual firm level, at a specific time.

5.2.4 Data Sources

Data were extracted from two sources for this study. First, accounting, and organisational data were obtained from the Orbis database, consistent with previous researchers (Ali, Ng & Kulik 2014). Second, information on the composition of boards of directors was obtained from the annual reports available at ASX websites.

5.2.4.1 Orbis Database

Orbis is a global company database produced by Bureau van Dijk. It contains comprehensive information on companies across the world. It focuses on private company information and presents companies in comparable formats. Bureau van Dijk sources the information from different providers; it adds value to this information as it standardises the data and links the sources. It includes company financials in a standardised format, financial strength indicators, ratings, options to create the desired ratios and to create data fields, directors and contacts, original filings/images, stock data, private equity data and portfolios, patents, detailed corporate and ownership structures, industry research, business, and company-related news (Victoria University Library Guides). Moody's Analytics is a subsidiary of Moody's corporation, established in 2007 to focus on non-rating activities: it acquired Bureau van Dijk in 2017 and is the current owner of the Orbis database.

Orbis includes data on over 310 million companies globally, with information drawn from more than 160 information providers, plus many of Bureau van Dijk's own sources. The company is known for its expertise in providing information on privately held companies

and has increasingly been developing specialised tools for specific user groups. Underpinning the service are official filing content from sources such as Companies House in the UK and the Securities and Exchange Commission in the US, as well as its multiple relationships with data partners around the world (Bureau van Dijk 2017).

5.2.4.2 Reliability, Suitability and Adequacy of the Orbis Database

Bureau van Dijk takes its own steps to ensure accuracy and consistency in official data. This ranges from tidying up spelling mistakes to directly interrogating the companies' profiles to resolve any inconsistencies in underlying numbers. It also has an excellent reputation for standardising company data in accordance with clearly defined principles. It also creates and maintains company information itself. Its teams append ownership links, shareholders, directors, and contact information to profiles. They also maintain a proprietary mergers and acquisitions (M&A) database, Zephyr, with some of this data being available within Orbis. The company has teams of researchers in the UK, Brussels, and Singapore, who provide a continuous stream of updates to data, such as corporate links and M&A activity. The information comes from official registers, annual reports, company websites, newswires, telephone research and direct correspondence with companies.

Orbis is a commercially available dataset that covers over 200 million firms worldwide. It provides company financials (e.g., operating revenue, employment, fixed capital) together with detailed information on firm ownership structure, 4-digit industry and other firm characteristics.

5.2.4.3 Annual Reports

Corporate governance and other relevant data were collected manually from the annual reports (Ararat, Aksu & Cetin 2015) and other information on ASX websites.

(ASX 2018) state:

> ASX operates at the heart of the globally attractive, deep, and liquid Australian financial markets. It uses technology to develop innovative solutions that make life easier for our customers and create value for our shareholders. ASX Compliance function oversees compliance by listed entities and market participants with ASX listing and operating rules, respectively. Confidence in the operations of ASX is reinforced by the market

supervision and regulatory role undertaken by the Australian Securities and Investments Commission (ASIC) across all trading venues and clearing and settlement facilities, as well as through the Reserve Bank of Australia's oversight of financial system stability. ASIC also supervises ASX's own compliance as a listed public company.

5.2.5 Variables

The findings of the literature review as outlined in Chapter 2 were a combination of concepts and variables. This section of the chapter will now examine and define the main variables that have arisen from the theories outlined in Chapter 2 and Chapter 4 and are integral to this study.

5.2.6 Independent Variables

As per the conceptual model outlined in the previous chapter, board demography diversity is considered an independent variable for this study. It can be defined in terms of some noticeable measures that include gender, age and nationality, along with some relatively less noticeable functional characteristics, such as occupational background related to education, technical ability and professional experience (Ararat, Aksu & Cetin 2015; Martín-Ugedo & Mínguez-Vera 2014). The demographic attributes of members of a board in terms of gender, age, educational level and experience have a direct effect on the functioning of the board (Johnson, Hill & Schnatterly 2013; Post & Byron 2015). From a broader perspective, it is important to study the influences of demographic diversity on the performance of a company (Srivastava, Das & Pattanayak 2018). Women with competencies in human capital, external networking, information technology and other characteristics that are important to firms deserve opportunities to serve on corporate boards and in top management teams (Carter et al. 2010). However, because of unavailability of a complete set of data, this study considers only gender diversity as an independent variable.

Blau's index will be used to measure gender diversity. It is deemed appropriate for this study because its operationalisation procedure aligns with measurements previously employed to assess gender diversity levels (Ararat, Aksu & Cetin 2015; Kagzi & Guha 2018b; Richard et al. 2004).

Diversity as variability conceptualises categorical differences across the relevant characteristics between group members (Carpenter 2002; Solanas et al. 2012). Variety is

commonly measured by Blau's index, which can easily handle categorical attributes (Ararat, Aksu & Cetin 2015). Blau's index values (B) are used for the GDI:

$$B = 1 - \sum_{i=1}^{k} P_i^2 \quad \text{..... (1)}$$

Blau's index, denoted here by B, is defined as where P_i corresponds to the proportion of group members in i^{th} category and k denotes the number of categories for an attribute of interest. This index quantifies the probability that two members randomly selected from a population will be in different categories if the population size is infinite or if the sampling is carried out with replacement. Hence, if B equals its minimum value (i.e., 0), all members of the group are classified in the same category and there is no variety. In contrast, the higher the B value is, the more dispersed group members are over the categories. The maximum value for this index is achieved in the condition where members of a group are equally distributed among all categories (i.e., $p_1 = p_2 = \ldots = p_k$); that is, if and only if $n = mk$, where group size, n, is equal to the number of categories multiplied by a positive integer, m. Thus, the maximum value is:

$$B_{max} = 1 - \sum_{i=1}^{k} \left(\frac{m}{n}\right)^2 = 1 - k\left(\frac{m}{mk}\right)^2 = 1 - \frac{1}{k} = \frac{k-1}{k} \qquad (2)$$

It may be noted that the maximum value of B (B_{max}) does not depend on n. Further, as k tends to infinity, the maximum value of B approaches unity. For this reason, it has been suggested that Blau's values are not validly comparable if the number of categories is not identical across diversity variables (Harrison & Klein 2007) because the maximum value is a function of k. Nevertheless, researchers have asserted that comparisons between variables with a dissimilar number of categories still make sense, as long as larger number of categories contributes to greater diversity (Agresti & Agresti 1978). However, the index B can be standardised by dividing it by its theoretical maximum value of (k-1)/k (Ararat, Aksu & Cetin 2015). This controls for the number of categories and gives the index of qualitative variation (IQV) (Agresti & Agresti 1978). Blau's index and IQV can be used interchangeably when comparing variables with the same number of categories because they are highly similar measures and only differ in scale (Solanas et al. 2012).

5.2.6.1 Gender Diversity

Gender diversity is studied heavily compared with other attributes of demographic diversity (Hillman 2015)**.** The effect of board gender diversity as a specific board attribute

relating to firm performance is available in the existing literature (Brown et al. 2017; Kagzi & Guha 2018a). The primary emphasis is placed on the observable managerial characteristics that the female member indicators bring to an administrative situation. Examples of such characteristics are age, tenure in the organisation, functional background, education, socioeconomic roots, and financial position (Hambrick & Mason 1984). Most studies focus on gender diversity, with gender as an expression of diversity, instead of looking at 'gender processes within other grounds of diversity' (Humbert & Günther 2018, p. 7).

5.2.7 Dependent Variable

The dependent variables for this study are measures of firm performance. Researchers have employed different estimation methods to measure firm performance. Firm performance can be measured based on financial and account indicators. Most studies that measure firm performance employ Tobin's Q (Ahern & Dittmar 2012; Campbell & Mínguez-Vera 2008; Carter, Simkins & Simpson 2003; Rossi, Hu & Foley 2017b), ROA, ROE and ROCE indicators (Arena et al. 2015; Erhardt, Werbel & Shrader 2003; Kagzi & Guha 2018b; Kılıç & Kuzey 2016; Mahadeo, Hanuman & Soobaroyen 2012; Moreno-Gómez, Vaillant & Lafuente 2018; Shehata, El-Helaly & Salhin 2017; Srivastava, Das & Pattanayak 2018). Tobin's Q is a more market-based measure, while ROA, ROE and ROCE are accounting-based measures (Arena et al. 2015).

ROA, ROE, and ROCE are commonly used as accounting-based indicators for firm performance. These performance measurements are generally used to indicate the ability of a company to produce accounting-based earnings and returns to shareholders. These are also good indicators because the proxy is widely used as an overall profitability measure (Arena et al. 2015). In this study, ROA, ROE, and ROCE are based on past performance, and will be used to measure firm performance, which is considered appropriate for this research.

5.2.7.1 Return on Assets

ROA is an indicator to measure how profitable a company is relative to its TA. It is used as an overall profitability measure for a company, capturing its operating results (Arena et al. 2015). ROA gives a manager, investor, or analyst an idea regarding how efficient a company's management is at using its assets to generate earnings. It is often called the

firm's ROI, which measures the overall effectiveness of management in generating profits with its available assets and is calculated as: ROA = net profits after taxes/TA (Carter et al. 2010; Gitman, Juchau & Flanagan 2011). ROA is displayed as a percentage.

ROA, in basic terms, reveals what earnings are generated from invested capital (assets). ROA for public companies can vary substantially and will be highly dependent on industry type. Therefore, when using ROA as a comparative measure, it is best to compare it against a company's previous ROA numbers or a similar type of company's ROA. The ROA figure gives investors an idea of how effective the company is in converting the money it invests into net income. A higher ROA number is always better because it shows that the company is earning more money with less investment. In theory, ROA indicates the ability of a firm to produce accounting-based revenue more than actual expenses from a given portfolio of assets measured as amortised historical costs. It is a measure of income, and indicates income produced for shareholders.

5.2.7.2 Return on Equity

ROE is a measure of another financial performance. It measures the return earned on a shareholder's investment in the firm. It is calculated by dividing net profits after taxes by ordinary shareholders' equity (Gitman, Juchau & Flanagan 2011)**.** As shareholders' equity is equal to a company's assets minus its debts, ROE could be thought of as the return on net assets. ROE is considered a measure of how effectively management is using a company's assets to create profits. ROE is expressed as a percentage and can be calculated for any company if net income and equity are both positive numbers.

5.2.7.3 Return on Capital Employed

ROCE is a financial ratio that measures a company's profitability and the efficiency with which its capital is employed. ROCE is calculated as: ROCE = earnings before interest and tax (EBIT)/capital employed

ROCE is a useful metric for comparing profitability across companies based on the amount of capital they use. Two metrics are required to calculate ROCE. EBIT, also known as operating income, shows how much a company earns from its operations alone without regard to interest or taxes. EBIT is calculated by subtracting the cost of goods sold and the operating expenses from revenue. Capital employed is the total amount of

capital that a company has used to generate profits. It is the sum of shareholders' equity and debt liabilities.

5.2.7.4 Tobin's Q

Tobin's Q is a stock-market-based measure of firm performance: it represents a forecast of future cash flow produced by a firm and a market assessment of the investment opportunity of a firm (Bhagat & Bolton 2008; Carter et al. 2010; Dezsö & Ross 2012). It is defined as the ratio of the market value of a firm's assets to their replacement value (Tobin 1969). Tobin's Q considers the expected value of future cash flows, which are captured in the market value of a firm's assets. It is measured as stock market capitalisation plus the book value of liabilities, as a ratio of TA (Kagzi & Guha 2018b). Tobin's Q indicates the wealth position of a firm and is important to shareholders and creditors as it measures wealth. A value greater than '1' indicates that the market value of shareholder and creditor investment is greater than the amortised historical cost of the assets. Tobin's Q is a market-based measure to some degree and is measured as: book value of TA – book value of shareholder's equity + market value of shareholder's equity/book value TA.

5.2.8 Control Variables

This study uses four control variables: firm size, firm age, management/board size and leverage. These controls have been commonly used in the previous research, as detailed below. In addition, there is plausible association between the control variables and the primary independent and dependent variables, justifying assessment of these variables as potential confounders in the association between gender diversity and firm performance.

5.2.8.1 Firm Size

Firm size is the most commonly used control variable in prior research on the relationship between board gender diversity and firm performance because it is related to profitability, age of a firm, disclosure and monitoring between firms (Ararat, Aksu & Cetin 2015). Firm size is expected to have a positive effect on financial performance and board diversity. This may be explained as being the case because larger firms are expected to have an effect on labour productivity and are more effective than smaller firms as they use the advantage of scales of economy (Ali, Ng & Kulik 2014). Additionally, larger

firms tend to have more gender-diverse boards. It may be noted that firms in different industries (e.g. manufacturing and servicing) will be affected by gender diversity as the levels of demand for managers to interact among themselves, and with customers in these two industry types can be different (Ali, Ng & Kulik 2014).

Firm size indicators can be expressed in terms of the book value of TA or total sales and the number of employees and measured in logarithmic form. The advantage of measuring firm size in logarithmic form is that a 1% increase represents a larger absolute increase for larger values of firm size: for instance, from 500 to 505 instead of from 100 to 101. Each 1% increase in size has the same effect on the dependent variable (Albright et al. 2011). Firm size measured in book value of the total year-end assets in a natural logarithm will be used as a control variable in this study.

5.2.8.2 Firm Age

Firm age is an important firm-specific element that influences the profitability of firms. There are some firm age–related factors that eventually determine and shape managers' risks and decision-making processes and that affect future performance. Some of these factors include decisions on project investments, spending on R&D, human resource development and risk management. There are mixed results on the relationships between firm age and firm performance. The positive relationship between firm age and firm performance is based on the argument that businesses perform better with experience gained over time (Coad, Segarra & Teruel 2013; Gaur & Gupta 2011). According to Coad Segarra and Teruel (2013), firms show improvement with age, experience and increase in the level of productivity, profit margins and larger size, along with lower debt ratios and higher equity ratios. These firms are also able to translate sales growth, and then into the subsequent growth of profits and productivity and cope well with uncertainties. However, the authors also found that the performance of firms deteriorates with age, as older businesses have lower expected growth rates of sales.

Productivity can be affected by the age of the firm because new firms possibly have less formalised organisational structures that can make them more effective and efficient by taking the advantages that a diverse workforce can offer, such as new technology, creativity, and innovation (Ali, Ng & Kulik 2014; Jackson et al. 1991). Consistent with previous studies, firm age is determined by the number of years since a firm's formation

(Kagzi & Guha 2018b). It has been used as a control variable, given that older firms may possess more fully developed operations capabilities and are in a better position (and are more likely) to overcome performance-related problems (Dezsö & Ross 2012). The natural logarithm of firm age will be used in this study to measure the effect of firm age.

5.2.8.3 Board Size

Board size is the total number of directors on a board and is directly associated with an increase in the pool of expertise and skills; it is potentially related to gender diversity in the boardroom. The availability of more knowledge and the experience of team members can be treated as a valuable resource and align with RDT. This theory suggests that a larger board is associated with a higher level of performance because larger boards can secure critical resources with the help of its environmental links. However, very large boards may suffer from a lack of cohesiveness, coordination difficulties and may be prone to frictions due to infighting among members; improvement is noticeable with a decrease in board size. On the other hand, a very small board size is disadvantageous because of the inadequate pool of expertise, information, and the level of advice available to a larger board. However, board size is only a measure of the number of directors and does not reflect the tasks and roles they perform. As such, the skill and knowledge base are the important factors for performance, rather than board size (Bonn, Yoshikawa & Phan 2004).

Li et al. (2012) note an overall positive relationship between board size and performance in small firms. With respect to board size, their study shows that fewer directors on a board significantly decrease the firm's cost of capital. Other researchers have found that the relationship between board size and the value of a firm varies from positive (Kyereboah-Coleman & Biekpe 2006) to negative (Loderer & Peyer 2002). Board size has been extensively used as a control variable in prior studies (Arena et al. 2015; Kagzi & Guha 2018b). In line with these previous studies, a natural logarithm of the total number of members in management and on the board will be used as a measure of management/board size in this study.

5.2.8.4 Leverage

Using leverage as control variable is appropriate to its effect on bankruptcy risk, task benefits and creditor monitoring. It is another variable that may affect a firm's cost of

capital by saving tax or creating a high risk of bankruptcy. As Gitman, Juchau and Flanagan (2011, p. 548) state:

> Leverage results from the use of fixed cost assets or funds to magnify returns to the firm's owners. Generally, increases in leverage results in increased return and risks, whereas decreases in leverage result in decreased return and risks. The amount of leverage in the firm's capital structure—the mix of long-term debt and equity maintained by the firm can significantly affect a firm value by affecting return and risk. Unlike some causes of risks, management has almost complete control over the risk introduced through the use of leverage.

Leverage can be used as a measure of productivity differences in firms. Higher productivity indicates that firms may plan to grow by taking advantage of their good state. Thus, a higher debt level and higher leverage ratios (conditional on their equity size) are associated with more productive firms (Huynh & Petrunia 2010). Leverage calculated as a debt-to-equity ratio influences firm performance (Dezsö & Ross 2012). In this study, leverage is calculated by taking the percentage of total borrowings to TA of the firm, as used in previous studies (Srivastava, Das & Pattanayak 2018). Higher leverage exposes firms to the risks of bankruptcy. A high level of bankruptcy cost may be associated with a high level of debt. Thus, a negative association is expected between leverage and firm performance (Campbell & Mínguez-Vera 2008).

5.2.9 Research and Development as a Potential Effect Modifier

Effect modification occurs when the magnitude of the effect of the primary exposure on an outcome (i.e., the association) differs depending on the level of a third variable. In this study, if effect modification (sometimes termed interaction) is present, there will be different results for the association between gender diversity and firm performance for different levels of the third variable. Innovation is one such a third variable, and this study thus tests the possibility of innovation (measured through R&D) as a potential effect modifier.

Introducing new processes and products through innovation helps a firm create new areas of profit or reduction in costs, and thus helps the sustainability of that firm (Sharma 2016). Innovation is imperative in maintaining a competitive edge and it is found in the knowledge developed or acquired and held by a firm (Ruiz-Jiménez, Fuentes-Fuentes &

Ruiz-Arroyo 2016). It is essential for a firm to gain competitive advantages and create opportunities to open new markets through innovation (Diaz-Garcia, Gonzales-Moreno & Saez-Martinez 2013). Diaz-Garcia, Gonzales-Moreno and Saez-Martinez (2013) argue that female representation in top management brings informational and social diversity benefits, enriches the behaviours exhibited by managers throughout the firm, and motivates women at all levels. According to Galia and Zenou (2013), women on boards with a variety of knowledge, skills and ideas bring different perspectives, experiences and management styles when compared with their male colleagues. This can help to identify new innovative opportunities. Gender diversity and innovation are linked because innovative ideas that are generated as strategic direction of a firm are influenced by diverse human capital on boards (Miller & Triana 2009). Gender diversity, with a variety of views among the members leads to the detailed processing of information, which is valuable for tasks requiring creative solutions such as innovation processed that depend on insightful and distinctive recombination and reapplications of existing resources (Dezsö & Ross 2012).

Theoretically, directors on a board are challenged with the task of allocating resources and providing ideas and relationships that increase the innovation of a firm. Board diversity provides strategic human and social capital resources to firms that can influence these efforts, thereby increasing innovation. R&D expenses can be used as a proxy for innovation and can be measured by R&D intensity. This reflects decisions made by directors to allocate resources to innovation, and the previous literature has established that a firm's R&D intensity is a suitable proxy for the firm's innovation (Balkin, Markman & Gomez-Mejia 2000; Hitt, Hoskisson & Kim 1997; Hoskisson et al. 2002; O'Brien 2003). Consistent with this research, innovation can be measured by R&D intensity, and is operationalised by a firm's reported R&D expenditure (Miller & Triana 2009).

5.2.10 Time Horizon

This study covers a duration of five years from 2014 to 2018, for the included ASX-listed SMEs in Australia. During this period, the awareness of gender diversity on Australian boards gained importance because of the recommendation of ASX's corporate governance council, which encouraged listed companies to establish and disclose a diversity policy and set a measurable policy for achieving gender diversity.

5.3 Research Methods

The processes and techniques used in the collection of data or evidence for analysis in order to uncover new knowledge or get a better understanding of a topic are known as research methods. The research methods used in this project are described below.

5.3.1 Retrospective Cohort Study

This is a retrospective cohort study, which is based on the existence of a common characteristic within a subgroup of populations. In this study, the investigators jump back in time to identify a cohort of individual firms at certain point in time before they had developed the outcomes of interest and tried to establish their exposure status. A retrospective study design allows the investigator to formulate hypotheses about possible associations between an outcome and an exposure and to further investigate the potential relationships. The characteristic feature of a cohort study is that the investigator identifies firms at a point in time when they do not have the outcome of interest, and then compares the incidence of the outcome of interest among groups of exposed and unexposed (or less exposed) firms.

5.3.2 Panel Study

Panel studies are like cohort studies except that in addition they are longitudinal (they refer to data containing time series observations of several individuals). Therefore, observations in panel data involve at least two dimensions; a cross-sectional dimension, indicated by subscript ‘i’, and a time-series dimension, indicated by subscript‘t’. They may be prospective or retrospective in nature, and the information is always collected from the same data source. There are several advantages of panel data. These include that they provide more controlling for individual heterogeneity, less collinearity among the variables, more degrees of freedom and more efficiency, are able to control the effect of omitted variables, as well as being able to uncover dynamic relationships that generate more accurate predictions for individual outcomes (Hsiao 2007). Therefore, the lack of independence among repeated measurements for the same firm, a positive correlation among the repeated measurements, the fact that variability may be heterogeneous, and that variability may be different at the start of the study than at end of a follow-up period, are able to be considered in the analysis.

The limitations of panel data include design and data collection problems, distortion of measurement errors, selectivity problems, short time-series dimension, and cross-section dependence. These limitations are mostly associated with panel survey that are not applicable in this study because the data here were collected from a standard reliable database and company annual reports.

5.3.3 Types of Data

5.3.3.1 Cross-Sectional Data

Cross-sectional data are collected by observing the characteristics of included firms at one point or period. It does not consider the changes of data over time; thus, it was not considered for this study. The findings may vary when researchers examine data from the same company for one year or for longer periods (Ararat, Aksu & Cetin 2015). Many researchers have stated that panel data offers concrete results. Results of studies that use cross-sectional data on corporate governance suffer from the problems of reverse causality and endogeneity (Adams & Ferreira 2009). However, most of the research on board diversity is based on cross-sectional data (Dezsö & Ross 2012).

