

BOARD DIVERSITY, TEXTUAL SOCIAL and
ENVIRONMENTAL DISCLOSURES, AND
CORPORATE PERFORMANCE

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The Impact of Board Diversity on Textual Social,
Environmental Disclosures, and Corporate Performance

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Abstract

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Drawing on the notion of faultlines – a hypothetical dividing line that splits a group into two or more subgroups based on the alignment of one or more individual attributes – this thesis proposes a new approach to the measurement and assessment of board diversity to understand how high(er) performing boards can be built i.e., the multi-dimensional diversity index (MDI). The proposed MDI captures the joint effect of differences in director attributes at four diversity levels for 26,743 directors, namely: (i) surface (or baseline); (ii) identity; (iii) demographic; and (iv) meso-level. The current study uses three-stage least squares (3SLS) with a panel of 3,357 FTSE All-Share index non-financial companies from 2005 to 2018. To this end, a key implication of this study – and by extension, the proposed MDI – is that it challenges the conventional notion that boards are improved ‘enough’ by focusing on the micro-dimension and increasing stand-alone diversity attributes, such as gender. Collectively, this study’s results suggest that a well-diversified board incentivises managers to disclose more information on social and environmental activities in contrast to firms with an extreme faultline score. The results show that highly effective boards with a moderate faultline score at meso-level diversity (e.g., identity, information, and non-demographic attributes) lead to better accounting profitability, corporate value, and market-based performance. Remarkably, the present study finds that nationality diversity *per se* positively impacts corporate performance; in contrast, the dominance of male directors hinders firm performance significantly.

Keywords: automated textual content analysis; board Faultline; corporate governance; meso-level diversity; social and environmental disclosure; value-based corporate performance.

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Dedication

TO MY GORGEOUS FAMILY

My parents, the memory of my father and my beloved mother “Mrs Seham Gamaleldin”.

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List of Abbreviations

MDI	Multi-dimensional diversity index
SED	Social and environmental disclosure
CSR	Corporate social responsibility
VBM	Value-based measures
EVA	Economic value added
NOPAT	Net operating profit after tax
WACC	Weighted average cost of capital
RI	Residual income
ROA	Return on asset
ROE	Return on equity
ASW algorithm	Average silhouette width
BOD	Board of directors
E-PRTR	European pollutant release and transfer register
FRC	Financial reporting council
FTSE	Financial times stock exchange
GAAP	Accepted accounting principles
GLS	Generalized least square
IFRS	International financial reporting standards
LCCA	Latent class cluster analysis
LSE	London stock exchange
MDI	multi-dimensional diversity index
MENA	Middle east and north Africa
MNEs	Multinational enterprises
NASDAQ	National association between securities dealers
NYSE	New York stock exchange
OLS	Ordinary least square

Chapter 1: Introduction

1.1. Overview

The convergence of board diversity, corporate disclosure and performance has received considerable attention in recent years. The route of this thesis began with the study (Hung 1998) to evaluate to what extent the Cadbury and Greenbury report targets were reached in response to the Hampel Committee. The Hampel report, resulting in the Combined Code on Corporate Governance, was published in 1998 (the Combined Code), which applied to all listed companies. The same theme was re-examined following major financial crises, such as the Enron and Parmalat scandals (Beretta and Bozzolan 2008). Given the 2008 global financial crisis, these ideas continue to be examined. Reasons for such increased attention are discussed in the next section.

Corporate governance (CG) research (Thatcher and Patel 2012; Hafsi and Turgut 2013; Meyer et al. 2014; Chung et al. 2015b; Spoelma and Ellis 2017; Fang et al. 2018; Aguilera et al. 2019; Desender et al. 2020) considers appropriate board diversity proxy based on micro-dimension director attributes, such as the board composition process, according to traditional diversity attributes (such as gender). However, little attention has been paid to designing a