5.3.3.2 Longitudinal Data

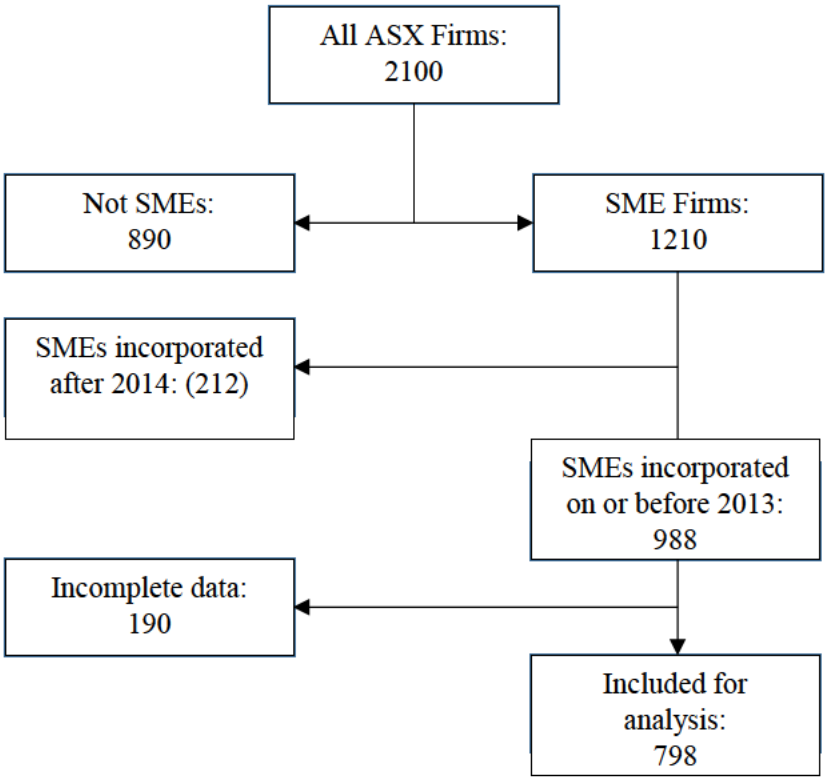
Longitudinal data are multidimensional and involve measurements of the same firm over time. It therefore tracks the same sample at different points in time. Longitudinal data allow for the measurement of within-sample change over time, enable a measurement of the duration of events, and record the timings of various events (Bureau of Labor Statistics 2021). Longitudinal data used to test data samples within a certain time has been used by other authors (Adams & Ferreira 2009; Heyden et al. 2015; Rose 2007; Rose, Munch-Madsen & Funch 2013; Srivastava, Das & Pattanayak 2018; Vafaei, Ahmed & Mather 2015).

5.3.4 Sample

The initial sample comprised 1210 SME organisations listed on the ASX. Of these, 212 SMEs were excluded because they had incorporated on or after 2014 and were not considered because the data collected for this study relate to the time between 2014 and 2018. Only those listed firms for which a complete data set on dependent and independent variables could be constructed for this study period are included here. This reduces the

number of organisations, and thus 798 SMEs with complete data sets were selected for this research as shown in Figure 5.1 below.

Figure 5.1 Sample Frame



These organisations in this study represent nine global industry classification standard industry groups. The industry groups of the included firms are energy (10%), materials (40%), industrial (6%), consumer (7%), healthcare (11%), financials (10%), information technology (11%), communication services (3%) and utilities (2%).

We have winsorised to restrict certain variables (dependent variables and leverage) at percentiles specified by option cuts (5%, 95%). Winsorising is not equivalent to simply excluding data, which is a simpler procedure known as trimming or truncation. In a trimmed estimator, the extreme values are discarded; in a winsorised estimator, the extreme values are instead replaced by certain percentiles, specified by option cuts (5%, 95%). The values at the tails of the distribution are not removed but are recoded to fewer extreme values. In this study, 5% of the lowest values are recoded to the value of the 5th percentile and the 5% of the highest values are recoded to the value of the 95th percentile. It may be noted that only winsorising works as a data transformation procedure—it changes the values of a variable (by default creating a new variable which is added to the dataset), on which we may work thereafter.

5.3.5 Analysis

In the next chapter, baseline variables are presented sub grouped by gender diversity and by sector type. Next, we display a change in performance over the five years using line plots and standard errors for each year, sub grouped by gender diversity. This is repeated by types of sectors to explore the change in performance for each sector.

5.3.5.1 Summary of Longitudinal Data

Sample means, standard deviations, and variances of the response variable on each occasion (year) are calculated. Beyond the summary statistics at each time point, the correlation or covariance between the time points is assessed. Because these are repeated measures on firms, the correlation between time points was expected to be positive. The correlation between the first time point (years 2014) and itself is equal to '1', and this holds for any time point and itself. Further, the covariance between measurements was calculated.

5.3.5.2 Reshaping the Data

By converting to a long format, four observations per company are created, one for each of the repeated measurements. An index variable, 'time', was created to distinguish the repeated measures from each other. Finally, as performance was not included, the outcomes are just repeated for each of the four time points. The indices for 'firms' and 'time' are then specified. The longitudinal nature of each performance measure over time is displayed using the means (and SE of means) for each performance level at the four occasions.

5.3.5.3 Modelling the Association Between Gender Diversity and Firm Performance

The univariate association between gender diversity and performance is explored using a linear mixed model. These are a generalisation of linear regression allowing for the inclusion of random deviations (effects) other than those associated with the overall error term. Mixed models are characterised as containing both fixed and random effects. The fixed effects are analogous to standard regression coefficients and are estimated directly. The random effects are not directly estimated but are summarised according to their estimated variances and covariance. Random effects may take the form of either random intercepts or random coefficients, and the grouping structure of the data may consist of

multiple levels of nested groups. As such, mixed models are also known in the literature as multi-level models and hierarchical linear models. The overall error distribution of the linear mixed model is assumed to be Gaussian, and heteroscedasticity and correlations within lowest level groups also may be modelled.

The key to fitting mixed models lies in estimating the variance components, and for doing this many methods are available. The most popular methods, however, are ML and restricted maximum likelihood (REML). This research uses REML. The basic idea behind REML is that a set of linear contrasts of the response can be formed that does not depend on the fixed effects, β, but instead depends only on the variance components to be estimated.

The first analyses undertaken are a 2-level model because a 1-level linear model, by convention, is just a standard OLS regression. The longitudinal dataset includes performance measurements of SMEs over five successive years. SMEs are identified by the variable ID.

Because this study's interest is not really in these companies per se, they are instead treated as a random sample from a larger population. The between-firm variability is modelled as a random effect or, as a random-intercept term at the firm level. The model employed for the analysis is as follows:

$$\text{Performance}_{ij} = \beta_0 + \beta_1 GD_{ij} + u_j + \varrho_{ij} \quad (3)$$

For i = 1, . . . , 5 years and j = 1, . . . SMEs. The fixed portion of the model, $\beta_0 + \beta_1 GD_{ij}$, simply states that one overall regression line represents the population average. The random effect, u_j, serves to shift this regression line up or down according to each firm and ϱ_{ij} is the error term. A covariance structure is not specified for the random affected, and the default independent structure is assumed.

The above methodology was repeated to assess the association between gender diversity and R&D and between R&D and performance:

$$RD_{ij} = \beta_0 + \beta_1 GD_{ij} + u_j + \varrho_{ij} \quad (4)$$

$$\text{Performance}_{ij} = \beta_0 + \beta_1 RD_{ij} + u_j + \varrho_{ij} \quad (5)$$

Having established that R&D is a potential moderator in the association between gender diversity and performance, a mixed effects analysis was undertaken and adjusted for the association between gender diversity and performance

5.4 Data Analysis

5.4.1 Adjusted Mixed Effects Model

Following a univariate association of gender diversity on firm performance and establishing that R&D could be a potential moderator in the association between gender diversity and performance, this thesis proceeds to determine the independent association between gender diversity and performance when adjusted for potential confounding variables, as listed in Chapter 4.

For this analysis, the following models are attempted for fit:

$$\text{Performance Measure} = \beta_0 + \beta 1.\text{Gender Diversity} + \beta 2.\text{Board Size} + \beta 3.\ \text{Firm Size} + \beta 4.\text{Firm Age} + \beta 5.\text{Leverage} + \beta 6.\ \text{R\&D Investment} + u_j + \varrho_{ij} \quad (6)$$

Where β_x denotes coefficient of the variables, β_0 is the constant term.

The model was repeated for all four outcome measures:

$$\text{ROA} = \beta_0 + \beta 1.\text{Gender Diversity} + \beta 2.\text{Board Size} + \beta 3.\ \text{Firm Size} + \beta 4.\text{Firm Age} + \beta 5.\text{Leverage} + \beta 6.\ \text{R\&D Investment} + u_j + \varrho_{ij} \quad (7)$$

$$\text{ROE} = \beta_0 + \beta 1.\text{Gender Diversity} + \beta 2.\text{Board Size} + \beta 3.\ \text{Firm Size} + \beta 4.\text{Firm Age} + \beta 5.\text{Leverage} + \beta 6.\ \text{R\&D Investment} + u_j + \varrho_{ij} \quad (8)$$

$$\text{ROCE} = \beta_0 + \beta 1.\text{Gender Diversity} + \beta 2.\text{Board Size} + \beta 3.\ \text{Firm Size} + \beta 4.\text{Firm Age} + \beta 5.\text{Leverage} + \beta 6.\ \text{R\&D Investment} + u_j + \varrho_{ij} \quad (9)$$

$$\text{TQ} = \beta_0 + \beta 1.\text{Gender Diversity} + \beta 2.\text{Board Size} + \beta 3.\ \text{Firm Size} + \beta 4.\text{Firm Age} + \beta 5.\text{Leverage} + \beta 6.\ \text{R\&D Investment} + u_j + \varrho_{ij} \quad (10)$$

The effect of the interaction term to test the moderation effect is repeated for all outcomes as above.

$$\text{Performance} = \beta_0 + \beta 1.\text{Gender Diversity} + \beta 2.\text{Board Size} + \beta 3.\ \text{Firm Size} + \beta 4.\text{Firm Age} + \beta 5.\text{Leverage} + \beta 6.\ \text{R\&D Investment} + \beta 7.\ \text{Gender Diversity} * \text{R\&D Investment} + u_j + \varrho_{ij} \quad (11)$$

5.4.2 Post-estimation Assessment

Following fitting the models, the following post-estimation tools were used to determine the model's robustness:

1. summary of the composition of the nested groups
2. display of the estimated random-effects covariance matrix (or matrices)
3. estimation of variance inflation factors.

The composition included nested group reports, number of groups and minimum, average and maximum group sizes for each level of the model. Model levels are identified by the corresponding group variable in the data. Because groups are treated as nested, the information in this summary may differ from each group variable when tabulated individually.

The covariance matrix displays the estimated variance–covariance matrix of the random effects for each level in the model. Random effects can be either random intercepts, in which case the corresponding rows and columns of the matrix are labelled as 'cons', or random coefficients, in which case the label is the name of the associated variable in the data.

When there is a perfect linear relationship among the predictors, the estimates for the model cannot be uniquely computed. The term collinearity implies that two variables are near-perfect linear combinations of one another. When more than two variables are involved, this is often called multicollinearity, although the two terms are often used interchangeably. The primary concern is that as the degree of multicollinearity increases, the model estimates of the coefficients become unstable and the standard errors for the coefficients can become wildly inflated. Here multicollinearity was checked using a variance inflation factor (VIF). A variable with a VIF value greater than 10 should be investigated further, as a rule of thumb. Many studies employ tolerance, which is defined as 1/VIF, to determine the degree of collinearity. A VIF of 10 is comparable to a tolerance

value of less than 0.1. It suggests the variable can be thought of as a linear combination of other independent variables.

5.5 Study Scope

The attributes (age, education, and tenure) of board members are not fully available for SMEs because of non-available disclosed data. As such, given the limitation of the data, it was not possible to calculate composite GDI. Hence, Gender Diversity in this thesis refers to the presence of a female director on the board. Gender diversity is a binary variable. The numerical value of Gender diversity in the models measures the propensity of the presence of a female director on the board.

Chapter 6: Results

6.1 Introduction

Chapter 5 discussed the methodology adopted by this thesis to address the research questions and to test the hypotheses developed from the conceptual framework.

Chapter 6 reports the results of the effect of gender diversity on the performance of ASX-listed SMEs in Australia. This study explored the analysis of all sectors of SME following the example of Sector specific studies in Australian industry carried out by different authors (Ali, Ng & Kulik 2014; Chapple & Humphrey 2014). Further tests were carried out to analyse how innovation may serve as a moderator for the relationship between innovation and firm performance.

Section 6.2 provides the results of the descriptive statistics of firms by industry and by gender diversity. Section 6.3 presents the results of univariate associations between gender diversity and the performance of all SMEs, followed by the association between gender diversity and innovation in Section 6.4 and the association between innovation and performance in Section 6.5. The adjusted (multivariable) association between gender diversity and performance, along with the post-estimation assessments of the performance models are summarised in Section 6.6. The data on the potential moderation effect of innovation on the relationship between gender diversity and firm performances are presented in Section 6.7. Univariable and multivariable associations of gender diversity and performance by industry are detailed in Section 6.8. The results of the univariable and multivariable analysis on the association between gender diversity and sector-wise performance outcomes are summarised in Section 6.9. Section 6.10 concludes with the results and findings that address the research questions.

6.2 Descriptive Statistics

Descriptive statistics illustrate the characteristic features of the quantitative data obtained during the data collection process to summarise the data in a meaningful way. Descriptive statistics are useful to describe the features of gender diversity in boardrooms and the performance of ASX-listed SME firms. Table 6.1 briefly summarises the variables, measures and data sources used in this study. The following sections present a summary

of the descriptive statistics of the sample firms, along with the descriptive statistics of the variables.

Table 6.1 Description of Variables, Measures and Data Sources

Sr. No	Variables	Type	Measures	Data Sources	Data Required
1	Financial Performances	Dependent	ROA, ROE, ROCE, and Tobin's Q	Orbis database. Annual reports of the sample firms cross-checked with ASX data	Balance sheet, income statement
2.	Gender diversity	Independent	Blau's index	Orbis database Annual Reports of the sample firms	Total number of female board members Total number of board members
3.	Firm Size	Control	Total Assets of the firms	Orbis database Annual Reports of the sample firms	Balance Sheet
4.	Board size	Control	Total number of board members	Orbis database Annual reports of sample firms	Total number of members, in the board of directors.
5.	Firm Age	Control	Number of years from the incorporation date	Orbis database and Annual Reports of the sample firms	Date of incorporation of the firm
6.	Leverage	Control	Ratio of total debt to total assets	Orbis database Annual reports of the sample firms	Balance sheet
7	Innovation	Potential Moderating	R&D expenditure	Orbis database and Annual Reports of the sample firms	Profit and loss account

6.2.1 Firm Categories

A selection of sample firms is provided in Figure 5.1. A complete data set for the variables required for this study for 2014 to 2018 is unavailable for 412 of the original 1210 ASX-listed SME firms. As such, data for the five years of interest for this study are considered for 798 SMEs, which is equivalent to 3990 firm-year data.

For this analysis, GDI is dichotomised. GDI with no female members on a board are defined as 'no gender diversity' and GDI with female members on the corporate board are defined as having 'gender diversity'. A summary of the dichotomised GDI per year

of the firms is listed in Table 6.2. The proportion of females in corporate boards increased from 16.67% in 2014 to 24.94% in 2018, as shown in Table 6.2. This clearly indicates that more than three-quarters of the listed SME companies do not have female directors at all.

Table 6.2 Dichotomised Yearly Distribution of Firms

Year	Firms with No Gender Diversity	Firms with Gender Diversity	No of Firms
2014	665 (83.33%)	133 (16.67%)	798
2015	661 (82.83%)	137 (17.17%)	798
2016	645 (80.83%)	153 (19.17%)	798
2017	622 (77.94%)	176 (22.06%)	798
2018	599 (75.06%)	199 (24.94%)	798
Total number of firm years	3192	798	3990

Table 6.3 displays the sector-wise distribution with the proportion of females in each sector. The materials sector has the maximum representation, with 39.8% SME firms, followed by health care and information technology, with 11.5 % and energy with 10.6 %. The representation of each of the remaining five sectors is less than 10%. The healthcare sector had a 31.74% presence of female board members, followed by the financial sector with 28.42%. Thus, gender diversity is highest in the health care sector and lowest in the utilities sector across this study period.

Table 6.3 Sector-wise Distribution of the Firms

Sector	Category	Total firm-years	No gender diversity	Gender diversity
1	Utilities	60 (1.50%)	54 (90%)	6 (10%)
2	Communication Services	115 (2.89%)	90 (78.26%)	25 (21.74%)
3	Consumers	270 (6.77%)	205 (75.92%)	65 (24.08%)
4	Energy	425 (10.65%)	340 (80%)	85 (20%)
5	Financials	380 (9.52%)	272 (71.58%)	108 (28.42%)
6	Health Care	460 (11.53%)	314 (68.26%)	146 (31.74%)
7	Industrials	230 (5.76%)	190 (82.60%)	40 (17.40)
8	Information Technology	460 (11.53%)	374 (81.30%)	86 (18.70%)
9	Materials	1590 (39.85%)	1353 (85.09%)	237 (14.91%)

6.2.2 Descriptive Statistics of the Variable

Table 6.4 provides the descriptive statistics for all variables used in this study. The overall average number of directors on boards is 4.14, and the average number varies to 4.84 when gender diversity is present, to 3.96 in a board with no gender diversity. This is lower than the reported average of 7.90 in top 500 ASX-listed companies in Australia (Vafaei, Ahmed & Mather 2015). Average firm size is found to be higher (USD 154.3 million) in a board with gender diversity than in for a board with no gender diversity (USD 30.8 million). Firms with female directors are larger and have larger boards. Average firm age for a board with gender diversity is found to 20.96 years, compared with 18.51 years in a firm with no gender diversity. Thus, firms with female board members are older than firms without women on the board. Average leverage for a firm with gender diversity is found to be 31.77 higher than for firms with no gender diversity, at 29.91. Average female members on a board with gender density is 1.18, with an overall average female member of 0.23. As a result, the average GDI is 0.36 and the overall figure is 0.07. The average R&D expenditure for a board with gender diversity is AUD 60.8 thousand, compared with AUD 52.7 thousand in a firm with no gender diversity. This indicates that a board with gender diversity spends more on R&D than a board with no gender diversity.

The average financial performance of the measurements for ROA, ROCE and ROE are negative in boards with or without gender diversity and positive overall when measured

as ROE and ROCE. The market-based performance measure Tobin's Q reveals a positive average value of 2.40 and 2.17 for boards with gender diversity and boards without gender diversity, which suggests that the market value of the firm is greater than the book value of the assets. Overall, although the average GDI is only 0.36 with an average 1.18 female members on a board, the results indicate that firms with female members on boards are older, larger, spend more on R&D and perform better.

Table 6.4 Variables

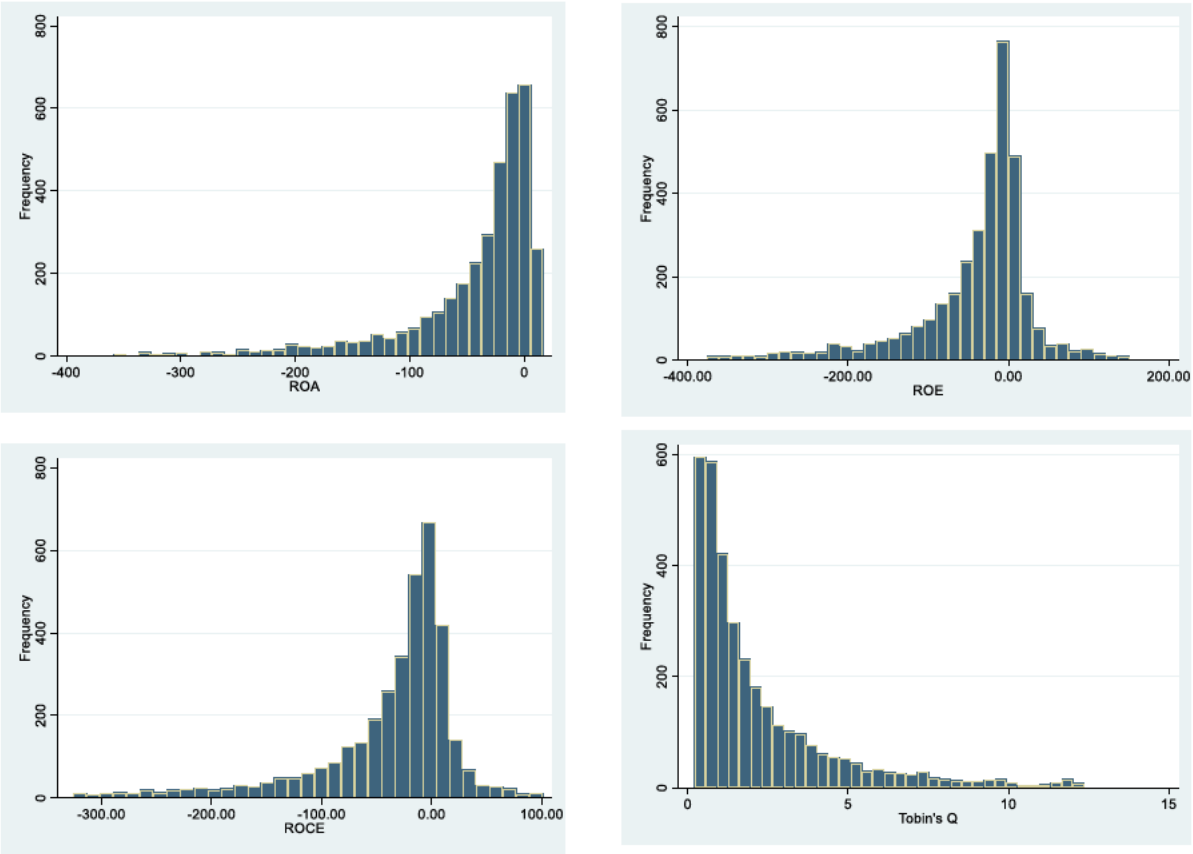
Variables		No gender diversity	Gender diversity	Overall
Board Size	Mean (SD) Median (IQR)	3.96 (1.06) 4.00 (3.00–5.00)	4.84 (1.41) 5.00 (4.00–6.00)	4.14 (1.19) 4.00 (3.00–5.00)
Firm Size (USD)	Mean (SD) Median (IQR)	30,811.05 (108,142.60) 7,369.50 (2,640–19,627.50)	154,299.10 (673,728.10) 14,016 (4,851–37,179)	55,508.65 (320,135.40) 8201.5 (2,976–23,906)
Firm Age (years)	Mean (SD) Median (IQR)	18.51 (13.76) 15.00 (10.00–25.00)	20.96 (15.56) 17.00 (11–28)	19.00 (14.17) 15 (10–26)
Leverage	Mean (SD) Median (IQR)	29.91 (29.81) 19.79 (7.16–43.01)	31.77 (30.45) 21.21 (9.80–43.33)	177.85 (5,173.73) 20.20 (6.78–46.97)
Male member	Mean (SD) Median (IQR)	3.96 (1.06) 4 (3–5)	3.65 (1.35) 4 (3–5)	3.90 (1.13) 4 (3–5)
Female member	Mean (SD) Median (IQR)	0.0 (0.00) 0.0 (0.00)	1.18 (0.43) 1 (1–1)	0.23 (0.51) 00 (00–00)
GDI	Mean (SD) Median (IQR)	0.0 (0.00) 0.00 (0.00)	0.36 (0.07) 0.38 (0.32–0.44)	0.07 (0.15) 0.00 (0.0–0.00)
R&D (AUD)	Mean (SD) Median (IQR)	52.67 (205.44) 0.00 (0.00)	60.78 (208.85) 0.00 (0.00)	54.21 (206.09) 0.00 (0.00)
ROA	Mean (SD) Median (IQR)	–44.62 (62.00) –21.43 (–59.60—5.75)	–36.05 (54.34) –18.00 (–49.20—2.61)	–116.89 (901.78) –20.61 (–63.62—3.53)
ROE	Mean (SD) Median (IQR)	–42.71 (77.32) –20.14 (–63.59—0.84)	–32.27 (67.85) –13.65 (–50.73–3.22)	172.43 (10605.04) –18.80 (–69.92–2.58)
ROCE	Mean (SD) Median (IQR)	–40.07 (66.94) –19.24 (–56.97– –1.45)	–30.86 (61.35) –13.03 (–44.68–2.66)	14.94 (3014.57) –17.63 (–63.52–1.73)
Tobin's Q	Mean (SD) Median (IQR)	2.17 (2.25) 1.32 (0.69–2.76)	2.40 (2.42) 1.44 (0.76–3.37)	4.20 (21.09) 1.34 (0.66–3.17)

SD = Standard Deviation; IQR = Inter Quartile Range

6.2.3 Outcome Variables

For this research, the outcome variables are four measures of firm performance. The distributions of these variables are illustrated in Figure 6.1.

Figure 6.1 Distribution of Outcome Variables

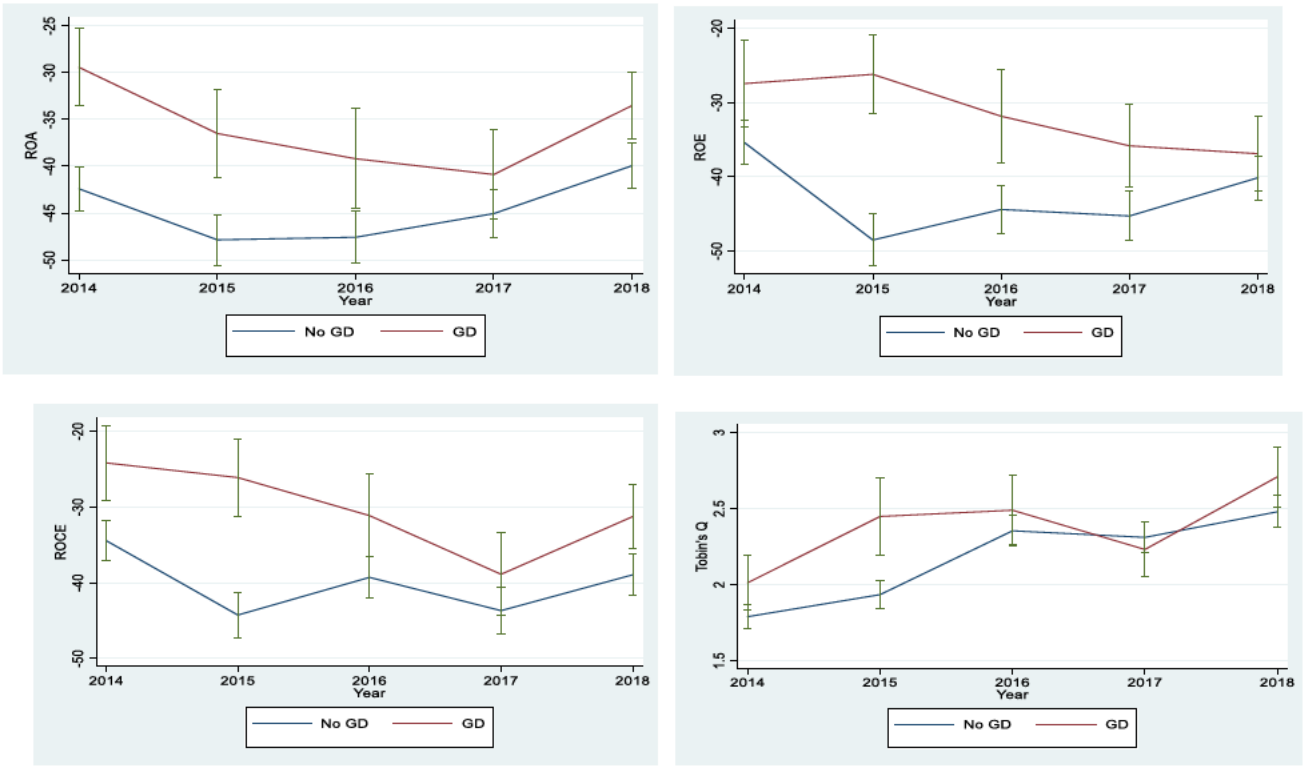


The descriptive data presented above is that available in the database and company websites. It is obvious that the data spread, as seen from the maximum and minimum values in the data collected across different variables, is wide. Thus, outliers could have inadvertently affected the association between exposure and outcome variables. The variations may be attributed to inaccuracy or errors in the reported data. Given the high standard deviation and presence of outliers in the data, in the econometric models some variables are winsorised at a 10% level (i.e., equalling outliers to data in the 5th and 95th percentiles) to attenuate the influence of outliers; this is consistent with previous authors (Ahmed, Hillier & Tanusasmita 2011; Capizzi 2015; Vafaei, Ahmed & Mather 2015).

6.2.4 Changes in Performance Between Gender Diversity and Return on Assets, Return on Equity, Return on Capital Employed and Tobin's Q

The pattern of change over time for each performance measure is sub grouped by firms with gender diversity (see Figure 6.2). For all four performance variables, outcomes appear lower in the absence of gender diversity. The following section describes the post-estimation assessment of data and tests the statistical significance of these differences.

Figure 6.2. Performance Sub grouped by Gender Diversity Over Time



6.2.5 Post-estimation Assessments Data

Normality of residuals and homogeneity of variance are important assumptions of the model. In addition, independence of predictors is important for validity of the model. If one or more of the predictors in the model are correlated, then the model may produce unstable parameter estimates with highly inflated standard errors, resulting in an overall significant model with no significant predictors. Multicollinearity occurs in a situation where one predictor variable in a model can be predicted from one or more of the other variables.

In assessing the models for multicollinearity, two methods are used. The first constructs a correlation matrix. In this matrix, if the correlations between predictors approach '1',

then multicollinearity is suspected to be a problem. In that case, one could make an educated guess about what predictors to retain in the analysis (based on biological significance, ease of measurement, etc.).

Another way to identify collinear predictors is by calculating a VIF for each predictor. The VIF represents the proportion of variance in one predictor explained by all the other predictors in the model. A VIF = 1 indicates no collinearity, whereas increasingly higher values suggest increasing multicollinearity. The approach used here calculates VIFs for each parameter in the model, and if they are larger than the cut-off of 2.0, the predictor with the largest VIF is sequentially dropped, recalculated, and repeated until all values are below the cut-off (suggested cut-off of 2). For the above four models, post-estimation assessments are presented below.

6.2.5.1 Correlation Matrices

The correlation matrices for the four models are illustrated below. The correlation matrix ROA, ROE, ROCE, and Tobin's Q for the model are presented in Tables 6.5, 6.6, 6.7 and 6.8 respectively. There was weak correlation between the variables, suggesting unlikely multicollinearity among them.

Table 6.5 Summary of Statistics and Correlation Matrix Return on Assets

Variables	Obs	Mean	Std Dev	Median	IQR	[1]	[2]	[3]	[4]	[5]	[6]
ROA	3,990	–16.89	901.78	–20.61	–63.62– –3.53						
[1] BS	3,990	4.14	1.19	4.00	3.00–5.00	1.00					
[2] FS	3,990	55,508.65	320,135.40	8201.50	2,976.00– 23,906.00	–0.21	1.00				
[3] FA	3,990	19.00	14.17	15.00	10.00– 26.00	–0.01	–0.21	1.00			
[4]R&D	3,990	54.21	206.09	0.00	0.00	–0.11	–0.01	–0.02	1.00		
[5]GD	3,990	0.07	0.15	0.00	0.00–0.00	–0.26	–0.11	–0.02	0.01	1.00	
[6] LEV	3,990	177.85	5173.73	20.20	6.78–46.97	–0.00	–0.26	–0.02	0.01	–0.03	1.00

Std Dev = Standard Deviation; IQR = Inter Quartile Range

Table 6.6 Summary of Statistics and Correlation Matrix Return on Equity

Variables	Obs	Mean	Std Dev	Median	IQR	[1]	[2]	[3]	[4]	[5]	[6]
ROE	3,990	172.43	10,605.04	–18.80	–69.92–2.58						
[1] BS	3,990	4.14	1.19	4.00	3.00–5.00	1.00					
[2] FS	3,990	55,508.65	320,135.40	8,201.50	2,976.00–23,906.00	–0.22	1.00				
[3] FA	3,990	19.00	14.17	15.00	10.00–26.00	–0.00	–0.27	1.00			
[4] R&D	3,990	54.21	206.09	0.00	0.00	–0.15	0.06	–0.02	1.00		
[5] GD	3,990	0.07	0.15	0.00	0.0–0.00	–0.27	–0.06	–0.02	0.01	1.00	
[6] LEV	3,990	177.85	5,173.73	20.20	6.78–46.97	–0.00	0.01	–0.03	0.01	–0.03	1.00

Std Dev = Standard Deviation; IQR = Inter Quartile Range

Table 6.7 Summary of Statistics and Correlation Matrix Return on Capital Employed

Variables	Obs	Mean	Std Dev	Median	IQR	[1]	[2]	[3]	[4]	[5]	[6]
ROCE	3,990	14.94	3014.57	–17.63	–63.52–1.73						
[1] BS	3,990	4.14	1.19	4.00	3.00–5.00	1.00					
[2] FS	3,990	55,508.65	32,0135.40	8,201.50	2,976.00–23,906.00	–0.21	1.00				
[3] FA	3,990	19.00	14.17	15	10.00–26.00	–0.01	–0.27	1.000			
[4] R&D	3,990	54.21	206.09	0.00	0.00	–0.10	0.05	–0.02	1.00		
[5] GD	3,990	0.07	0.15	0.00	0.0–0.00	–0.27	–0.06	–0.02	0.01	1.00	
[6] LEV	3,990	177.85	5173.73	20.20	6.78–46.97	–0.01	–0.01	–0.03	0.01	–0.03	1.00

Std Dev = Standard Deviation; IQR = Inter Quartile Range

Table 6.8 Summary of Statistics and Correlation Matrix Tobin's Q

Variables	Obs	Mean	Std Dev	Median	IQR	[1]	[2]	[3]	[4]	[5]	[6]
Tobin's Q	3,990	4.20	21.09	1.34	0.66–3.17						
[1] BS	3,990	4.14	1.19	4.00	3.00–5.00	1.00					
[2] FS	3,990	55,508.65	320,135.40	8,201.50	2,976–23,906	–0.93	1.00				
[3] FA	3,990	19.00	14.17	15.00	10–26	–0.02	–0.26	1.00			
[4] R&D	3,990	54.21	206.09	0.00	0.00–0.00	–0.06	0.04	–0.02	1.00		
[5] GD	3,990	0.07	0.15	0.00	0.00–0.00	–0.23	–0.07	–0.02	–0.00	1.00	
[6] LEV	3,990	177.85	5173.73	20.20	6.78–46.97	–0.03	0.01	–0.03	0.01	–0.00	1.00

Std Dev = Standard Deviation; IQR = Inter Quartile Range

6.2.5.2 Variance Inflation Factors

VIF identified for all predictors as around '1' indicates the absence of multicollinearity (see Table 6.9) in all the performance measures in this study. The absence of multicollinearity is confirmed by a mean VIF of 1.10 with individual VIFs ranging from 1.00 to 1.20 for ROA, and a mean VIF of 1.11 with individual VIFs ranging from 1.00 to 1.20 for ROE. For ROCE this is confirmed by a mean VIF of 1.12, with individual VIFs ranging from 1.00 to 1.22 and for Tobin's Q it is also confirmed as a mean VIF of 1.12, with individual VIFs ranging from 1.00 to 1.22. The VIF scores are well below the threshold value of 10.

Table 6.9 Variance Inflation Factors for Return on Assets, Return on Equity, Return on Capital Employed and Tobin's Q

Variable	**ROA**		**ROE**		**ROCE**		**Tobin's Q**	
	VIF	1/VIF	VIF	1/VIF	VIF	1/VIF	VIF	1/VIF
Board size	1.20	0.84	1.20	0.83	1.20	0.83	1.22	0.82
Firm size	1.19	0.84	1.20	0.83	1.20	0.83	1.22	0.82
Firm age	1.10	0.91	1.11	0.90	1.10	0.91	1.12	0.89
R&D	1.02	0.98	1.10	0.91	1.02	0.98	1.03	0.97
GDI	1.11	0.90	1.02	0.98	1.11	0.90	1.12	0.89
Leverage	1.00	0.99	1.00	0.99	1.00	0.99	1.00	0.99
Mean VIF	1.10		1.11		1.11		1.12	

6.2.5.3 Composition of the Nested Groups

Most data points are available in the nested groups, as detailed in Table 6.10. For each outcome measure, the number of SMEs included for analysis are listed as the number of groups with the average number of observations being over four for each SME (i.e. for most SMEs, data were analysed over 4 years).

Table 6.10 Summary of the Composition of the Nested Groups

Variables	No of Groups	Minimum Group size	Average Group Size	Maximum Group size
ROA	776	1	4.2	5
ROE	781	1	4.2	5
ROCE	779	1	4.2	5
Tobin's Q	759	1	4.1	5

6.3 Association Between Gender Diversity and Performance

Regression estimates of the association between board gender diversity and firm performance measures are based on the sample consisting of a panel of 3,990 firm-year observations for 2014 to 2018. The univariable association of gender diversity with all sectors combined, and with individual sectors, are detailed in the following sections.

6.3.1 Univariate Association of Gender Diversity with Performance

The univariate association of gender diversity with performance is shown in Table 611. A positive and statistically significant association exists between gender diversity and all the accounting-based measures (ROA, ROE, and ROCE) of firm performance. However, the association, when measured with stock-market-based Tobin's Q, is positive but not significant. Thus, in the absence of control variables, gender diversity significantly affects accounting-based measures of performance.

Table 6.11 Univariate Association between Gender Diversity and Outcome Measures (Return on Assets, Return on Equity, Return on Capital Employed and Tobin's Q)

Performance	Coeff (95% CI)	p-value
ROA	7.14 (1.37, 12.90)	0.015
ROE	9.16 (1.91, 16.4)	0.013
ROCE	8.78 (2.42, 15.14)	0.007
Tobin's Q	0.16 (–0.06, 0.39)	0.160

6.4 Association Between Gender Diversity and Research and Development

The univariate association of gender diversity with R&D is positive and not statistically significant. The multivariate association of gender diversity with R&D is positive but not significant. The results, as detailed in Table 6.12, cannot be excluded as a potential confounder. Thus, the statistically non-significant results partially support Hypothesis 2.

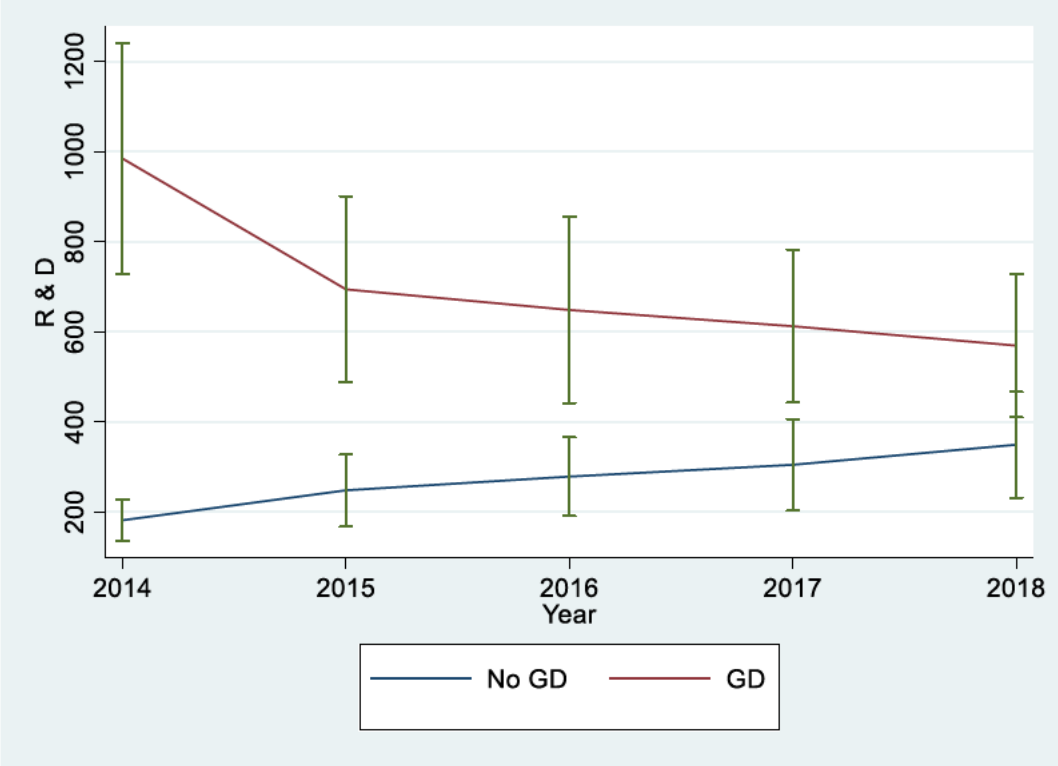
Table 6.12 Results of Regression Analyses for the Effect of Gender Diversity on Innovation

Variable	Univariate	Multivariate
Gender diversity	64.83 (46.82)	26.43 (54.14)
Board size		33.47 (17.25)
Firm size		0.00 (0.00)
Firm age		1.74 (4.15)
Leverage		0.26 (0.56)
Cons	298.92*** (57.03)	152.70 (115.66)
Wald Chi-sq	1.92	6.97
Adj R-sq	0.01	0.02
Overall F	21.16	16.67
No. of obs/grp size	3973/798	3565/785

Notes: Unstandardised coefficients are displayed in the tables (standard errors (s.e) in parentheses); *** p ≤ .001. ** p ≤ .01. * p ≤ .05 (two-tailed tests); univariate association Innovation, the coefficient for the Gender Diversity is 64.83 (s. e = 46.82); Multivariate association Innovation, the coefficient for the Gender Diversity is 26.43 (s. e = 54.14)

The change of R&D over time for the subgroups of firms with gender diversity and those without is illustrated in Figure 6.3.

Figure 6.3 Change of Research and Development Over Time



6.5 Associations Of Innovation (Research and Development) and Performance

The associations of innovation (R&D) and performance are not statistically significant, as detailed in Table 6.13. However, given a potential association of gender diversity with R&D, it is retained as a confounder in the multivariable model.

Table 6.13 Association of Innovation (Research and Development) and Performance

Performance	Coeff (95% CI)	p-value
ROA	0.00 (–0.001, 0.001)	0.860
ROE	0.00 (–0.002, 0.001)	0.360
ROCE	0.00 (–0.001, 0.001)	0.950
Tobin's Q	0.00 (–0.00, 0.001)	0.074

6.6 Adjusted (Multivariable) Associations of Gender Diversity and Financial Performance

The adjusted association of gender diversity, including control variables with each of the performance variables are detailed in Table 6.14. The adjusted association of gender diversity, including control variables with ROE show that gender diversity has a significant positive association with ROE (coeff 8.506 $p \leq .05$) and a positive association with all other measure of performance. Although the coefficients are positive in all the measures of performance, it is statistically significant only with ROE. Thus, the results suggest that Hypothesis 1 is partially supported. Firm age is positively associated with all the performance measures. Board size is positively associated with all the accounting-based measures of performance (ROA, ROE, and ROCE) but is negatively associated with Tobin's Q. Leverage has a significant negative effect on all the performance measures except Tobin's Q. The negative correlation is consistent with the findings from other authors, suggesting that firms with high leverage tend to have a poor financial performance (Noamene et al. 2021). There is no significant association with gender diversity after adjusting for the potential confounders. Overall, the positive association between firm performance and gender diversity is consistent with the theoretical expectation supporting resource dependence, agency, and human capital perspectives.

Table 6.14 Results of Regression Analyses for the Effect of Gender Diversity on Financial Performances

Variable	ROA	ROE	ROCE	Tobin's Q
Gender diversity	3.57 (3.01)	8.51 * (4.01)	6.55 (3.47)	0.19 (0.12)
Board size	1.94 (3.00)	1.91 (1.38)	1.97 (1.19)	–0.05 (0.04)
Firm size	0.00*** (0.00)	0.00 ** (0.00)	0.00** (0.00)	0.00** (0.00)
Firm age	0.18 (0.11)	0.28* (0.14)	0.24 (0.13)	0.01 (0.01)
R&D	0.00 (0.00)	–0.00 (0.00)	–0.00 (0.00)	0.00 (0.00)
Leverage	–0.39*** (0.04)	–0.48*** (0.06)	–0.46*** (0.05)	0.01*** (0.00)
Cons	–43.28*** (4.90)	–50.43*** (6.54)	–45.78*** (5.70)	1.98*** (0.19)
Wald Chi-sq	142.64	87.65	110.45	57.81
Adj R-sq	0.04	0.025	0.03	0.02
Overall F	22.67	15.20	15.35	8.79
No. of obs/grp size	3285/776	3249/781	3281/779	3109/759

Notes: Unstandardised coefficients are displayed in the tables (standard errors (s.e) in parentheses); *** p ≤ .001. ** p ≤ .01. * p ≤ .05 (two-tailed tests); a. Controlling for all variables as in ROA, the coefficient for the Gender Diversity is 3.57 (s. e = 3.01); b. Controlling for all variables as in ROE, the coefficient for the Gender Diversity is 8.51 (s.e = 4.01) shows a significant impact (p < .05) on performance; c. Controlling for all variables as in ROCE, the coefficient for the Gender Diversity is 6.55 (s.e = 3.47); d. Controlling for all variables as in Tobin's Q, the coefficient for the Gender Diversity is 0.19 (s.e = 0.12)

6.7 Potential Effect Modification by R&D

Section 5.2.9 identified R&D as a potential confounder. The potential for R&D to be an effect modifier is explored below. No significant association was found of the interaction term (GD*R&D), including control variables with all the measures of performance, as detailed in Table 6.15. However, the effect of gender diversity and firm age is positive but not significant on the performance measures, which is consistent with earlier results (see Table 6.14). Thus, the results partially support Hypothesis 3.

Table 6.15 Results of Regression Analyses for the Effect of GD*R&D on Financial Performances

Variable	ROA	ROE	ROCE	Tobin's Q
GD*R&D	–0.00	–0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)
GD	3.73	8.60*	6.55	0.15
	(3.08)	(4.11)	(3.56)	(0.12)
Board size	1.93	1.91	1.97	–0.52
	(1.04)	(1.39)	(1.19)	(0.04)
Firm size	0.00***	0.00**	0.00**	0.00**
	(0.00)	(0.00)	(0.00)	(0.00)
Firm age	0.18	0.28*	0.24	0.00
	(0.11)	(0.14)	(0.13)	(0.00)
R&D	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)
Leverage	–0.39***	–0.48***	–0.46	0.01***
	(0.37)	(0.06)	(0.05)	(0.00)
Cons	–43.27***	–50.43***	–45.78***	1.99***
	(4.90)	(6.54)	(5.70)	(0.19)
Wald Chi-Sq	142.66	87.65	110.43	59.84
Adj R-Sq	0.04	0.03	0.03	0.02
Overall F	19.43	13.02	13.17	8.37
No. Of Obs/Grp Size	3285/776	3249/781	3281/779	3109/759

Notes: Unstandardised coefficients are displayed in the tables (standard errors (s.e) in parentheses); *** p ≤ .001. ** p ≤ .01. * p ≤ .05 (two-tailed tests); a. Controlling for all variables as in ROA, the coefficient for the interaction of Gender Diversity and R&D is insignificant; b. Controlling for all variables as in ROE, the coefficient for the interaction of Gender Diversity and R&D is insignificant; c. Controlling for all variables as in ROCE, the coefficient for the interaction of Gender Diversity and R&D is insignificant; d. Controlling for all variables as in Tobin's Q, the coefficient for the interaction of Gender Diversity and R&D is insignificant.

6.8 Sector-wise Descriptive Data and Associations of Gender Diversity and Performance

6.8.1 Communication Services Sector

The number of firms in the communications sector is 2.8% of the total ASX-listed SMEs, with gender diversity present in only 22% of the firms (see Table 6.2). The mean value of board size was 4.22. The average female number in this sector was 1.2, which is consistent with the sectors overall, but the critical mass (with at least three female board members) was not found in any year in this sector. Average GDI in this sector is 0.37, which is similar to the overall GDI of all the combined SME sectors. Other than Tobin's Q, the mean value of firm performance measured as ROA, ROE and ROCE was negative, which is in line with the overall combined SME sectors. The descriptive statistics for the communication services sector are shown in Table 6.16.

Table 6.16 Descriptive data of Communication Services Sector

Variables	Mean (SD) Median (IQR)	No gender diversity	Gender diversity	Overall
Board size	Mean (SD) Median (IQR)	4.10 (1.10) 4.00 (3.00–5.00)	4.64 (1.15) 5.00 (4.00–5.00)	4.22 (1.13) 4.00 (3.00–5.00)
Firm size (USD)	Mean (SD) Median (IQR)	10,730.73 (15,507.78) 4,448.50 (1,740.00–13,545.00)	14,047.92 (12,972.43) 9,543.00 (3,872.00–24,288.00)	11,451.86 (15,002.29) 4,846.00 (1,799.00–16,251)
Firm age (years)	Mean (SD) Median (IQR)	21.61 (14.12) 21.00 (9.00–31.00)	19.20 (12.05) 18.00 (14.00–30.00)	21.08 (13.68) 20.00 (9.00–31.00)
Leverage	Mean (SD) Median (IQR)	30.76 (26.77) 23.28 (10.92–42.61)	34.26 (32.31) 25.62 (15.81–37.95)	31.56 (28.00) 23.75 (12.03–41.36)
Male members	Mean (SD) Median (IQR)	4.10 (1.10) 4.00 (3.0–5.00)	3.44 (1.29) 3.00 (2.00–4.00)	3.95 (1.17) 4.00 (3.00–5.00)
Female members	Mean (SD) Median (IQR)	0.00 (0.00) 0.00 (0.00–0.00)	1.20 (0.41) 1.00 (1.00–1.00)	0.26 (0.53) 0.00 (0.00–0.00)
GDI	Mean (SD) Median (IQR)	0.00 (0.00) 0.00 (0.00–0.00)	0.37 (0.08) 0.37 (0.32–0.44)	0.08 (0.16) 0.00 (0.00–0.00)
R&D (AUD)	Mean (SD) Median (IQR)	2.04 (13.65) 0.00 (0.00–0.00)	67.87 (193.96) 0.00 (0.00–0.00)	15.56 (91.20) 0.00 (0.00–0.00)
ROA	Mean (SD) Median (IQR)	–61.58 (77.07) –37.60 (– 96.58—2.42)	–49.44 (77.89) –5.24 (–98.29–4.61)	–9.02 (76.99) –28.23 (–96.58–0.72)
ROE	Mean (SD) Median (IQR)	–61.44 (101.68) –17.80 (–94.47–6.77)	–40.85 (98.55) 1.38 (–32.90–8.43)	–57.28 (100.89) –13.34 (–89.29–7.85)
ROCE	Mean (SD) Median (IQR)	–60.39 (91.01) –19.04 (–94.12–7.09)	–24.07 (69.70) 5.46 (–29.10–8.66)	–53.20 (88.07) –13.84 (–79.20–7.41)

Variables	Mean (SD) Median (IQR)	No gender diversity	Gender diversity	Overall
Tobin's Q	Mean (SD)	1.85 (1.71)	2.07 (2.13)	1.90 (1.81)
	Median (IQR)	1.23 (0.68–2.67)	1.00 (0.83–2.57)	1.21 (0.70–2.64)

SD = Standard Deviation; IQR = Inter Quartile Range

6.8.1.1 Univariate Association of Gender Diversity with Performances in Communication Services Sector

In the subgroup of companies from the communications sector, there is a significant and positive association of gender diversity with ROCE and Tobin's Q only. Associations of gender diversity with ROA and ROE are not significant, as detailed in Table 6.17. These results are not consistent with combined results of the SME sectors as listed in Table 6.11.

Table 6.17 Univariate Associations of Gender Diversity and Performance in Communication Services Sector

Performance	Coeff (95% CI)	p-value
ROA	–11.05 (–48.94, 26.84)	0.568
ROE	14.47 (–22.46, 51.39)	0.442
ROCE	39.98 (0.85, 79.11)	0.045
Tobin's Q	1.00 (0.15, 1.85)	0.021

6.8.1.2 Adjusted (Multivariable) Association of GD with Performances in Communication Services Sector

In the communication services sector, the adjusted association of gender diversity, including control variables, shows that gender diversity has no significant association with any of the measures of performance as detailed in Table 6.18. Thus, the results suggest that Hypothesis 1 is not supported. However, association of gender diversity with all the performance measures are positive except ROCE, which partially supports the theoretical predications. Board size is significantly associated with ROE and ROCE. R&D and leverages are negatively associated with all the performance measures except ROCE.

Table 6.18 Results of Regression Analyses for the Effect of Gender Diversity on Financial Performances in Communication Services Sector

Variable	ROA	ROE	ROCE	Tobin's Q
Gender diversity	8.12 (18.80)	–0.18 (8.97)	9.39 (17.21)	0.60 (0.44)
Board size	8.17 (6.80)	25.06*** (3.14)	26.06*** (4.93)	–0.05 (0.14)
Firm size	0.00*** (0.00)	0.00** (0.00)	0.00 (0.00)	–0.00 (0.00)
Firm age	0.67 (0.65)	1.35 (1.00)	1.69 (1.00)	–0.01 (0.02)
R&D	–0.02 (0.02)	–0.03* (0.01)	–0.02 (0.01)	–0.00 (0.00)
Leverage	–0.85** (0.32)	–1.83*** (0.17)	1.60*** (0.28)	–0.02** (0.01)
Cons	–121.03*** (31.39)	–169.55*** (29.01)	–182.97*** (32.24)	2.66*** (0.68)
Wald Chi-sq	27.83	326.54	126.62	9.66
Adj R-sq	0.20	0.18	0.16	0.08
Overall F	4.79	4.16	3.79	2.17
No. of obs/grp size	90/22	89/22	88/22	85/21

Notes: Unstandardised coefficients are displayed in the tables (standard errors (s.e) in parentheses); ∗∗∗ p ≤ .001. ∗∗ p ≤ .01. ∗ p ≤ .05 (two-tailed tests); a. Controlling for all variables as in ROA, the coefficient for the Gender Diversity is 8.12 (s. e = 18.80); b. Controlling for all variables as in ROE, the coefficient for the Gender Diversity is −0.18(s.e = 8.966); c. Controlling for all variables as in ROCE, the coefficient for the Gender Diversity is 9.39 (s.e = 17.21); d. Controlling for all variables as in Tobin's Q, the coefficient for the Gender Diversity is 0.60 (s.e. = 0.44)

6.8.2 Consumer Sector

The number of firms in the consumers sector, which includes consumer staples and consumer discretionary, is 6.8% of the total ASX-listed SMEs, with gender diversity is present in only 24% of the firms (see Table 6.2). The mean value of board size is 3.90. The average female number is 1.07 compared with 3.24 male members and boards with a critical mass number of at least three female board members are found only in two years of this study. The average firm performances measured as ROA, ROE and ROCE are negative, whereas Tobin's Q is positive, which is consistent with overall results of combined SME sectors. Average GDI in this sector is 0.37, which is similar to the overall

GDI of all the combined SME sectors. The descriptive statistics for the consumer sector are shown in Table 6.19.

Table 6.19 Descriptive Data of Consumers Sector

Variables	Mean (SD) Median (IQR)	No gender diversity	Gender diversity	Overall
Board size	Mean (SD) Median (IQR)	3.77(1.06) 4.00 (3.00–4.00)	4.32 (1.00) 4.00 (4.00–5.00)	3.90 (1.07) 4.00 (3.00–5.00)
Firm size (USD)	Mean (SD) Median (IQR)	25,949.46 (59,045.09) 10,107.00 (3,732.00–31,944.00)	43,460.80 (53,604.66) 25,741.00 (12,119.00–42,776.00)	30,165.16 (58,170.52) 12,383.00 (4,798.00–33,191.00)
Firm age (years)	Mean (SD) Median (IQR)	18.95 (1.69) 17.00 (11.00–26.00)	17.75 (11.09) 13.00 (11.00–22.00)	18.66 (11.54) 16.00 (11.00–25.00)
Leverage	Mean (SD) Median (IQR)	40.72 (26.91) 36.09 (20.68–54.87)	40.70 (35.96) 29.54 (16.36–52.43)	40.71 (29.22) 34.83 (19.12–54.31)
Male members	Mean (SD) Median (IQR)	3.77 (1.06) 4.00 (3.00–4.00)	3.24 (1.01) 3.00 (2.00–4.00)	3.64 (1.07) 3.00 (3.00–4.00)
Female members	Mean (SD) Median (IQR)	0.00 (0.00) 0.00 (0.00–0.00)	1.07 (0.37) 1.00 (1.00–1.00)	0.26 (0.49) 0.00 (0.00–0.00)
GDI	Mean (SD) Median (IQR)	0.00 (0.00) 0.00 (0.00–0.00)	0.37 (0.60) 0.37 (0.32–0.44)	0.09 (0.16) 0.00 (0.00–0.00)
R&D (AUD)	Mean (SD) Median (IQR)	82.49 (265.29) 0.00 (0.00–0.00)	18.98 (108.49) 0.00 (0.00–0.00)	67.85 (239.77) 0.00 (0.00–0.00)
ROA	Mean (SD) Median (IQR)	–40.33 (69.88) –14.86 (–48.46–2.78)	–23.08 (30.38) – 16.91(– 39.83– –1.47)	–36.06 (62.84) – 15.12(– 43.07–1.88)
ROE	Mean (SD) Median (IQR)	–36.96 (88.09) – 5.87 (– 55.80– 703)	–14.33 (54.16) –6.00 (–34.38–8.95)	–31.33 (81.47) –6.00 (–50.65–7.07)
ROCE	Mean (SD) Median (IQR)	–32.83 (68.42) –5.91 (–54.75–6.45)	–20.99 (40.22) –10.45 (–41.60–1.89)	–29.85 (62.68) –7.60 (–49.63–6.11)
Tobin's Q	Mean (SD) Median (IQR)	1.69 (1.74) 1.19 (0.65–2.01)	1.66 (1.94) 0.84 (0.45–1.74)	1.69 (1.78) 1.13 (0.62–2.01)

SD = Standard Deviation; IQR = Inter Quartile Range

6.8.2.1 Univariate Associations of Gender Diversity and Performances in Consumer Sector

In the subgroup of companies from the consumer sector, there is a significant association of gender diversity with ROA, as listed in Table 6.20. Positive associations are found with all other measures of performance, which supports the theoretical model.

Table 6.20 Univariate Associations of Gender Diversity and Performance in Consumer Sector

Performance	Coeff (95% CI)	p-value
ROA	27.47 (11.93, 43.00)	0.001
ROE	16.74 (–6.24, 39.73)	0.153
ROCE	15.46 (–1.69, 32.60)	0.077
Tobin's Q	0.04 (–0.58, 0.66)	0.904

6.8.2.2 Adjusted (Multivariable) Association of Gender Diversity with Performances in Consumer Sector

In the consumer sector, the adjusted association of gender diversity, including control variables, shows that gender diversity has a significant association with ROA (coeff 21.38 $p \leq .05$) and ROE (Coeff 24.32 $p \leq .05$), as detailed in Table 6.21. Thus, the results suggest that Hypothesis 1 is partially supported. Associations of gender diversity are positive with ROCE and negative with Tobin's Q, as detailed in Table 6.21. Leverage has a significant negative association with ROA and ROCE and firm age has a positive association with all the measures of performance.

Table 6.21 Results of Regression Analyses for the Effect of Gender Diversity on Financial Performances in Consumer Sector

Variable	ROA	ROE	ROCE	Tobin's Q
Gender Diversity	21.38*	24.32*	9.56	–0.02
	(8.39)	(11.37)	(9.55)	(0.33)
Board Size	1.75	–1.42	–2.96	0.26*
	(3.35)	(5.12)	(3.86)	(0.13)
Firm Size	0.00	0.00	0.00*	0.00**
	(0.00)	(0.00)	(0.00)	(0.00)
Firm Age	0.28	0.75	0.39	0.01
	(0.41)	(0.58)	(0.52)	(0.01)
R&D	–0.01*	–0.03***	–0.02*	0.00007
	(0.01)	(0.01)	(0.01)	(0.00)
Leverage	–0.29**	0.13	–0.59***	–0.00
	(0.11)	(0.19)	(0.15)	(0.00)
Cons	–35.77*	–51.66*	–13.09	0.71
	(15.22)	(22.12)	(17.73)	(0.53)
Wald Chi-sq	30.18	21.58	32.13	12.02
Adj R-sq	0.11	0.09	0.10	0.02
Overall F	5.70	4.82	5.38	1.74
No. of obs/grp size	236/53	233/54	233/53	214/50

Notes: Unstandardised coefficients are displayed in the tables (standard errors (s.e) in parentheses); *** p ≤ .001. ** p ≤ .01. * p ≤ .05 (two-tailed tests); a. Controlling for all variables as in ROA, the coefficient for the Gender Diversity is 21.38 (s. e = 11.37) shows a significant impact (p < .05) on performance; b. Controlling for all variables as in ROE, the coefficient for the Gender Diversity is 24.32 (s.e = 4.01) shows a significant impact (p < .05) on performance; c. Controlling for all variables as in ROCE, the coefficient for the Gender Diversity is 9.56 (s.e = 9.55); d. Controlling for all variables as in Tobin's Q, the coefficient for the Gender Diversity is −0.02 (s.e. = 0.33)

6.8.3 Energy Sector

The number of firms in the energy sector is 10.6% of the total ASX-listed SMEs, with gender diversity present in only 20% of the firms, as shown in Table 6.2. The mean value of board size is 4.39. The average female number is 1.19 compared with 3.92 male

members on a board with gender diversity, and boards with a critical mass number of at least three female board members were found in one year of this study. Other than Tobin's Q, the average firm performances measured as ROA, ROE and ROCE are negative, which is consistent with the overall combined results of SME sectors. Average GDI in this sector is 0.37, which is similar to the overall GDI of all the combined SME sectors. The descriptive statistics for the energy sector are shown in Table 6.22.

Table 6.22 Descriptive Data of Energy Sector

Variables	Mean (SD) Median (IQR)	No gender diversity	Gender diversity	Overall
Board Size	Mean (SD)	4.21 (1.20)	5.10 (1.53)	4.39 (1.32)
	Median (IQR)	4.00 (3.00–5.00)	5.00 (4.00–6.00)	4.00 (3.00–5.00)
Firm Size (USD)	Mean (SD)	39,329.31 (121,069.40)	312,775.60 (1,012,854.00)	94,018.58 (476,393.00)
	Median (IQR)	10,664.50 (3,504.00–37,846.50)	38,164.00 (9,453.00–85,658.00)	12,654.00 (4,318.00–43,983.00)
Firm Age (years)	Mean (SD)	18.57 (11.39)	23.95 (17.80)	19.65 (13.09)
	Median (IQR)	15.00 (11.00–25.50)	22.00 (12.00–31.00)	16.00 (11.00–27.00)
Leverage	Mean (SD)	28.27 (31.62)	25.88 (20.13)	27.83 (29.84)
	Median (IQR)	14.87 (5.60–39.63)	21.83 (13.02–35.43)	16.87 (6.15–38.96)
Male member	Mean (SD)	4.21 (1.20)	3.92 (1.35)	4.15 (1.24)
	Median (IQR)	4.00 (3.00–5.00)	4.00 (3.00–5.00)	4.00 (3.00–5.00)
Female member	Mean (SD)	0.00 (0.00)	1.19 (0.42)	0.24 (0.51)
	Median (IQR)	0.00 (0.00–0.00)	1.00 (1.00–1.00)	0.00 (0.00–0.00)
GDI	Mean (SD)	0.00 (0.00)	0.36 (0.07)	0.07 (0.15)
	Median (IQR)	0.00 (0.00–0.00)	0.37 (0.32–0.44)	0.00 (0.00–0.00)
R&D (AUD)	Mean (SD)	15.92 (105.33)	0.00 (0.00)	12.73 (94.37)
	Median (IQR)	0.00 (0.00–0.00)	0.00 (0.00–0.00)	0.00 (0.00–0.00)
ROA	Mean (SD)	–46.00 (65.17)	–29.77 (50.14)	–42.61 (62.63)
	Median (IQR)	–21.84 (–53.96– –7.02)	–8.32 (–32.43– –4.16)	–19.62 (–50.87– –6.16)
ROE	Mean (SD)	–44.98 (77.53)	–34.24 (58.09)	–42.70 (73.90)
	Median (IQR)	–22.42 (–61.48– –22.42)	–9.68 (–37.57– –4.30)	–19.58 (–59.40– –5.33)
ROCE	Mean (SD)	–40.31 (65.73)	–28.06 (50.78)	–37.70 (62.98)
	Median (IQR)	–17.32 (–49.31– –6.00)	–7.99 (–27.96– –3.57)	–15.52 (–44.57– –5.12)
Tobin's Q	Mean (SD)	1.62 (1.97)	1.45 (1.08)	1.59 (1.83)
	Median (IQR)	0.83 (0.50–1.69)	1.36 (0.66–1.84)	0.88 (0.53–1.70)

SD = Standard Deviation; IQR = Inter Quartile Range

6.8.3.1 Univariate Association of Gender Diversity with Performances in Energy Sector

In the subgroup of companies from the energy sector, there is a positive but not significant association of gender diversity with all the performance measures, as listed in Table 6.23.

This result supports the positive effect of gender diversity but is not consistent with the results of the overall combined sectors.

Table 6.23 Univariate Associations of Gender Diversity and Performance in Energy Sector

Performance	Coeff (95% CI)	p-value
ROA	15.49 (–1.43, 32.42)	0.073
ROE	7.35 (–12.19, 26.89)	0.461
ROCE	10.03 (–7.62, 27.67)	0.265
Tobin's Q	0.22 (–0.26, 0.70)	0.368

6.8.3.2 Adjusted (Multivariable) Association of GD with Performances in Energy Sector

In the energy sector, the adjusted association of gender diversity, including control variables, shows that GD has no significant association with any of the measures of performance as detailed in Table 6.24. Thus, the results suggest that Hypothesis 1 is not supported. However, the result supports the positive effect of gender diversity on performance. Leverage has a significant negative association with ROA, ROE, and ROCE. Board size has a positive effect on all performance measures and a significant negative association with Tobin's Q.

Table 6.24 Results of Regression Analyses for the Effect of Gender Diversity on Financial Performances in Energy Sector

Variable	ROA	ROE	ROCE	Tobin's Q
Gender diversity	2.65	6.22	4.68	0.33
	(9.63)	(11.48)	(11.05)	(0.29)
Board size	3.84	2.29	1.21	–0.22*
	(2.83)	(3.51)	(3.35)	(0.08)
Firm size	0.00	0.00*	0.00*	–0.00
	(0.00)	(0.00)	(0.00)	(0.00)
Firm age	0.02	–0.12	–0.25	0.01
	(0.38)	(0.42)	(0.44)	(0.01)
R&D	0.0057	–0.00	–0.00	–0.00
	(0.02)	(0.02)	(0.02)	(0.00)
Leverage	–0.29*	–0.99***	–0.67***	0.01
	(0.11)	(0.17)	(0.16)	(0.00)
Cons	–52.70***	–35.14*	–28.46	2.02***
	(15.78)	(18.62)	(18.34)	(0.44)
Wald Chi-sq	13.38	37.29	22.23	11.57
Adj R-sq	0.06	0.09	0.03	0.27
Overall F	4.42	6.51	2.75	19.85
No. of obs/grp size	343/82	330/82	336/82	312/80

Notes: Unstandardised coefficients are displayed in the tables (standard errors (s.e) in parentheses); *** p ≤ .001. ** p ≤ .01. * p ≤ .05 (two-tailed tests); a. Controlling for all variables as in ROA, the coefficient for the Gender Diversity is 2.65 (s. e = 9,63); b. Controlling for all variables as in ROE, the coefficient for the Gender Diversity is 6.22 (s.e = 11.48); c. Controlling for all variables as in ROCE, the coefficient for the Gender Diversity is 4.68 (s.e = 11.05); d. Controlling for all variables as in Tobin's Q, the coefficient for the Gender Diversity is 0.33 (s.e. = 0.29)

6.8.4 Financial Sector

The number of firms in the financial sector is 9.5% of the total ASX-listed SMEs, with gender diversity present in only 28% of the firms, as shown in Table 6.2. The mean value of board size in this sector is 5.77, which is higher than the 4.84 of the combined SME sectors. The average female number is 1.43 compared with 1.18 on boards with gender diversity, and a critical mass number with at least three female board members was found

across the four years of this study. Thus, the increase in female board members is associated with the increase in board size. The average firm performances measured as ROA, ROE and ROCE are negative, whereas Tobin's Q is positive, which is consistent with the overall results of the combined SME sectors. Average GDI in this sector is 0.36, which is same as the overall GDI of all the combined SME sectors. The descriptive statistics for the financial sector are shown in Table 6.25.

Table 6.25 Descriptive Data of Financials Sector

Variables	Mean (SD) Median (IQR)	No gender diversity	Gender diversity	Overall
Board size	Mean (SD) Median (IQR)	4.08 (0.95) 4.00 (3.00–5.00)	5.77 (2.00) 5.50 (4.00–7.00)	4.56 (1.53) 4.00 (3.00–5.00)
Firm size (USD)	Mean (SD) Median (IQR)	122,151.70 (205,352.20) 35,613.50 (7,724.50–143,615.00)	581,102.40 (1,402,898.00) 16,152.50 (8,925.00–23,1087.00)	252,590.30 (792,944.30) 31,175.00 (7,761.50–170,110.00)
Firm age (years)	Mean (SD) Median (IQR)	22.19 (21.45) 14.00 (9.00–27.00)	23.60 (20.07) 16.00 (12.00–28.00)	22.59 (21.05) 15.00 (10.00–28.00)
Leverage	Mean (SD) Median (IQR)	32.44 (26.19) 25.63 (12.11–43.53)	38.40 (30.99) 29.08 (12.65–63.51)	34.18 (27.76) 26.78 (12.28–48.62)
Male members	Mean (SD) Median (IQR)	4.08 (0.95) 4.00 (3.00–5.00)	4.30 (1.91) 4.00 (3.00–6.00)	4.15 (1.29) 4.00 (3.00–5.00)
Female members	Mean (SD) Median (IQR)	0.00 (0.00) 0.00 (0.00–0.00)	1.43 (0.60) 1.00 (1.00–2.00)	0.41 (0.73) 0.00 (0.00–1.00)
GDI	Mean (SD) Median (IQR)	0.00 (0.00) 0.00 (0.00–0.00)	0.36 (0.08) 0.37 (0.32–0.44)	0.10 (0.17) 0.00 (0.00–0.24)
R&D (AUD)	Mean (SD) Median (IQR)	1.60 (18.76) 0.00 (0.00–0.00)	0.00 (0.00) 0.00 (0.00–0.00)	1.16 (15.98) 0.00 (0.00–0.00)
ROA	Mean (SD) Median (IQR)	–11.72 (38.74) 0.62 (–10.23–5.75)	–15.52 (39.24) 0.03 (–21.44–3.92)	–12.72 (38.85) 0.37 (–12.88–4.97
ROE	Mean (SD) Median (IQR)	–6.74 (46.44) 4.29 (–6.33–10.86)	–7.86 (68.54) 4.35 (–10.87–15.40)	–7.06 (53.53) 4.32 (–8.44–12.00)
ROCE	Mean (SD) Median (IQR)	–6.31 (41.96) 4.09 (–5.97–10.12)	–11.40 (72.01) 3.77 (–12.46–15.36)	–7.77 (52.27) 3.94 (–6.29–10.66)
Tobin's Q	Mean (SD) Median (IQR)	1.32 (1.59) 0.83 (0.55–1.34)	2.39 (2.66) 1.03 (0.72–3.27)	1.64 (2.02) 0.89 (0.60–1.67)

SD = Standard Deviation; IQR = Inter Quartile Range

6.8.4.1 Univariate Association of Gender Diversity with Performances in Financial Sector

In the subgroup of companies from the financial sector, there is no significant association of gender diversity with any of the performance measures as listed in Table 6.26. Gender diversity is positively associated with all the performance measures except ROE.

Table 6.26 Univariate Associations of Gender Diversity and Performance in Financials Sector

Performance	Coeff (95% CI)	p-value
ROA	0.73 (–9.94, 11.39)	0.894
ROE	–2.27 (–16.32, 11.77)	0.751
ROCE	0.79 (–13.79, 15.37)	0.915
Tobin's Q	0.51 (–0.01, 1.03)	0.053

6.8.4.2 Adjusted (Multivariable) Association of Gender Diversity with Return on Assets in Financials Sector

In the financial sector, the adjusted association of gender diversity, including control variables, shows that gender diversity has no significant association with any of the measures of performance as detailed in Table 6.27. Thus, the results suggest that Hypothesis 1, is not supported. Associations of gender diversity with ROA and Tobin's Q are positive, but the association is negative with ROE and ROCE. Leverage has a significant negative association with ROA, ROE, and ROCE. R&D has a significant positive association with Tobin's Q. Board size and firm age have positive associations with ROA, ROE, and ROCE but negative associations with Tobin's Q.

Table 6.27 Results of Regression Analyses for the Effect of Gender Diversity on Financial Performances in Financial Sector

Variable	ROA	ROE	ROCE	Tobin's Q
Gender diversity	7.46	–10.46	–0.94	0.49
	(4.87)	(7.74)	(7.76)	(0.25)
Board size	0.18	4.16	0.56	–0.02
	(1.52)	(2.27)	(2.23)	(0.07)
Firm size	0.00	0.00	0.00	–0.00
	(0.00)	(0.00)	(0.00)	(0.00)
Firm age	0.07	0.09	0.15	–0.01
	(0.14)	(0.19)	(0.23)	(0.01)
R&D	–0.09	0.0044	0.0044	0.0014***
	(0.09)	(0.00)	(0.01)	(0.00)
Leverage	–0.19***	–0.48***	–0.44***	0.00
	(0.06)	(0.12)	(0.12)	(0.00)
Cons	–6.86	–11.40	–1.68	1.38***
	(7.64)	(11.21)	(11.80)	(0.37)
Wald Chi-sq	16.12	25.88	17.32	53.32
Adj R-sq	0.06	0.04	0.03	0.05
Overall F	4.17	3.07	3.03	2.74
No. of obs/grp size	319/73	346/76	348/76	303/72

Notes: Unstandardised coefficients are displayed in the tables (standard errors (s.e) in parentheses); $***$ p ≤ .001. $**$ p ≤ .01. $*$ p ≤ .05 (two-tailed tests); a. Controlling for all variables as in ROA, the coefficient for the Gender Diversity is 7.46 (s. e = 4.87); b. Controlling for all variables as in ROE, the coefficient for the Gender Diversity is −10.46 (s.e = 7.74); c. Controlling for all variables as in ROCE, the coefficient for the Gender Diversity is −0.94 (s.e = 7.76); d. Controlling for all variables as in Tobin's Q, the coefficient for the Gender Diversity is 0.49 (s.e. = 0.25)

6.8.5 Health Care Sector

The number of firms in the health care sector is 11.5% of the total ASX-listed SMEs, with gender diversity present in only 32% of the firms, as shown in Table 6.2. The mean value of board size is 4.46. The average female number is 1.20 compared with 4.08 male members and boards with a critical mass number of at least three female board members was found in two years of this study. Other than Tobin's Q, the average firm performances

measured as ROA, ROE and ROCE are negative, which is consistent with the overall combined SME sectors. Average GDI in this sector is 0.37 which is similar to the overall GDI of all the combined SME sectors. The descriptive statistics for the health care sector are shown in Table 6.28.

Table 6.28 Health Care Sector Descriptive Data

Variables		No gender diversity	Gender diversity	Overall
Board Size	Mean (SD) Median (IQR)	4.43 (1.08) 4.00 (4.00–5.00)	4.71 (1.09) 5.00 (4.00–5.00)	4.46 (1.09) 4.00 (3.00–5.00)
Firm Size (USD)	Mean (SD) Median (IQR)	23,340.07 (87,215.86) 7,106.00 (3,494.00–17,655.00)	16,110.23 (15,329.57) 10,824.50 (4,667.00–23,795.00)	21,045.38 (72,613.09) 8,102.50 (3,753.50–19,522.50)
Firm Age (years)	Mean (SD) Median (IQR)	18.68 (9.47) 17.00 (11.00–28.00)	17.74 (8.30) 17.00 (11.00–22.00)	18.38 (9.12) 17.00 (11.00–25.50)
Leverage	Mean (SD) Median (IQR)	28.41 (26.62) 20.98 (10.11–36.77)	25.96 (21.77) 17.45 (10.48–36.76)	27.62 (25.15) 20.33 (10.31–36.76)
Male member	Mean (SD) Median (IQR)	4.34 (1.08) 4.00 (3.00–5.00)	3.51 (1.08) 4.00 (3.00–4.00)	4.08 (1.14) 4.00 (3.00–5.00)
Female member	Mean (SD) Median (IQR)	0.00 (0.00) 0.00 (0.00–0.00)	1.20 (0.43) 1.00 (1.00–1.00)	0.38 (0.61) 0.00 (0.00–1.00)
GDI	Mean (SD) Median (IQR)	0.00 (0.00) 0.00 (0.00–0.00)	0.37 (0.07) 0.37 (0.32–0.44)	0.12 (0.18) 0.00 (0.00–0.32)
R&D (AUD)	Mean (SD) Median (IQR)	290.28 (447.13) 0.00 (0.00–536.00)	295.19 (374.76) 33.00 (0.00–544.00)	291.74 (426.32) 0.00 (0.00–541.00)
ROA	Mean (SD) Median (IQR)	–47.06 (47.95) –36.88 (–67.98– –14.75)	–47.06 (52.00) –34.17 (–60.38– –14.68)	–47.06 (49.25) –35.90 (–65.91– –14.75)
ROE	Mean (SD) Median (IQR)	–49.27 (68.74) –36.90 (–79.95– –6.90)	–53.60 (60.22) –41.03 (–74.71– –17.36)	–50.65 (66.11) –39.74 (–78.79– –11.08)
ROCE	Mean (SD) Median (IQR)	–46.99 (62.45) –35.39 (–74.89– –5.71)	–51.86 (59.59) –38.82 (–69.33– –15.46)	–48.55 (61.52) –36.13 (–72.18– –9.12)
Tobin's Q	Mean (SD) Median (IQR)	3.0 (2.38) 2.38 (1.26–3.81)	3.34 (2.62) 2.99 (1.46–4.45)	3.15 (2.47) 2.50 (1.30–4.13)

SD = Standard Deviation; IQR = Inter Quartile Range

6.8.5.1 Univariate Association of Gender Diversity with Performances in Health Care Sector

In the subgroup of companies from the health care sector, there is no significant association of gender diversity with any of the performance measures as listed in Table 6.29. The associations of gender diversity and performance is negative with ROA, ROE, and ROCE but positive with Tobin's Q.

Table 6.29 Univariate Associations of Gender Diversity and Performance in Health Care Sector

Performance	**Coeff (95% CI)**	**p-value**
ROA	–0.31 (–11.07, 10.45)	0.955
ROE	–4.28 (–20.12, 11.56)	0.596
ROCE	–4.66 (–19.29, 9.97)	0.533
Tobin's Q	0.19 (–0.38, 0.76)	0.508

6.8.5.2 Adjusted (Multivariable) Association of Gender Diversity with Performances in Health Care Sector

In the health care sector, the adjusted association of gender diversity, including control variables shows that gender diversity has no significant association with any of the measures of performance as detailed in Table 6.30. Thus, the results suggest that Hypothesis 1 is not supported. However, an association of gender diversity with all the performance measures is positive, which supports the theoretical predications. Leverage has a significant negative association with ROA, ROE and ROCE and R&D has a significant negative association with ROE. Firm age has a positive association with all the performance measures.

Table 6.30 Results of Regression Analyses for the Effect of Gender Diversity on Financial Performances in Health Care Sector

Variable	ROA	ROE	ROCE	Tobin's Q
Gender diversity	3.11	2.24	4.74	0.08
	(5.65)	(8.31)	(7.35)	(0.30)
Board size	–1.40	–0.63	–2.75	0.19
	(2.30)	(3.43)	(3.08)	(0.13)
Firm size	0.00***	0.00***	0.00***	0.00
	(0.00)	(0.00)	(0.00)	(0.00)
Firm age	0.34	1.24*	0.28	0.03
	(0.38)	(0.54)	(0.54)	(0.02)
R&D	–0.001	–0.00***	–0.00	–0.00
	(0.00)	(0.00)	(0.00)	(0.00)
Leverage	–0.40***	–0.83***	–0.61***	0.00
	(0.10)	(0.19)	(0.15)	(0.00)
Cons	–38.48**	–54.70**	–35.86*	1.73*
	(13.54)	(19.95)	(18.24)	(0.71)
Wald Chi-sq	26.88	40.22	25.65	6.46
Adj R-sq	0.04	0.05	0.04	0.08
Overall F	3.66	4.16	3.50	5.82
No. of obs/grp size	406/91	408/90	414/91	388/87

Notes: Unstandardised coefficients are displayed in the tables (standard errors (s.e) in parentheses); *** p ≤ .001. ** p ≤ .01. * p ≤ .05 (two-tailed tests); a. Controlling for all variables as in ROA, the coefficient for the Gender Diversity is 3.11 (s. e = 5.65); b. Controlling for all variables as in ROE, the coefficient for the Gender Diversity is 2.24 (s.e = 8.31); c. Controlling for all variables as in ROCE, the coefficient for the Gender Diversity is 4.74 (s.e = 7.35); d. Controlling for all variables as in Tobin's Q, the coefficient for the Gender Diversity is 0.08 (s.e. = 0.30)

6.8.6 Industrial Sector

The number of firms in the industrial sector is 5.8% of the total ASX-listed SMEs, with gender diversity present in only 17% of the firms as shown in Table 6.2. The mean value of board size is 4.42. The average female number is 1.02, which is less than the average female members (1.18) of the combined SME sectors on boards with gender diversity; no boards with a critical mass were found in this sector. Other than Tobin's Q, the average firm performances measured as ROA, ROE and ROCE are negative, which is consistent with the overall SME sectors. Average GDI in this sector is 0.36, which is same as the

overall GDI of all the combined SME sectors. The descriptive statistics for the industrial sector are shown in Table 6.31.

Table 6.31 Descriptive data of Industrial Sector

Variables	Mean (SD) Median (IQR)	No gender diversity	Gender diversity	Overall
Board size	Mean (SD) Median (IQR)	4.13 (1.16) 4.00 (3.00–5.00)	4.42 (1.32) 4.00 (3.00–5.00)	4.19 (1919) 4.00 (3.00–5.00)
Firm size (USD)	Mean (SD) Median (IQR)	20,545.62 (25,536.42) 10,841.00 (2,639.00–26,700.00)	52,202.05 (97,979.19) 7,191.50 (2,556.00–40,675.50)	26,051.09 (48,142.77) 10,540.00 (4,514.00–27,985.00)
Firm age (years)	Mean (SD) Median (IQR)	21.15 (14.10) 18.00 (11.00–28.00)	26.42 (21.95) 25.50 (11.00–31.50)	22.07 (15.82) 19.00 (11.00–28.00)
Leverage	Mean (SD) Median (IQR)	40.96 (28.63) 35.95 (21.53–51.79)	36.95 (33.88) 31.33 (10.42–47.37)	40.27 (29.57) 34.73 (19.75–51.79)
Male members	Mean (SD) Median (IQR)	4.13 (1.06) 4.00 (3.00–5.00)	3.40 (1.28) 3.00 (2.00–4.00)	4.01 (1.21) 4.00 (3.00–5.00)
Female members	Mean (SD) Median (IQR)	0.00 (0.00) 0.00 (0.00–0.00)	1.02 (0.16) 1.00 (1.00–1.00)	0.18 (0.39) 0.00 (0.00–0.00)
GDI	Mean (SD) Median (IQR)	0.00 (0.00) 0.00 (0.00–0.00)	0.36 (0.07) 0.37 (0.32–0.44)	0.06 (0.14) 0.00 (0.00–0.00)
R&D (AUD)	Mean (SD) Median (IQR)	90.45 (229.88) 0.00 (0.00–0.00)	29.54 (184.47) 0.00 (0.00–0.00)	79.80 (223.43) 0.00 (0.00–0.00)
ROA	Mean (SD) Median (IQR)	–27.82 (52.91) –8.53 (–33.84–2.64)	–36.74 (66.67) –6.12 (–52.91–3.94)	–29.51 (55.69) –8.53 (–36.56–2.91)
ROE	Mean (SD) Median (IQR)	–29.59 (75.95) –4.96 (–46.01–7.51)	–38.81 (103.63) 0.00 (–29.69–8.62)	–31.32 (81.67) –4.05 (–44.94–7.96)
ROCE	Mean (SD) Median (IQR)	–21.67 (52.81) –5.05 (–32.73–6.99)	–44.38 (96.94) –1.79 (–43.19–6.89)	–26.01 (63.97) –3.89 (–35.12–6.94)
Tobin’s Q	Mean (SD) Median (IQR)	2.07 (2.27) 1.07 (0.56–2.70)	2.35 (3.16) 0.86 (0.50–2.34)	2.11 (2.43) 1.04 (0.56–2.66)

SD = Standard Deviation; IQR = Inter Quartile Range

6.8.6.1 Univariate Association of Gender Diversity with Performances in Industrial Sector

In the subgroup of companies from the industrial sector, there is a significant positive association of gender diversity with ROE only as listed in Table 6.32. Negative associations between gender diversity and other performance measures are found in ROA, ROCE and Tobin's Q.

Table 6.32 Univariate Associations of Gender Diversity and Performance in Industrial Sector

Performance	Coeff (95% CI)	p-value
ROA	–8.59 (–27.96, 10.78)	0.385
ROE	30.17 (1.66, 58.68)	0.038
ROCE	–1.46 (–22.72, 19.79)	0.893
Tobin's Q	–0.06 (–0.88, 0.76)	0.881

6.8.6.2 Adjusted (Multivariable) Association of Gender Diversity with Performances in Industrials Sector

In the industrial sector, the adjusted association of gender diversity, including control variables shows that gender diversity has no significant association with any of the measures of performance as detailed in Table 6.33. Thus, the results suggest that Hypothesis 1 is not supported. However, a significant negative association was found with ROCE. Leverage has a significant negative association with ROA, ROE and ROCE and a significant positive association with Tobin's Q. Firm age has a positive association with ROA, ROE and ROCE and a negative association with Tobin's Q.

Table 6.33 Results of Regression Analyses for the Effect of Gender Diversity on Financial Performances in Industrial Sector

Variable	ROA	ROE	ROCE	Tobin's Q
Gender diversity	13.74	–4.23	–22.46*	0.23
	(8.23)	(12.60)	(9.15)	(0.40)
Board size	–4.82	–3.31	2.64	–0.40**
	(2.69)	(5.14)	(3.83)	(0.13)
Firm size	0.00	0.00	0.00*	–0.00
	(0.00)	(0.00)	(0.00)	(0.00)
Firm age	0.43	0.52	0.15	–0.02
	(0.29)	(0.47)	(0.41)	(0.02)
R&D	0.0088	–0.02	–0.01	0.0001
	(0.01)	(0.01)	(0.01)	(0.00)
Leverage	–0.61***	–0.65**	–0.30*	0.01*
	(0.09)	(0.22)	(0.15)	(0.00)
Cons	10.83	–11.41	–33.10	3.53***
	(13.33)	(25.35)	(18.78)	(0.65)
Wald Chi-sq	55.74	18.84	18.38	24.32
Adj R-sq	0.07	0.08	0.09	0.02
Overall F	3.38	3.69	4.39	4.14
No. of obs/grp size	200/46	199/46	200/46	192/45

Notes: Unstandardised coefficients are displayed in the tables (standard errors (s.e) in parentheses); *** p ≤ .001. ** p ≤ .01. * p ≤ .05 (two-tailed tests); a. Controlling for all variables as in ROA, the coefficient for the Gender Diversity is 13.74 (s. e = 8.23); b. Controlling for all variables as in ROE, the coefficient for the Gender Diversity is −4.23 (s.e = 12.60); c. Controlling for all variables as in ROCE, the coefficient for the Gender Diversity is −22.46 (s.e = 9.15) shows a significant impact (p < .05) on performance; d. Controlling for all variables as in Tobin's Q, the coefficient for the Gender Diversity is 0.23 (s.e. = 0.40).

6.8.7 Information Technology Sector

The number of firms in the information technology sector is 11.5% of the total ASX-listed SMEs, with gender diversity present in only 19% of the firms as shown in Table 6.2. The mean value of board size for boards with gender diversity is 5.06 and the average female number is 1.16, compared with 3.89 male members; no boards with a critical mass of at least three female members were found in this sector. Other than Tobin's Q, the

average firm performances measured as ROA, ROE and ROCE are negative, which is consistent with the overall combined SME sectors. Average GDI in this sector is 0.35, which is similar to the overall GDI of all the combined SME sectors. The descriptive statistics for the information technology sector are shown in Table 6.34.

Table 6.34 Descriptive Data of Information Technology Sector

Variables	Mean (SD) Median (IQR)	No gender diversity	Gender diversity	Overall
Board size	Mean (SD) Median (IQR)	4.01 (1.02) 4.00 (3.00–5.00)	5.06 (1.16) 5.00 (4.00–6.00)	4.21 (1.12) 4.00 (3.00–5.00)
Firm size (USD)	Mean (SD) Median (IQR)	10,673.24 (18,105.83) 4,927.00 (1,474.00–12,560.00)	24,003.06 (21,300.68) 19,444.00 (5,677.00–39,698.00)	13,165.34 (19,429.07) 5,988.50 (1,912.50–16,367.00)
Firm age (years)	Mean (SD) Median (IQR)	20.43 (12.70) 18.00 (11.00–29.00)	21.28 (11.00) 22.50 (12.00–30.00)	20.58 (12.39) 19.00 (11.00–29.00)
Leverage	Mean (SD) Median (IQR)	39.23 (32.52) 31.35 (13.22–52.62)	35.23 (30.82) 26.14 (14.68–41.78)	38.42 (32.18) 30.54 (13.58–51.60)
Male members	Mean (SD) Median (IQR)	4.02 (1.02) 4.00 (3.00–5.00)	3.89 (1.23) 4.00 (3.00–5.00)	3.99 (1.06) 4.00 (3.00–5.00)
Female members	Mean (SD) Median (IQR)	0.00 (0.00) 0.00 (0.00–0.00)	1.16 (0.37) 1.00 (1.00–1.00)	0.22 (0.48) 0.00 (0.00–0.00)
GDI	Mean (SD) Median (IQR)	0.00 (0.00) 0.00 (0.00–0.00)	0.35 (0.07) 0.32 (0.28–0.37)	0.05 (0.13) 0.00 (0.00–0.00)
R&D (AUD)	Mean (SD) Median (IQR)	118.62 (282.38) 0.00 (0.00–12.00)	88.50 (222.17) 0.00 (0.00–27.00)	113.43 (272.94) 0.00 (0.00–12.00)
ROA	Mean (SD) Median (IQR)	–61.72 (73.79) –36.23 (–96.53– –8.84)	–47.16 (71.26) –20.97 (–72.62– –0.50)	–58.98 (73.45) –30.89 (–91.40– –7.31)
ROE	Mean (SD) Median (IQR)	–54.10 (94.83) –31.30 (–97.69–5.08)	–24.85 (74.58) –6.21 (–35.83–11.92)	–48.51 (91.94) –26.01 (–87.21–6.98)
ROCE	Mean (SD) Median (IQR)	–56.24 (82.38) –33.71 (–96.96–0.78)	–30.73 (66.11) –10.46 (–45.37–10.56)	–51.05 (79.92) –27.18 (–87.21–4.53)
Tobin's Q	Mean (SD) Median (IQR)	3.04 (2.78) 2.06 (0.98–4.38)	3.33 (2.61) 2.77 (1.24–4.72)	3.10 (2.75) 2.14 (0.99–4.40)

SD = Standard Deviation; IQR = Inter Quartile Range

6.8.7.1 Univariate Association of Gender Diversity with Performances in Information Technology Sector

In the subgroup of companies from the information technology sector, there is a significant positive association of gender diversity with ROE and a positive association with all other measures of performances as listed in Table 6.35. The positive associations

of gender diversity and all other performance measures are consistent with theoretical predictions in RDT, AT and HCT.

Table 6.35 Univariate Associations of Gender Diversity and Performance in Information Technology Sector

Performance	Coeff (95% CI)	p-value
ROA	2.97 (–16.59, 22.53)	0.766
ROE	23.85 (0.52, 47.19)	0.045
ROCE	14.15 (–6.63, 34.94)	0.182
Tobin's Q	0.22 (–0.47, 0.91)	0.532

6.8.7.2 Adjusted (Multivariable) Association of Gender Diversity with Performances in Information Technology Sector

In the information technology sector, the adjusted association of gender diversity, including control variables, shows that gender diversity has no significant association with any of the measures of performance as detailed in Table 6.36. Thus, the results suggest that Hypothesis 1 is not supported. However, the associations are positive in all performance measure except ROA. Firm age has a significant positive association with ROE and ROCE and a positive association with ROA and Tobin's Q. Leverage has a significant negative association with ROA and ROCE and is positively associated with ROE and Tobin's Q. Board size has a significant negative association with ROA.

Table 6.36 Results of Regression Analyses for the Effect of Gender Diversity on financial performances in Information Technology Sector

Variable	ROA	ROE	ROCE	Tobin's Q
Gender diversity	–2.24	18.34	10.65	0.09
	(9.39)	(11.87)	(9.60)	(0.36)
Board size	–11.77**	–8.54	–4.78	0.08
	(3.98)	(4.90)	(3.95)	(0.14)
Firm size	0.00***	0.00***	0.00***	0.00**
	(0.00)	(0.00)	(0.00)	(0.00)
Firm age	0.57	1.33**	1.33**	0.01
	(0.46)	(0.47)	(0.45)	(0.02)
R&D	0.0007	0.0009	0.0008	0.0001
	(0.00)	(0.00)	(0.00)	(0.00)
Leverage	–0.31**	0.24	–0.41**	0.01*
	(0.10)	(0.19)	(0.15)	(0.00)
Cons	–30.80	–75.19***	–69.99***	2.52***
	(18.93)	(22.82)	(19.08)	(0.69)
Wald Chi-sq	57.71	46.94	54.55	17.22
Adj R-sq	0.16	0.15	0.17	
Overall F	11.99	11.13	13.28	
No. of obs/grp size	358/89	353/90	356/89	354/88

Notes: Unstandardised coefficients are displayed in the tables (standard errors (s.e) in parentheses); *** p ≤ .001. ** p ≤ .01. * p ≤ .05 (two-tailed tests); a. Controlling for all variables as in ROA, the coefficient for the Gender Diversity is −2.24 (s. e = 9.39); b. Controlling for all variables as in ROE, the coefficient for the Gender Diversity is 18.34 (s.e = 11.87); c. Controlling for all variables as in ROCE, the coefficient for the Gender Diversity is 10.65 (s.e = 9.60); d. Controlling for all variables as in Tobin's Q, the coefficient for the Gender Diversity is 0.09 (s.e. = 0.36)

6.8.8 Materials Sector

The number of firms in the materials sector is 40% of the total ASX-listed SMEs, with gender diversity present in only 15% of the firms as shown in Table 6.2. The mean value of board size with gender diversity is 4.53. The average female number is 1.10 compared with 3.42 male members. Boards with a critical mass number of at least three female board members were found in three years of this study. Other than Tobin's Q, the average

firm performances measured as ROA, ROE and ROCE are negative, which is consistent with results obtained from overall combined SME sectors. Average GDI in this sector is 0.37, which is similar to the overall GDI of all the combined SME sectors. The descriptive statistics for the materials sector are shown in Table 6.37.

Table 6.37 Descriptive Data of Materials Sector

Variables	Mean (SD) Median (IQR)	No gender diversity	Gender diversity	Overall
Board size	Mean (SD) Median (IQR)	3.76 (0.94) 4.00 (3.00–4.00)	4.53 (1.24) 4.00 (4.00–5.00)	3.87 (1.03) 4.00 (3.00–4.00)
Firm size (USD)	Mean (SD) Median (IQR)	15,900.02 (47,357.12) 5,624.00 (2,138.00–13,757.00)	72,066.54 (327,939.20) 9,801.00 (3,166.00–23,867.00)	24,272.01 (135,207.80) 6,050.50 (2,265.00–14,440.00)
Firm age (years)	Mean (SD) Median (IQR)	16.37 (13.32) 12.00 (9.00–21.00)	20.91 (16.91) 16.00 (9.00–26.00)	17.05 (14.00) 13.00 (9.00–21.00)
Leverage	Mean (SD) Median (IQR)	23.25 (28.92) 10.58 (4.37–29.84)	28.14 (33.72) 13.89 (4.63–34.54)	23.97 (29.72) 10.80 (4.39–30.45)
Male members	Mean (SD) Median (IQR)	3.76 (0.94) 4.00 (3.00–4.00)	3.42 (1.23) 3.00 (2.00–4.00)	3.71 (0.99) 4.00 (3.00–4.00)
Female members	Mean (SD) Median (IQR)	0.00 (0.00) 0.00 (0.00–0.00)	1.10 (0.33) 1.00 (1.00–1.00)	0.16 (0.41) 0.00 (0.00–0.00)
GDI	Mean (SD) Median (IQR)	0.00 (0.00) 0.00 (0.00–0.00)	0.37 (0.07) 0.37 (0.32–0.44)	0.05 (0.13) 0.00 (0.00–0.00)
R&D (AUD)	Mean (SD) Median (IQR)	10.33 (85.23) 0.00 (0.00–0.00)	24.07 (153.29) 0.00 (0.00–0.00)	12.37 (98.43) 0.00 (0.00–0.00)
ROA	Mean (SD) Median (IQR)	–47.66 (60.75) –22.67 (–62.74– –9.74)	–39.15 (54.17) –18.70 (–51.60– –6.17)	–46.40 (59.88) –22.13 (–60.51– –9.02)
ROE	Mean (SD) Median (IQR)	–47.30 (72.54) –22.74 (–63.61– –7.90)	–35.68 (61.11) –17.25 (– 60.74– –5.12)	–45.57 (71.05) –22.04 (–62.69– –7.29
ROCE	Mean (SD) Median (IQR)	–43.79 (64.06) –21.36 (–57.38– –7.63)	–29.56 (51.25) –14.86 (–42.94– –4.86)	–41.65 (62.49) –20.51 (–55.41– –6.89)
Tobin's Q	Mean (SD) Median (IQR)	2.15 (2.18) 1.35 (0.72–2.71)	1.91 (2.05) 1.18 (0.65–2.18)	2.12 (2.16) 1.33 (0.71–2.65)

SD = Standard Deviation; IQR = Inter Quartile Range

6.8.8.1 Univariate Association of Gender Diversity with Performances in Materials Sector

In the subgroup of companies from the materials sector, there is a significant positive association of gender diversity with ROE and ROCE as listed in Table 6.38. The association is positive with ROA but negative with Tobin's Q.

Table 6.38 Univariate Associations of Gender Diversity and Performance in Materials Sector

Performance	Coeff (95% CI)	p-value
ROA	8.43 (–1.41, 18.26)	0.093
ROE	12.55 (0.59, 24.51)	0.040
ROCE	15.12 (4.57, 22.66)	0.005
Tobin's Q	–0.13 (–0.51, 0.25)	0.494

6.8.8.2 Adjusted (Multivariable) Association of Gender Diversity with Performances in Materials Sector

In the materials sector, the adjusted association of gender diversity, including control variables, shows that gender diversity has no significant association with any of the measures of performance as detailed in Table 6.39. Thus, the results suggest that Hypothesis 1 is not supported. The associations are positive with ROA, ROE and ROCE but negative with Tobin's Q. Board size has a significant positive association ROA and ROCE. Leverage has a significant negative association with ROA, ROE and ROCE and a positive association with Tobin's Q, which is consistent with the overall results of combined SME sectors (see Table 6.14). Board size also has a significant positive association with ROA and ROCE, a positive association with ROE and a negative association with Tobin's Q.

Table 6.39 Results of Regression Analyses for the Effect of Gender Diversity on Financial Performance in Materials Sector

Variable	ROA	ROE	ROCE	Tobin's Q
Gender diversity	5.18	9.53	10.83	–0.14
	(5.21)	(6.69)	(5.99)	(0.20)
Board size	3.55*	2.88	4.02*	–0.02
	(1.77)	(2.28)	(2.04)	(0.06)
Firm size	0.00**	0.00*	0.00**	–0.00
	(0.00)	(0.00)	(0.00)	(0.00)
Firm age	–0.04	–0.15	–0.08	0.00
	(0.15)	(0.19)	(0.17)	(0.01)
R&D	–0.00	–0.01	–0.02	0.0001
	(0.02)	(0.02)	(0.02)	(0.00)
Leverage	–0.47***	–0.66***	–0.51***	0.01***
	(0.06)	(0.09)	(0.082)	(0.00)
Cons	–50.50***	–51.13***	–53.76***	1.79***
	(7.60)	(9.85)	(8.77)	(0.28)
Wald Chi-sq	78.53	61.60	57.20	36.33
Adj R-sq	0.06	0.06	0.04	
Overall F	14.60	13.46	9.95	
No. of obs/grp size	1289/309	1249/311	1261/309	1228/305

Notes: Unstandardised coefficients are displayed in the tables (standard errors (s.e) in parentheses); *** p ≤ .001. ** p ≤ .01. * p ≤ .05 (two-tailed tests); a. Controlling for all variables as in ROA, the coefficient for the Gender Diversity is 5.18 (s. e = 5.21); b. Controlling for all variables as in ROE, the coefficient for the Gender Diversity is 9.53 (s.e = 6.69); c. Controlling for all variables as in ROCE, the coefficient for the Gender Diversity is 10.83 (s.e = 5.99); d. Controlling for all variables as in Tobin's Q, the coefficient for the Gender Diversity is −0.14 (s.e = 0.20)

6.8.9 Utilities Sector

The number of firms in the utilities sector is 1.5% of the total ASX-listed SMEs, with gender diversity present in only 10% of the firms as shown in Table 6.2. The mean value of board size on boards with gender diversity was 5.83, with an average female number of 1.5, which are higher compared with 4.84 and 1.18 respectively for overall combined SME sectors. Board with a critical mass number of at least three female board members

are found in one year only. Other than Tobin's Q, the average firm performances measured as ROA, ROE and ROCE are negative, which is consistent with overall SME sectors. Average GDI in this sector is 0.36, which is the same as the overall GDI of all the combined SME sector. The descriptive statistics for the utilities sector are shown in Table 6.40.

Table 6.40 Utilities Sector Descriptive Data

Variables	Mean (SD) Median (IQR)	No gender diversity	Gender diversity	Overall
Board size	Mean (SD) Median (IQR)	4.50 (1.61) 4.00 (3.00–6.00)	5.83 (1.17) 5.50 (5.00–6.00)	4.63 (1.61) 4.00 (3.00–6.00)
Firm size (USD)	Mean (SD) Median (IQR)	161,653.10 (451,004.20) 11,460.00 (2,393.00–48,570.00)	1,170,883.00 (827,201.80) 940,529.50 (855,870.00–1,865,317.00)	262,576.20 (577,867.40) 12,247.50 (2,690.00–66,627.00)
Firm age (years)	Mean (SD) Median (IQR)	22.98 (13.24) 23.50 (13.00–31.00)	13.16 (1.47) 13.50 (12.00–14.00)	22.00 (12.90) 20.50 (12.50–30.00)
Leverage	Mean (SD) Median (IQR)	50.15 (28.65) 53.29 (22.56–76.85)	62.84 (26.29) 68.43 (54.58–80.52)	51.74 (28.42) 55.09 (24.02–76.90)
Male members	Mean (SD) Median (IQR)	4.50 (1.61) 4.00 (3.00–6.00)	4.33 (0.52) 4.00 (4.00–5.00)	4.48 (1.53) 4.00 (3.00–4.00)
Female members	Mean (SD) Median (IQR)	0.00 (0.00) 0.00 (0.00–0.00)	1.50 0.84) 1.00 (1.00–2.00)	0.15 (0.51) 0.00 (0.00–0.00)
GDI	Mean (SD) Median (IQR)	0.00 (0.00) 0.00 (0.00–0.00)	0.36 (0.08) 0.32 (0.32–0.44)	0.03 (0.11) 0.00 (0.00–0.00)
R&D (AUD)	Mean (SD) Median (IQR)	44.53 (183.90) 0.00 (0.00–0.00)	0.00 (0.00) 0.00 (0.00–0.00)	41.29 (177.34) 0.00 (0.00–0.00)
ROA	Mean (SD) Median (IQR)	–48.95 (61.64) –30.47 (–80.35– –4.08)	–2.05 (6.17) 0.08 (–6.26–2.62)	–43.21 (59.75) –16.04 (–63.01–0.48)
ROE	Mean (SD) Median (IQR)	–27.52 (101.86) –4.81 (–59.55–32.16)	–18.10 (48.37) 0.16 (–5.60–6.75)	–26.43 (96.92) –3.05 (–58.43–23.21)
ROCE	Mean (SD) Median (IQR)	–37.89 (89.81) –8.24 (–60.58–14.56)	0.71 (10.81) 5.24 (–6.58–7.26)	–33.44 (85.35) –4.41 (–57.34–11.54)
Tobin's Q	Mean (SD) Median (IQR)	2.60 (3.39) 0.84 (0.5–3.40)	0.72 (0.30) 0.61 (0.53–0.91)	2.40 (3.25) 0.77 (0.56–2.74)

SD = Standard Deviation; IQR = Inter Quartile Range

6.8.9.1 Univariate Association of Gender Diversity with Performances in Utilities Sector

In the subgroup of companies from the utilities sector, there are no significant associations of gender diversity with any of the performance measures as listed in Table 6.41. However, associations are positive with ROE and ROCE and negative with ROA.

Table 6.41 Univariable Associations of Gender Diversity and Performance in Utilities Sector

Performance	Coeff (95% CI)	p-value
ROA	–4.54 (–18.09, 9.00)	0.511
ROE	21.70 (–20.69, 64.09)	0.316
ROCE	21.43 (–5.77, 48.62)	0.123
Tobin's Q	NA	NA

6.8.9.2 Adjusted (Multivariable) Association Of gender diversity With Performances In Utilities Sector

This could not be estimated because of the lack of sufficient data.

6.9 Summary of Sector-wise Data

Prior studies found that having female board members is more advantageous to businesses, so caution should be used when interpreting some of the industry results. Because a number of industries have few firms, further categorising enterprises into those with and without female board members might substantially reduce the number of firms in each sector, and thus the results may not be consistent across all industries (Brammer, Millington & Pavelin 2007; Chapple & Humphrey 2014).

6.9.1 Descriptive Statistics

The analysis was extended to the specific sectors of SME firms. From the overall sector-wise descriptive statistics, the mean value of firm size, male members, board size and Tobin's Q was highest for the utilities sector. The mean value of firm age was highest for the communications services sector and leverage was highest in the consumer sector. The mean value of female members on a board, ROA, ROCE, and ROE was highest in the financial sector. The health care sector had the highest mean value of GDI and R&D expenditure. The mean values of ROA, ROE and ROCE were negative, while this was positive for Tobin's Q in each sector.

6.9.1.1 Univariate Associations of Gender Diversity and Performance

A summary of the results of the univariable analysis on the association between gender diversity and sector wise performance outcomes is detailed in Table 6.42. The results indicate that significant positive associations (Coeff 26.45 $p \leq .001$) of GD and ROA are found in the consumer sector, and of gender diversity and ROE in the industrial (Coeff 30.17 $p \leq .05$), information technology (Coeff 23.85 $p \leq .05$) and material sectors (Coeff 12.55 $p \leq .05$), GD and ROCE in the communication services (Coeff 39.99 $p \leq .05$) and materials sectors (Coeff 15.12 $p \leq .01$), and gender diversity and Tobin's Q in the communications services sector (Coeff 1.00 $p \leq .01$).

Positive associations of gender diversity and different performances are found across all sectors. Positive associations of gender diversity with all four measures of performance are found in consumers, energy and information technology. A positive association of gender diversity with three performance measures is found in communication, financials and materials. The industrial and utilities sectors have two positive associations of gender diversity and performance measures. Health care has a positive association of gender diversity and Tobin's Q. Overall results indicate a positive association of gender diversity on performance.

Table 6.42 Summary of the Sector-wise Data on the Effect of Gender Diversity on Performance

Sectors	**ROA**	**ROE**	**ROCE**	**Tobin's Q**
	Coeff (p value)	Coeff (p value)	Coeff (p value)	Coeff (p value)
Communications	–11.05 (0.568)	14.47 (0.442)	39.98*. (0.045)	1.00** (0.002)
Consumers	26.45*** (0.001)	16.74 (0.153)	13.46 (0.077)	0.04 (0.904)
Energy	15.49 (0.073)	7.35 (0.461)	10.03 (0.265)	0.22 (0.368)
Financials	0.73 (0.894)	–2.27 (0.751)	0.79 (0.915)	0.51 (0.053)
Health care	–0.31 (0.955)	–4.28 (0.596)	–4.66 (0.533)	0.19 (0.508)
Industrials	–8.59 (0.385)	30.17* (0.038)	–1.46 (0.893)	–0.06 (0.881)
Information technology	2.97 (0.766)	23.85* (0.045)	14.15 (0.182)	0.22 (0.532)
Materials	8.43 (0.093)	12.55* (0.040)	15.12** (0.005)	–0.13 (0.494)
Utilities	–4.54 (0.511)	21.70 (0.316)	21.43 (0.123)	N/A

6.9.1.2 Adjusted (Multivariable) Association of Gender Diversity with Performance

A summary of the results of the multivariable association between gender diversity and sector wise performance outcomes is detailed in Table 6.43. Based on the findings of the sector-by-sector analysis, it can be concluded that the presence of female board members

has a positive effect on 75% of the performance measures in different SME sectors. The results indicate that a significant positive association between gender diversity and ROA exists in the consumer sector (Coeff 21.38 $p \leq .05$), and between gender diversity and ROE in the consumer sector (Coeff 24.37 $p \leq .05$). Positive associations of gender diversity and different performances are found across all the sectors. Positive associations of gender diversity with all four measures of performances are found in energy and healthcare sectors. Positive associations of gender diversity with three performance measures are found in the communication services, consumer, information technology and materials sectors. The financial and industrial sectors had two positive associations of gender diversity and performance measure. A significant negative association of gender diversity with ROCE was found in the industrial sector (Coeff −22.46 $p \leq .05$) only.

Table 6.43 Summary of the Sector-wise Data on the Effect of Adjusted Gender Diversity on Performance

Sector	ROA	ROE	ROCE	Tobin's Q
	Coeff (standard error)	Coeff (standard error)	Coeff (standard error)	Coeff (standard error)
Communications	8.11(18.80)	–0.18 (8.97)	9.39 (17.21)	0.60 (0.44)
Consumers	21.38*(8.39)	24.32*(11.37)	9.56 (9.55)	–0.02 (0.33)
Energy	2.65 (9.63)	6.22 (11.48)	4.68 (11.05)	0.33 (0.29)
Financials	7.46 (4.87)	–10.46 (7.74)	–0.94 (7.76)	0.49 (0.25)
Health care	3.11 (5.65)	2.24 (8.31)	4.74 (7.35)	0.08 (0.30)
Industrials	13.74 (8.23)	–4.23 (0.86)	–22.46* (9.15)	0.23 (0.40)
Information technology	–2.24 (9.39)	18.34 (11.87)	10.65 (9.60)	0.09 (0.36)
Materials	5.18 (5.21)	9.53 (6.69)	10.83 (5.99)	–0.14 (0.20)
Utilities	NA	NA	NA	NA

6.10 Summary of the Results

Sections 6.3 to 6.9 of this chapter outlined the report on the data analysis undertaken to test hypotheses in this thesis.

6.10.1 Research Question 1: Is Gender Diversity Associated with Performance of Listed SMEs in Australia?

The results related to Research Question 1 and whether statistically significant relationships were found between gender diversity and financial performance, gender

diversity and innovation and innovation and performance to test the hypotheses are presented below.

6.10.1.1 Hypothesis 1: Gender Diversity Has Positive Effect on the Financial Performance

Table 6.11 above indicates that a univariable association of gender diversity is positive and financial performance is measured as ROA (Coeff = 7.14, p = 0.015) and ROE (Coeff = 9.16, p = 0.013) and ROCE (Coeff = 8.78, p = 0.007). The association is not statistically significant when Tobin's Q is used as a performance measure (Coeff = 0.16, p = 0.160). However, as can be seen in Table 6.14, when the adjusted effect of control variables is considered, the effect of gender diversity on performance is positive in all performance measures (ROA Coeff = 3.57, ROE Coeff = 8.51, ROCE Coeff = 6.55 and Tobin's Q Coeff = 0.19), but is significant only when performance is measured as ROE (Coeff = 8.51*(s. e = 4.01)).

From the detailed sector-wise analysis, the effect of univariable gender diversity on performance is positive and significant in seven performance measures of the five sectors. Considering the effect of control variables, the influence of gender diversity is positive and significant on ROA in the consumer sector (Coeff 21.38 $p \leq .05$), and on ROE in the consumer sector (Coeff 24.37 $p \leq .05$). That the statistically significant positive effect of gender diversity on ROE in the consumer sector is similar to the overall sector result highlights the fact that female members on boards bring more influence in terms of understanding and targeting consumer needs and markets. However, there is a significant negative effect of gender diversity on ROCE (Coeff—22.46 $p \leq .05$) in the industrial sector (see Tables 6.42 and 6.43).

6.10.1.2 Hypothesis 2: Gender Diversity Has a Positive Effect on Innovation

The univariate association between gender diversity and innovation is positive (coeff 64.83), and the multivariate association of gender diversity with R&D is also positive (coeff 26.43), but not statistically significant, as shown in Section 6.4. Thus, Hypothesis 2 is partially supported.

6.10.1.3 Hypothesis 2a: Innovation Has a Positive Effect On Firm Performance.

The result of the sector-wise analysis shows the statistically significant effect of innovation on the performance measure (Tobin's Q) in the financial sector. A positive association between innovation and performance was found in a number of sectors. Innovation has a positive effect on all the four performance measures (ROA, ROE, ROCE, and Tobin's Q) in the information technology sector, three performance measures (ROE, ROCE and Tobin's Q) in the financial sector, two performance measures (ROA and Tobin's Q) in the industrial sector, and one performance measure in the energy (ROA) and materials sector (Tobin's Q). There are no significant associations between innovation and performance in all combined sectors, as shown in Table 6.13. Thus, Hypotheses 2a is partially supported.

6.10.2 Research Question Two: Does Innovation Moderate the Association between Gender Diversity and Firm Performance of Listed SMEs in Australia?

The results related to Research Question 2 and whether innovation moderates the association between gender diversity and financial performance, to test the hypotheses are presented below.

6.10.2.1 Hypothesis 3: Gender Diversity Is Independently Associated with Financial Performance

The results of the analysis carried out with the moderating effect of innovation in Table 6.15 show no significant association of the interaction term (GD*R&D) with all the measures of performance. However, gender diversity is positively associated with all the performance measures and significantly so when measured as ROE, which is in agreement with earlier results. Thus, Hypothesis 3 is partially supported in this study. Summary of the results are detailed in Table 6.44 below.

Table 6.44 Summary of Results

RQ	Hypothesis	Results	Support?
1 Is gender diversity associated with performance of listed SMEs in Australia?	RQ1H1: Gender diversity has a positive effect on the financial performance	The effect of gender diversity on performance were positive in all performance measures and significant when measured as ROE in overall industry. Positive and significant results were also found in sector-wise study.	Partially supported
	RQ1H2: Gender diversity has a positive effect on innovation	There is a positive association between gender diversity and innovation but not statistically significant.	Partially supported
	RQ1H2a: Innovation has a positive effect on firm performance	Statistically significant result was found in financial sector for Tobin's Q. Positive association between innovation and performance was found in a number of sectors.	Partially supported
2. Does innovation moderate the association between gender diversity and firm performance of listed SMEs in Australia?	RQ2H3: Gender diversity is independently associated with financial performance	Gender diversity is positively associated with all the performance measures but no significant effect of the interaction of innovation on gender diversity and performance was noticed.	Partially supported

Chapter 7: Discussion

7.1 Introduction

Chapter 6 reported the results of the study. The purpose of this chapter is to discuss the results regarding the effect of gender diversity on the financial performances of ASX-listed SMEs in Australia. This study uses secondary data to validate concepts derived from theories in the literature review and the outline of the conceptual model developed from the theoretical framework. Chapter 5 detailed the collection of data, and the methods used to analyse the data.

The structure of this chapter is as follows: Section 7.2 discusses the relationship between gender diversity and performance and Section 7.3 discusses the potential moderating effects of innovation on the association between gender diversity and performance. Each section first discusses the results, then critically analyses whether the empirical results support the underlying theories. For areas in which the theories fail to explain the results, alternative explanations are proposed. Section 7.4 consolidates the research findings and is followed by a summary of the chapter.

7.2 Relationship between Board Gender Diversity and Performance

Research Question 1 aimed to determine the association of gender diversity with performance of the ASX-listed SMEs.

This study found some direct relationships between board gender diversity and performance of listed SMEs in Australia. Board gender diversity is measured by Blau's index, which is the proportion of female directors on the board. Both the accounting-based (ROA, ROE, and ROCE) and market-based (Tobin's Q) approaches are used as measurements of firm performance. Controlling for factors such as board size, firm size, firm age and leverage in the regression analysis, this study found a statistically significant positive relationship between gender diversity and ROE. The absence of a significant relationship in other measures of performance does not necessarily mean that gender diversity is not related to the performance of firms. Significant positive univariable associations between gender diversity and accounting-based measures of firm performance are observed, for example in ROA, ROE, and ROCE.

The positive relationship between gender diversity in the boardroom and firm financial performance supports AT, RDT and HCT. Past accounting performance is linked to the boards due care and supervision in maximising management's performance to generate wealth for shareholders (Jensen & Meckling 1976). Further, women act differently than men, and these differences aid in monitoring activities. Women may also be more interested in monitoring boards, and women board members have stronger attendance records, which in turn improves the attendance of men. This type of behaviour could lead to better financial outcomes (Adams & Ferreira 2009).

Moreover, the results of this study are consistent with those of prior studies (Broome, Conley & Krawiec 2010; Campbell & Minguez-Vera 2010; Robinson & Dechant 1997), as detailed in the literature review. In summary, having more women on boards as directors could improve an Australian listed SME's financial performance. This is because women on boards have the potential to:

- Improve decision-making by evaluating more options. Women are particularly valued as board members for their ability to provide and generate more productive discussion and their presence may improve decision-making, as they are more participative and process oriented (Lucas-Pérez et al. 2015).
- Have a greater understanding of various areas in businesses than men, because of their different life and work experiences. As a result, diverse groups have the potential to provide critical and valuable information through bringing a greater range of perspectives to a board because of their experiences and differentiated knowledge (Hillman, Shropshire & Cannella 2007).
- Improve the board's decision-making processes in terms of innovation, creativity and quality. Board diversity provides strategic human and social capital resource to firms, which influences the firm's qualitative innovation efforts (Miller & Triana 2009).
- Produce better problem-solving results. The presence of women on a board produces more effective problem-solving (Nguyen & Faff 2006). Although heterogeneity may cause more disputes in the decision-making process at first, the range of views that arises may enable decision-makers to examine more alternatives and more thoroughly investigate the repercussions of those choices (Wang & Clift 2009).

- Improve the efficiency of the leadership. Greater representation of female directors is likely to influence the decision-making processes of a board. Post and Byron (2015) refer to UET and acknowledge that differences in the experience and knowledge of female directors ultimately lead to a wider pool of knowledge. Thus, an increase in female representation on corporate boards significantly influences how decisions are made. Women's leadership styles are said to be more participative, democratic and communal (Eagly, Johannesen-Schmidt & Van Engen 2003) than those of men, who are more likely to be autocratic (Eagly & Johannsesen-Schmidt 2001).
- Gain a greater understanding of the firm's market position, which helps build better global relationships. Women on a board help a firm to access a broad range of stakeholders, which has the potential to boost an organisation's legitimacy. This can enhance customer and supplier relationships (Hillman, Shropshire & Cannella Jr 2007). In an international setting, cultural sensitivity is essential, and ethno-cultural diversity makes corporate executives more sensitive to different cultures (Wang & Clift 2009).

7.2.1 Gender Diversity on the Board

A board members' task is to lead and support executives in managing the resources available and improving organisational efficiencies. Board members have a better understanding of how management functions and, as a result, know how to govern them. Investors, on the other hand, may interpret this as an emphasis on organisational efficiency rather than on investor wealth maximisation (Nicholson & Kiel 2007). According to Post and Byron (2015), the cognitive frame of female directors contributes positively to board decision-making, possibly because they bring perspectives, expertise and values that broaden the pool of knowledge considered valuable in decision-making. This will encourage deliberation in the board's processes. As a result, having female representation on boards enhances a company's ability to generate profits from its assets and investments.

In 2012, it was noted that the effects of gender diversity in the boardroom were not yet properly established because of improper implementation (Adams & Mehran 2012). Boards that are more diverse can necessitate additional mechanisms to promote member collaboration. Boards with a higher percentage of female members can face challenges in

establishing ways to collaborate. Further, when a firm's risk is high, it may select a board with fewer members to reduce disagreement and promote high cooperation among homogeneous board members. As a result, increases in gender diversity of a board of directors could be expensive for businesses and increasing gender diversity in a board may not necessarily improve a firm's performance. As a consequence of inconclusive findings, Fairfax (2010) argues that firms do not place a high value on the empirical evidence presented by research about the advantages of providing a gender-balanced board of directors.

On the contrary, homogeneous boards (in terms of gender) could lead to faster decision-making with fewer disputes (Bøhren & Strøm 2007). Further, it is possible that women have not served on boards for long enough to have had a significant effect on financial performance. The effect of gender diversity on firm performance is greater in businesses with poor governance structures because more gender-diverse boards have oversights that are more stringent. Gender diversity on boards can therefore lead to over-monitoring and, as a result, a reduction in value for firms that already have good governance processes in place. As a consequence, increases in gender diversity do not always imply improved performance (Adams & Ferreira 2009).

7.2.2 Effect of Female Members on the Board

The inclusion of women on boards increases the number of board meetings, and women on boards have higher meeting participation rates (Christensen, Kent & Stewart 2010). While female board members may view board meetings as a measure of carefulness, the market may interpret this as a lack of productivity or a higher business risk. There may also be a major concern among investors that women board members are more active than men board members, in areas other than maximising shareholder capital, such as the firm's social responsibility, long-term value, or improving stakeholder relationships (Langevoort 2010). This means that the involvement of female board members will cause the primary commitment to move away from short-term shareholder value maximisation and towards long-term non-financial goals, such as the firm's sustainability.

The appointment of women on the board of directors can have a negative effect on stock performance owing to investor bias (Dobbin & Jung 2011). Changes in boardrooms inevitably result in changes in investor behaviour. Investors in this category are thought

to devalue firms with female board members. Women are more likely to be appointed to boards of high-performing companies, but these appointments can have negative consequences (Dobbin & Jung 2011). Female directors have more of a considerable beneficial influence in high-performing organisations than in low-performing firms, indicating that the board gender diversity effect is not as uniform as previously claimed (Conyon & He 2017).

Gallego-Álvarez, García-Sánchez and Rodríguez-Dominguez (2010) report that having a larger number of women on boards has a detrimental effect on a company's financial results. This may be due to the interaction of other diversity variables, such as age, culture, education, training, previous work experience or other related factors that affect performance. It is important to remember that gender is just one aspect of diversity. Other factors related to diversity can affect a company's financial performance. There is even a case to be made that diversity increases board disagreement (Dobbin & Jung 2011). This could lead to a lower Tobin's Q.

The attributes of female board members have an effect on the relationship between female directorship and firm performance. Bennouri et al. (2018) found that female directorship significantly increased accounting-based performance such as ROA and ROE, but significantly decreased market-based performance such as Tobin's Q. After controlling for the different attributes of female directors that capture their monitoring capabilities and human capital capabilities as linked to demographic attributes and relational capital (tenure, multiple directorships, and media coverage), the authors found that the positive relationship between accounting performance and female directorship remained, while the negative relationship between Tobin's Q and female directorship disappeared. They also found that the different attributes of female directors did not uniformly affect accounting- and market-based performances. They explained the different relationships between attributes and firm performance by the trade-offs between the benefits and the costs of diversity on board effectiveness.

7.2.3 Influence of Female Members on Performance

Most previous research has assumed that the results of gender diversity in the boardroom are due to improvements in board member monitoring efficiency, which affects the profits of firms directly and indirectly in relation to the performance of shares. However, it

appears that the involvement of women does not increase firm performance, but rather hinders it. According to Dobbin and Jung (2011), women on boards have an effect on share prices as a result of improvements in board performance and monitoring. The effect on accounts-based performance measures and firm value moves in a similar direction. However, findings in the current study indicate that accounts-based measures of performance and firm value do not move in the same direction, suggesting that investor bias might exist. Women on boards may have a positive effect on earnings, but investors still place a negative value on women board members.

It is worthwhile to investigate how much influence female board members really have on a board. Having female members on a board may not lead immediately to improvement in a firm's performance, as female members may be viewed as tokenistic and do not have the power to achieve their plans. Another probable explanation for why diversity may not affect performance is that unconventional female board members may have embraced the behaviour and norms of conventional male board members and company executives, through a process of socialisation. This may be the only way to be noticed by senior decision-makers for high-level jobs in society, including access to boardrooms. As a result, the benefits of having female members on boards are never achieved or represented in any chosen performance measure (Rose 2007; Wang & Clift 2009).

According to Torchia, Calabrò and Huse (2011), visibility, polarisation and assimilation are the three behavioural effects exhibited when female members are treated as tokens. Because tokens are visible, female members are always under the impression that they must succeed. Polarisation occurs when the male members, as a dominant group, feel threatened or uneasy around tokens, and as a result, amplify their actions and reactions by exaggerating both token similarities and distinctions. Consequently, a majority group can exclude tokens from informal networks where essential socialisation occurs, resulting in social isolation for tokens. Therefore, tokens may feel socially isolated. Finally, assimilation means that tokens are forced into stereotypical categories identified by the dominant group, and that even if discrepancies occur among minority group members, they are not viewed by the majority groups.

In research on group behaviour, it is well known that in mixed-status teams, the higher status individuals talk more often and have more power and influence over group processes and discussions; as a result, the comments of lower status individuals may not

gain adequate consideration (Holtgraves 1986). This is relevant to a situation where women have limited authority and power, except where the chairperson is a woman. As a result, it is believed that the connection between gender diversity and firm performance will not always be positive or important in situations where status differences between decision-makers prevent women from being heard or influencing their colleagues (Miller & Triana 2009).

The benefits of the agency and resource dependence theories are noticeable once the token stage is passed. Gender diversity leads to success beyond the critical mass stage by increasing the diversity of backgrounds, ideas, values and attitudes among board members, and encouraging the sharing of new knowledge and know-how. It also offers exclusive social and career opportunities. When these factors are combined, board dynamics change, which is likely to have a positive effect on firm performance (Wiley & Monllor-Tormos 2018). The effect of critical mass could not be analysed in this study because of a lack of the required number of female members (three or more) on SME boards. This study found that female board participation has a mixed effect on accounting-based and market-based performances, perhaps because market behaviour represents not only a firm's ability to make profits, but also external perceptions and expectations regarding the firm's future or long-term value. Another possibility for why board gender composition is positively linked to accounting returns but not to market performance is that boards have more influence over accounting returns than market performance (Hambrick & Finkelstein 1995; Post & Byron 2015).

However, contextual factors are crucial to determine the nature of the effect of gender diversity on performance. The contextual factors for measuring performance are characterised by firm size, the stages of its life cycle, the number of years of existence, ownership and the nature of the industry. The companies must be context-aware to fully understand their measured performance. A firm's performance is also found to vary depending on the sectors in SME enterprises. The results of firm performance in primary sectors, which usually employ fewer women and are characterised by their distance from the final consumer, do not show a significant influence of gender diversity. However, results from firms in secondary and tertiary sectors show that gender diversity has a positive and significant relationship with firm performance. This evidence is in line with

the argument about the relative importance of female presence in sectors where firms are closer to consumers (Martín-Ugedo & Minguez-Vera 2014).

Measuring performance outcomes in terms of ROA, ROE, ROCE and Tobin's Q fails to capture the true extent of the effect of gender diversity on firm performance. The dynamics of diversity in the workplace are complex, and they influence firm output in a variety of ways that are not often captured by traditional financial metrics. There is a need to broaden the definition of what constitutes enhanced firm performance and to examine how gender diversity affects overall firm outcomes. In addition to direct indicators of firm profitability, investigation is needed regarding how diversity influences other variables such as talent development and retention, as well as corporate credibility, both of which are related to economic dividends. However, these effects are also difficult to quantify, and if the output variables being studied are unidimensional, they cannot be accurately measured. However, this study has found evidence of positive links between board diversity and performance overall, as well as in different SME sectors; as such, this does not contradict the case for including female members in the corporate boards of SMEs.

There is a possibility that the current environment is not set up properly to allow firms to achieve the benefits of board gender diversity. These results may be due to a missing moderator indicating how much power female board members have on the board. If female members on a board are seen as tokens and do not have the power to have their ideas implemented, then female representation on a board may not directly contribute to firm performance (Miller & Triana 2009). This rationale is consistent with the findings drawn by Dwyer, Richard and Chadwick (2003, p. 1009), who state that 'an appropriately configured and supportive organisational environment may need to be in place before the beneficial aspects of gender diversity can be fully realized'.

7.3 The Moderation Effect of Innovation

Research Question 2 investigates whether innovation moderates the association between gender diversity and firm performance of listed SMEs in Australia. This thesis explores how gender diversity on the board of directors influences innovation in firms. Because some of the results did not achieve statistical significance, the hypotheses that gender diversity positively influences firm innovation and the positive influence of innovation on performance can only be partially accepted. The moderation effect of innovation on

the relationship between gender diversity and firm performance in all measures of performances has not been established.

The findings suggest that further research work must be done to draw conclusions on this research topic. Although most studies focus on standard indicators of innovation (R&D, patents, publications, number of innovative projects, and percentage of innovative goods on the market), this study investigated the effect of board gender diversity on innovation by looking at gender diversity and R&D expenditure. Research and development expenditure by firms was considered a measure of firm innovativeness because this research is 'not primarily focused on research output, which is much less dependent on what the board decides and much more on factors outside its own influence, but rather on a firm board's commitment and decision to invest in R&D' (Midavaine, Dolfsma & Aalbers. 2016, p. 562).

7.3.1 Innovation and SMEs

Among the many meanings and principles of innovation, product, process, organisational and marketing are the four types of innovation considered here. When investigating the complexity of innovation strategy, this difference is particularly useful (Ballot et al. 2015). Product innovation cannot be the sole focus of an innovation strategy. Multiple aspects of the innovation process must be considered in an innovation plan, including R&D, collaboration, business research, consumer needs recognition, manufacturing process, job organisation, worker participation, and commercialisation of the innovation (Galia & Zenou 2013).

SMEs are essential components of the economy, as they stimulate innovation and competition in different industrial sectors. To compete in such economies, SMEs must be able to effectively support strategic management decisions and the needs of executives to consider appropriate strategies. The issue may be in the decision-making process, which is influenced by both internal and external factors and market conditions to promote innovation (Bayarçelik, Taşel & Apak 2014).

According to previous research by Karpak and Topçu (2010), legislation and policies are the most important factors influencing the performance of SMEs. The second factor is the location of the facility, and the third factor is the stage of the industry. The most important factor in SME innovation, according to Talebi, Ghavamipour and Irandust (2012), is the

stage of industries, followed by demand, industry-university links, and attitude towards work change, size and age.

However, management skills that play a critical role in the innovation process by encouraging entrepreneurial activities within a firm and providing adequate resources are frequently cited as the most important factor influencing SME performance (Man, Lau & Chan 2002). In contrast to their male counterparts, women on boards offer unique perspectives, backgrounds and working styles, as well as unique management skills and expertise (Daily & Dalton 2003; Hillman, Cannella & Harris 2002; Huse & Solberg 2006). This larger set of perspectives and knowledge aids in the discovery of new creative opportunities, such as innovation (Miller & Triana 2009). As a result, the involvement of women on boards is likely to have a positive effect on a firm's innovation.

7.3.2 Effect of Innovation in SMEs

Previous research shows that small businesses are unable to profit from gender diversity because their size polarises gender-diversity distribution. A small business's size prevents it from having a more gender-balanced workforce than its larger competitors. As a result, small firms have a lower degree of gender diversity and are unable to capitalise on the positive effects of gender diversity on innovation. There are also diseconomies of specialisation due to the predominance of small and young firms in some industries, in addition to size diseconomies. Small and young firms predominate in sectors such as information and communication technology, R&D operations, or services where women play a critical role, whereas larger firms predominate in sectors that are gender neutral or male-dominated (Teruel & Segarra-Blasco 2017).

SMEs face constraints in internal resources such as capital (funding), human resources and expertise, as well as constraints in accessibility to external resources due to their small size. Aside from cash flow issues, SMEs also lack the expertise and human capital needed to absorb external knowledge, which is critical for R&D and innovation. SMEs, unlike larger firms, lack complementary assets that are the assets, infrastructure or capabilities required to support the efficient commercialisation and marketing of innovation, such as intellectual property protection (Ceccagnoli et al. 2010). Capital constraints are a serious issue for SME involvement in R&D activities, as they rely on external business resources to conduct R&D activities. To gain advanced knowledge, they must pursue external

funding and collaborate with other organisations (Hottenrott & Peters 2012; Mancusi & Vezzulli 2014).

The importance of an intellectual property system for patents, trademarks and copyrights must also be considered, in addition to enhancing SME access to external resources. Even for creative SMEs, capturing the advantages of innovation can be challenging because of the difficulty of building a patent portfolio and the lack of complementary assets (such as intellectual property rights [IPR] management) to secure a competitive advantage. Small businesses are more vulnerable to patent lawsuits. Also, because of a lack of complementary assets, an SME's marginal revenues from R&D investment are reduced, lowering their incentive to invest in R&D. In addition, SMEs are unable to use external IPR to their own creative and competitive advantage because of a lack of absorptive capability and high costs (Lanjouw & Schankerman 2004). Thus, SMEs need capital, human resources, and skills for R&D and innovation. Traditionally, the most significant constraint to R&D and innovation has been a lack of internal and external resources (funding). Various public initiatives, including financial, networking and IPR support, have been introduced to close these gaps.

Accordingly, public policy debates have focused on providing direct funding through public incentives and tax credits. Owing to extreme knowledge asymmetry, it is argued that direct financial support is critical for ambitious young companies and start-up firms. Access to advanced expertise, on the other hand, can be an obstacle for creative SMEs. According to recent research, 'soft' or indirect financial support such as networking with universities and other organisations could be more successful than 'hard' or direct financial support (Nishimura & Okamuro 2011). Governments have been working to improve SME access to R&D services, to address inadequate R&D expenditure for SMEs and their outcomes. Subsidies from government and tax credits (deductions) are examples of traditional financial assistance programs. R&D tax credits, one of the most common types of innovation policy, often unintentionally favour large enterprises because R&D operations are largely concentrated in a few, generally larger, firms and because of their administrative burden. Financially constrained SMEs are less likely to use R&D tax credits and are more likely to obtain subsidies; on average, subsidies may be more suitable than tax credits, at least for SMEs (Busom, Corchuelo & Martínez-Ros 2014).

According to Palangkaraya, Spurling and Webster (2015, p. 193):

> SME firms that previously introduced innovations had an annual productivity increase that was 2.7 percentage points higher than non-innovating firms over the subsequent year. Furthermore, innovating firms with Australian-based collaborations raised their productivity by 4.4 percentage points per year. Given the nexus between profits and productivity, one might well ask: why don't all firms innovate?

One possible explanation is that managers might fail to innovate because they are unaware of their inefficiency or, if they are aware, do not know how to implement the necessary changes. For innovation to be successful, a complex group of activities that complement each other, such as specific collaborations, specialist in-house skills, intellectual property, marketing activities, capital investments and employee training, may be required (Bloom et al. 2013).

7.3.3 Gender Diversity and Innovation

According to Milliken and Martins (1996), diversity traits such as gender have cognitive effects, resulting in a wider range of ideas as well as a bigger number of ideas. Gender diversity may thus lead to product innovation, as more diverse concepts, both in terms of number and diversity, may improve the likelihood of a company launching new products or services.

Female directors bring a new set of values (Selby Smith & Ferrier 2005) and skills to a board, which can help to boost creativity and affect the degree of innovation (Torchia, Calabrò & Huse 2011). This expertise and experience will aid in the development of new products and services in the marketplace.

Østergaard, Timmermans & Kristinsson (2011) discovered a positive association between gender diversity and the possibility of introducing new products or services in their analysis of the relationship between employee diversity and innovation. Thus, it is expected that gender diversity on boards will have a positive effect on a company's product innovation. Sometimes, the success of an organisation's innovation relies on a contribution by all staff members. The various forms of individual information come into play to produce new knowledge or ideas in the sense of a complex social structure in an organisation (Woodman, Sawyer & Griffin 1993). Because diversity in the composition of a firm's staff leads to diversity in the knowledge base, the composition of individuals within a firm is a significant factor in understanding innovation. It should be considered

a social process. Employees work in groups to create, discuss, change, and implement new concepts, which is an interactive process. Employees engage in groups as part of the innovation process. Therefore, for a firm to be innovative, analysing board diversity alone is not sufficient; other aspects of the entire firm must be considered.

Women on boards, according to Kang, Cheng and Gray (2007), may have a greater understanding of consumer behaviour, customer needs and a firm's opportunities to meet those needs. According to previous studies, women have in-depth awareness of consumer markets and consumers, and one of the key effects of gender diversity on boards has been to expand the scope of ideas and perspectives to identify opportunities (Miller & Triana 2009). As a result, gender diversity on boards is expected to have an effect on innovation, especially marketing innovation. Other scholars suggest that when discussing the contribution of female directors to a firm's innovation, it is more appropriate to concentrate on organisational innovation, because this type of innovation is more 'people-oriented' and driven by unique individual characteristics (Torchia, Calabrò & Huse 2011). This implies that gender diversity has a positive effect on a company's organisational innovation.

Galia and Zenou's (2013) findings highlight that women on boards bring more influence in terms of understanding and targeting consumer needs and markets, rather than on introducing new products (product innovation). This contrasts with previous findings, such as those of Østergaard, Timmermans & Kristinsson (2011), which found a positive relationship (in a sample of Danish firms) between gender diversity and innovation, defined as the introduction of a new product or service by the company.

Cabeza-García, Del Brío and Rueda (2021) detected a moderating effect of innovation measured as R&D expenditure in the relationship between gender diversity and firm performance, when a firm has a critical mass of women on its board. The findings indicate that having a critical mass of female directors positively affects firm performance and creates an environment that promotes innovation and initiative in a strategic decision and as such, firm performance will grow as the firm's innovation activity increases.

7.4 Research Findings

Based on the research findings, the outcome regarding the hypotheses are as follows.

Gender diversity has a positive effect on firm performance, suggesting that gender diversity may improve firm performance. It could be implied that a larger sample size may have improved confidence in this parameter, confirming the hypothesis that gender diversity is associated with performance. However, even with the large sample size of this study, the confidence intervals were not narrow enough to demonstrate this association. This leads to a conclusion that such an association does exist in the accounting-based ROE measure.

The sector-wise performance data demonstrates that the presence of female board members has a positive effect on 75% of the performance measures in different SME sectors. Further, the potential effect of R&D expenditure as a moderator is not statistically significant. This is likely the first study to explore the moderating effect of innovation on the performance of a gender diverse board in SMEs. This outcome is not totally unexpected, as the significant moderating effect of innovation has only once been reported in the literature with the presence of critical mass in the corporate boards of large enterprises (Cabeza-García, Del Brío & Rueda 2021).

7.5 Summary

This chapter has explored the main discussion points and findings as they relate to the research questions posed and the hypotheses measured. It has also discussed the patterns that emerged across the different stages of the research, concerning gender diversity, firm performance, and innovation of the ASX-listed SMEs. This study is innovative as no previous research has examined board gender diversity and its influence on performance of listed SMEs, testing innovation as a potential moderating variable in the Australian setting. The findings of this study are consistent with prior research, where contradictory results or no results have been found when investigating the effect of board gender diversity on financial performance.

Chapter 8: Conclusions

8.1 Introduction

The aim of this chapter is to provide a summary of previous chapters and to recommend an approach to adopting the ASX Corporate Governance Council recommendation on gender diversity for changes in corporate boards of ASX-listed firms in Australia. The chapter is divided into five sections. The next section presents an overview of the thesis and summarises the main findings, the third section deals with the theoretical implications and sets out implications for policy and practice. The final section deals with the limitations of this research and offers a series of recommendations for future research.

8.2 An Overview

This study has attempted to provide a greater understanding of the effect of gender diversity in corporate boards on the performance of ASX-listed SMEs. This research is based on a soft regulatory approach, with the ASX recommending that listed companies implement a gender diversity policy and report on their results and accomplishments in accordance with that policy. Consequently, although the environment is not obligatory, it does exert significant external pressure on organisations to comply.

The literature review provided an outline of the effect of gender diversity on the financial performance of organisations around the world and confirmed that, despite significant research into the different types of organisations, there has been relatively little research into ASX-listed SME firms. The literature reviewed, in general, appears to support a 'business case' arguing that greater gender diversity improves financial performance. However, a closer examination finds that methodological difficulties, mediating variables and processes, and contextual factors all influence the direction of the relationship between gender diversity and firm performance.

An important topic worth investigating is how gender influences decision-making and the context of that decision-making. Advocates for more female representation on corporate boards typically use one of two arguments: the legal or business case for diversity. For equity purposes, the legal case for diversity argues that women should be considered for leadership roles. The goal is not to specifically improve results, but to ensure that more

female representation is seen as a positive and justified outcome. As a result, a higher proportion of females on boards may not be linked to better firm results, but it may reflect that boards with more females are more representative of society, where factors other than gender alone lead to better financial outcomes. The business case for diversity claims that having a diverse board of directors enhances financial growth and success, meaning that having a higher proportion of female directors is related to better company performance.

The argument for diversity in the workplace should not be completely disregarded. Contextual factors, as well as how diversity is handled, can influence whether increased female representation and the resulting increase in presence of gender diversity on corporate boards results in performance benefits for a company. Finding unique moderators has been a challenging task. The study could not support the potential effect of innovation as a moderator for the board gender diversity and performance link, as it had no effect in this study.

The theories discussed in the study suggest that greater gender diversity on a board is expected to contribute to a greater firm value. The theoretical basis for the hypotheses was mostly drawn from RDT, AT and HCT. The impact of CMT could not be investigated because of the lack of number of corporate boards with a critical of women mass in this study. The results do not show any significant effect of gender diversity on financial performance, except for ROE, but at the same time there is no evidence of a significant negative link between board diversity and performance. Thus, the results do not contradict the case for including female members on the corporate boards in SMEs. The effect of gender diversity may be different under different circumstances at different times. Thus, over several companies and time periods, the result could be offset and produce no effect on firm performance.

However, this study is expected to fill a gap relating to the understanding of how SMEs go about making corporate governance changes and to provide customised and practical recommendations for future corporate governance reforms by the ASX. This research provides new insight into understanding corporate governance change in ASX firms in different Australian SME sectors and provides directions to manage reform more effectively in a corporate boardroom. The outcomes of this gender diversity study may aid theorists in determining the appropriate balance of female members on corporate boards in SMEs to improve performance and contribute to the Australian economy. Also,

by taking input from the findings, regulators and industry can formulate policies to foster gender diversity on corporate boards in these Australian industries.

8.2.1 Main Findings

This study is based on the percentages of female directors from 2014 to 2018 and it is worth noting that the ASX's pursuit of a diversified composition, which includes requirements for boards or a relevant committee of the board to set measurable objectives for achieving gender diversity, has resulted in an increase in the number of female directors. The study found an increase of female directors in the corporate boards of SMEs from 16.67% in 2014 to 24.94% in 2018. This indicates a positive trend towards appointing female directors in corporate boards. However, the study also found only one woman on the board in more than 80% of the gender diverse firms in a sample of 798 ASX-listed SMEs.

The results gathered from the investigation and the key findings as they relate to the conceptual framework and research questions are discussed in the following subsections.

Research Question 1: Is gender diversity associated with the performance of listed SMEs in Australia?

This discussion responds to Research Question 1 concerning the association of gender diversity and performance. It also elaborates on the testing of Hypotheses 1, 2 and 2a. The effect of gender diversity on performance is positive in all performance measures and is significant when measured as ROE in listed SMEs in Australia. Positive and significant results are also found in the sector-by-sector analysis. There is a positive association between gender diversity and innovation and also a positive association between innovation and performance in a number of sectors. Thus, the results of testing for all these hypotheses are partially supportive.

Research Question 2: Does innovation moderate the association between gender diversity and firm performance of listed SMEs in Australia?

Research Question 2 concerned the moderating effect of innovation on the association between gender diversity and performance and was tested in Hypothesis 3. Gender diversity is positively associated with all the performance indicators; however, no

significant effect of the interaction of innovation on gender diversity and performance was noticed. The results of testing for Hypothesis 3 are partially supportive.

From these results, it cannot be said with certainty that a woman on a board influences the performance of the company itself. As with previous empirical studies, the findings may support the notion that having women on boards is the logical consequence of a more modern, innovative and transparent environment where all levels of a company achieve high performance. The results may also support the notion that companies with women on their boards have better relationships with relevant stakeholders at all levels of the company, which also enhances the company's reputation. This supports the principle that all the theories employed in developing the hypotheses, particularly RDT, describes a board of directors as also serving as a linking mechanism for all relevant stakeholders (Hillman, Shropshire & Cannella Jr 2007). In addition, female employees are encouraged to perform more effectively with women on a board because they can all visualise the opportunity to reach the top (Rose 2007). Firms can be more successful with female members on their boards because people are promoted based on their abilities rather than on demographic characteristics (Krishnan & Park 2005). Therefore, firms are more successful at using the entire pool of competent directors instead of half of it.

More research is needed to determine the causes behind these companies' superior ROE performance and the other factors mentioned above. Other things worth investigating include whether the female members of a board have different management or supervisory styles than their male counterparts and whether firms with more women on their boards are also more diverse on other levels, along with how shareholder return is related to diversity. The findings could contribute to a better understanding of the cause-and-effect relationship between diversity and corporate performance.

8.3 Implications of the Research

8.3.1 Theoretical Implications

Research about women on corporate boards is a critical enabler, not just for making an academic contribution, but also for laying the groundwork for change. This is to be more inclusive, and also for more effective gender representation at corporate decision-making levels (Terjesen, Sealy & Singh 2009). However, the number of female directors is not always an important factor in determining the effectiveness of corporate boards. Instead,

processes and team dynamics have greater explanatory power for the outcomes of board work. As a result, it is critical to not only select women for corporate boards, but also to establish favourable conditions for board members to reach their full potential. Board effectiveness can be considerably improved by focusing attention on board development activities and open debate while attempting to reduce conflicts in the boardroom. Moreover, because women directors may have various effects on different board activities, it is vital to define the nature of the board responsibilities beforehand and evaluate how hiring women with specific skills and attributes can assist the board accomplish some of these tasks more effectively (Nielsen & Huse 2010b).

This research has demonstrated a partial positive effect of gender diversity on the performance of ASX-listed SMEs despite a low percentage of female directors. It highlights the fact that the composition of gender diversity in the corporate board of SMEs has not yet been adopted to the recommendations of the ASX Corporate Governance Council and the limited representation of the proportional number of female board members in these corporate boards.

Some effects of gender diversity on innovation are demonstrated, which is in line with the findings of Teruel and Segarra-Blasco (2017) who state that firm size exerts a moderating role between gender diversity and the probability of innovating. Their findings show that it is more difficult for small firms to take advantage of gender diversity during the innovation process compared with large firms, and the effect of gender diversity on innovation outcomes differs, depending on the type of innovation.

The importance of gender diversity in fostering innovation is particularly important now, as organisations in all sectors struggle to cope with the disruptions brought on by rapid technological breakthroughs. These transformations, which range from automation to artificial intelligence, present organisations with both opportunities and challenges as they try to remain competitive against new goods, services or business models that are completely supplanting existing versions. Female leaders are more likely than men to demonstrate essential leadership behaviours such as investing in people's development and aligning professional demands with appropriate remuneration, which are favourably connected with such disruptive innovation (Joshi 2018). Despite the fact that these leadership skills are crucial for future company demands, they are in scarce supply,

bolstering the case for companies to pursue gender diversity and leverage it towards navigating a rapidly changing marketplace and so remain sustainable.

The presence of women directors helps diversity lead to more creativity, more diverse opinions and better decision-making processes. Thus, an innovative environment at the organisational level will enable decision-makers to see that they have sufficient resources to fund innovation activities and encourage more creativity and initiative, which leads to better performance. However, it is worth mentioning that firm innovativeness is not limited to the R&D department. A company's sustainable innovation being made possible by investing in R&D depends on factors that are organisationally separated from the R&D department. Diversity within the management team completely guides the innovation of a company (Metz, Harzing & Zyphur 2016)

In addition, the design and implementation of effective government innovation policies can improve the relationship between corporate governance and corporate performance. It is important for companies not only to increase their gender diversity, but also to invest in R&D to maximise the benefit of having women on the board. Adopting effective government innovation policies can improve the direct link between corporate governance and business performance.

8.3.2 Implications for Policy and Practice

This study extends the previous research by identifying gender diversity factors influencing corporate governance on the performances of ASX-listed SMEs. It has filled a gap relating to the presence of females on board in the ASX-listed SMEs, which may help future corporate board reforms in SMEs.

The knowledge gained through this research about the effect of gender diversity on the performance of listed SMEs in Australia regarding the changes in composition of corporate boards offers new insights into managing SMEs. The findings of this study may help theorists to define the correct proportion of women on corporate boards. Firms might come up with human resource policies, such as effective gender-neutral policies for appointing directors and create a positive environment at the organisation's top level through training and development programs so that the organisational culture is welcoming and encouraging to female directors. The inclusion of woman may not be considered a social requirement but a move to foster a more sustainable organisational

environment. Gender diversity has a significant social effect in addition to influencing a company's bottom line. As a result, this author agrees with Ferreira (2015, p. 110), who states: 'When discussing policies that promote women in business, it is better to focus on potential benefits to society that go far beyond narrow measures of firm profitability'.

The results here indicate that policymakers should encourage the right kind of diversity at the board level to improve a firm's creative outcomes. Instead of focusing on outcome issues such as patenting and R&D expenditure, innovation policy needs to concentrate on corporate issues such as board composition.

Regulators and firms must come forward to nurture gender diversity on corporate boards because to make such initiatives a success, regulations and the organisational culture must work hand in hand. Gender diversity on corporate boards leads to more efficient corporate governance through several board processes, some of which do not have a direct effect on the company's bottom line. Women directors contribute to significant firm-level outcomes in addition to governance outcomes because they play direct roles as executives, mentors, and network participants, as well as in indirect roles as models of opportunity for other women, inspiring them to succeed and remain with a firm. They deserve more credit for their important contributions to a firm's value (Terjesen, Sealy & Singh 2009).

SMEs are less inventive than large enterprises on average. Certain small enterprises can be extremely innovative and can exceed big organisations in terms of efficiency. Companies with higher innovation output develop and apply internal strategic instruments (e.g., management skills, ICT skills, R&D) as well as engage with external stakeholders in the innovation framework. Innovation has a critical role in determining efficiency and long-term growth. Supporting innovation in existing SMEs will promote inclusive growth by overcoming the productivity and salary gaps between SMEs and large businesses. Governments may aid SMEs in innovating by encouraging a healthy business climate, assisting SMEs in generating and effectively exploiting internal strategic resources, and providing an innovation framework that is successful in commercialising research and is also inclusive of a wide spectrum of SMEs (OECD 2018).

In partnership with other important stakeholders in the national innovation ecosystem, governments can stimulate innovation in existing SMEs by fostering a market climate that is conducive to growth and promotes the production of strategic assets and capital at the business level. They should ensure that SMEs are taken into account while developing R&D policy. Because they can be targeted, especially as small firms or programmes in which small businesses are more likely to participate, R&D grants are more likely to benefit SMEs than tax incentives (e.g., collaborative innovation). Small firms may be encouraged to employ intellectual property (IP) if the government encourages this. It is also critical to help SMEs use IP by increasing their understanding of various types of IPR, improving IPR-related skills in SMEs through education and training, and making the IP system more user-friendly SMEs by streamlining processes, properly structuring fees, and costs, and improving litigation and compliance mechanisms (OECD 2018).

8.4 Limitations and Recommendations

8.4.1 Research Limitations

In this study, the effects of gender diversity on firm performance and innovation were examined exclusively using archived secondary data sources. It has not considered the relationship between specific dimensions of innovation and business performance in SMEs specific to any particular industry such as manufacturing or the service sectors. Second, when looking for evidence to create a business case for more female members on boards, consideration must be given to the reasonable time before or after a woman is appointed to the board and the existence of a possible threshold number of members (critical mass).

Also, the findings addressing the relationship between female board representation and both stock price increase and total shareholder return should be investigated. While the only difference between the results for these two variables is the amount of dividends paid out, this could imply a difference in attitude between male and female directors towards the shareholders' and the company's interests (Lückerath-Rovers 2013).

This study did not explore all the relationships and constructs associated with gender diversity and business performance identified from the literature. It is limited to the influence of female board members on the financial performance of a firm, and it does not address the full effect of female members on an organisation, as their presence brings

multiple social benefits for all stakeholders (Hoobler et al. 2018). The presence of female board members improves the quality of primary responsibilities of boards, such as monitoring and strategy involvement (Post & Byron 2015; Sila, Gonzalez & Hagendorff 2016). In addition, as women form a major segment in the consumer market, having them on the board may contribute to better strategic decision-making; Brammer, Millington and Pavelin (2007) found that board diversity is influenced by the diversity that exists in the target market segment. Arfken, Bellar and Helms (2004) argue that to enhance strategic decisions, board members should reflect the corporation's consumer population.

The information gathered from the collection of data for this study does not permit a direct analysis of how a female director begins or contributes to the formulation of organisational strategy. Multiple perspectives of how gender diversity improves performance have been described, but the process of selecting directors has not been reviewed nor has this study assessed how subsequent performance is influenced by the characteristics of a director such as age, education, tenure, and experience in the sector (Moreno-Gómez, Vaillant & Lafuente 2018). More investigation into this topic would be beneficial. Also, cultural contexts, legal frameworks and market development variances may all play a role in how gender diversity affects performance. The study's geographic exclusivity necessitates extreme caution when interpreting and generalising its conclusions.

The conceptual framework originally developed for this study was to provide a more gender-sensitive measure of gendered processes. The alternative of reducing gender to biological sex by only considering the combined effect of demographic and functional gender diversity attributes (gender, age, tenure, and education) of female members in board processes through developing a GDI (Humbert & Günther 2018) could not be supported because of the unavailability of data for SMEs. As a result, an alternative working model was developed to extend the study of the effect of gender diversity on the performance of the individual firms in different sectors of the SMEs.

Thus, there are some limitations to be emphasised in this study, and the research methods in which it is outlined. First, it should be noted that the presence of women is only one aspect of diversity, and there are other factors that may be relevant. There may be concurrent effects of other variables such as age, culture, education, training, previous background and experience of the director, corporate social responsibility and other

relevant aspects of diversity that have not been considered. Given that some of these variables are difficult to measure, nevertheless they can affect the relationship between diversity and performance. Second, this research methodology should be complemented by other types of analysis, such as case studies and surveys, which can provide researchers with basic and primary information on how gender diversity in firms evolves (Gallego-Álvarez, García-Sánchez U Rodríguez-Dominguez 2010). The sample surveyed includes relevant SMEs listed on the ASX that have shown a growing interest in gender diversity on their board of directors. Third, the number of female members included in the sample is small (about 25% in 2018) because there are few women board members in the listed SMEs of ASX companies. It seems appropriate to do more research within a few years when boards become more diverse. Only ASX-listed companies are included in the sample. The findings should not be applied to all Australian businesses. The usage of supplementary data is another potential flaw. It may be reasonable to interview a sample of directors to confirm that their opinions corroborate with the data and results obtained.

Another research limitation is that even though there is relationship between the presence of women on a board and a company's performance, it is more difficult to establish a causal relationship. Brammer, Millington and Pavelin (2007) argue that a firm's business environment influences board diversity and suggest that proximity to final consumers has a greater effect on board diversity than does the proportion of women in the industry's workforce. The characteristics of the company can also affect the composition of the board of directors. For example, a service-oriented company might have more female directors than a manufacturing company, taking into account the gender of employees and customers. Increasing the number of female employees at all levels of a company could lead to an increase in the number of women in managerial positions and ultimately on the board of directors. Following RDT, companies with many female clients might have more incentive to communicate and effectively connect with those clients through female employees at all levels (Lückerath-Rovers 2013).

R&D expenditure as a measure of innovation has some limitations. Kemp et al. (2003) mention three limitations of this measure. First, R&D expenditures are an input to the innovation process and state nothing about the outcomes of this process. Second, R&D expenditures are not all related to innovative processes. Finally, R&D expenditures

underestimate innovations in service and small companies. The number of patents, new and efficient processes could capture the innovative output.

In this study, the author found no effect of innovation on firm performance. This is in agreement with the findings of Kemp et al. (2003), who found that innovative output has no effect on the profitability and productivity of SME firms. From a theoretical perspective, the positive effects of innovation may be expected. For firms that do not invest in innovation, one may expect that profit will decrease over time. Therefore, new research may focus on the relationship between innovation and the development or persistency of profitability.

8.4.2 Future Research

The improvement in financial performance should not be treated as the only justification for female board members. The integrity and broadening of perspectives that female directors bring to an organisation may lead to social as well as financial benefits. The influence of female directors on board processes, dynamics, and behaviours, in addition to financial outcomes, should be explored in future. Board gender diversity influences a company's other strategic decisions, such as organisational innovation, resource allocation, long-term investment, and stakeholder relationships (Miller & Triana 2009; Triana, Trzebiatowksi & Miller 2014). Future research may examine more process and outcome variables to help unravel the effect of boardroom diversity on results. An example might include the effect of board gender diversity on businesses as a result of mergers and acquisitions (Conyon & He 2017).

There is a high risk to SME firms because of the high costs associated with R&D expenditure, as well as human and other resource constraints. Given current competitive market conditions, SMEs find it challenging and risky to spend on R&D. Because SMEs often lack the support of infrastructure and administrative structures that aid large organisations in their decision-making processes, they must rely more on their managers' skills (Lubatkin et al. 2006; Sen & Cowley 2013). However, as opposed to larger corporations, a greater fluidity of interaction among employees in SMEs can lead to increased speed and versatility in the application of information to generate new ideas (Ruiz-Jiménez, Fuentes-Fuentes & Ruiz-Arroyo 2016). So, before making any decisions, SMEs must devote sufficient time and resources to collect enough information about

consumer demands and trends for their goods, as well as competitors and sources of innovation. Future research should concentrate on this decision-making method for undertaking innovation (Mohamad & Sidek. 2013).

Some researchers have noted that gender diversity on boards of directors is relatively more prevalent in specific industries, such as finance, telecommunications, pharmaceuticals, health care and consumer goods. However, they did not examine this issue empirically (Joecks, Pull & Vetter 2013). Future researchers may explore the relationship between gender diversity in corporate boards with different types of company performance indicators, which include growth-based measures (sales growth) and operational measures (delivery turnaround times, new product development time and customer service response) in addition to the market-based and accounting-based measures employed in this study. Also, future researchers might consider different forms of firm-level outcomes other than performance measures in examining the effect of gender diversity on corporate boards. Some of these outcomes might include corporate social responsibility spending, opportunities for companies to turn around their performance, and the inclination of companies to build relationships with key stakeholders, such as customers, suppliers, and investors.

Thus, research on gender diversity in corporate boards needs to consider gender-related processes within other grounds of diversity. Future work could investigate the effect of board diversity and its interaction with other factors such as age, education, and tenure of the individual member on firm performance. The beneficial effects and drawbacks of age diversity were discussed in Chapter 2. Future research might examine how the remuneration and incentive programmes of board members influence the relationship between age diversity and firm performance. Researchers can also explore how age diversity on corporate boards affects a company's strategic direction in terms of exploration and exploitation.

The characteristics of educational diversity and tenure diversity are detailed in the literature survey chapter. When it comes to educational diversity, future researchers can examine how the nature of the industry moderates the relationship between the natures of individual board member's education (engineering, medicine, business, etc.) diversity and company performance. This question will be interesting because companies in knowledge-intensive industries need special knowledge and skills. Future researchers can

explore the effects of board tenure diversity on different types of firm performance measures. In addition to the above, researchers can examine the differences between the effects of observable demographic characteristics of a board member and the effects of deeper level diversity related to attitude and opinion, and information about the board members on firm performance.

Another important topic is identifying the effect of female directors who have a family relationship with the owner on the company's performance and whether the qualifications of female directors are related to performance. Future research can conduct primary research to supplement the results of this study by collecting primary data. This can be obtained by conducting interviews with board members and corporate directors on the perception of female directors' influence on monitoring and strategic decisions that can reveal more about board processes and explain how a board makes decisions.

The notion that all women share some common features simply because they are females is a common side effect of efforts to achieve equal representation of women in gender-diversity research. Mandatory gender understandings are risky not just because they obscure women's diversity, but also because they regard gender identities as fixed and determined by a small number of criteria. When distinctions between men and women are exaggerated, the less strong female group is deemed more homogeneous. This focus on gender disparities, however, ignores inequalities in women's class, colour, age, marital status and social situation. Future studies on gender diversity can examine deeper degrees of diversity, not just diversity in demographic characteristics such as gender, to close this gap (Torchia, Calabrò & Huse 2011).

In addition, a study of female director human and social capital could disclose what specific attribute they contribute to boards and how those attributes improve board functioning in the context of specific events, environmental situations and corporate value-adding strategies. Female directors, in particular, appear to boost the financial performance of organisations that require more creativity, innovation, and critical thinking. As a result, future context-specific studies on the relationship between gender diversity and financial performance should choose specific environments where gender diversity benefits are fully leveraged (Wiley & Monllor-Tormos 2018).

Since past studies used proportion of female board menbers as a measure of diversity, future research should investigate if the measurement used in this study, i.e, dichotomised GDI, is more appropriate than the proportion of female board. This can be done by including both measures in the model and to find out which one is more significant. Another suggestion for future research would be to expand the data gathering to other key internal and external stakeholders of relevance and explore the transferability of study findings to other contexts. The implications of the study could potentially be expanded to cover off social and societal perspectives as well.

8.5 Chapter Summary

This study is one of the first of its type conducted in Australia on the inter-relationship between gender diversity, innovation, and performance of ASX-listed SMEs. It may not provide conclusive evidence of how much effect women on corporate boards have, but it does indicate that companies with women on their boards show a positive association between firm performance and gender diversity, with a significant positive ROE. The inability to generalise the findings to other countries is a drawback. The findings of this analysis are mixed. This may be due to the measurement of female directors as dichotomous variables, which ignores gender as a structure of relationships, identity, and power (Hoobler et al. 2018).

8.6 Publications Resulting from the Work Related to the Research

1. Li, Y & Mitra, D 2019, 'CSR and performance of family businesses: systematic review', paper presented at the Environmental, Social and Governance for Sustainability 2019 Program, Victoria University Business School, Melbourne, Australia.
2. Ly, P, Li, Y & Mitra, D 2020, 'CSR and performance of family businesses: systematic review', *Australasian Accounting, Business and Finance Journal*, vol.14, no.3, pp.1–14.

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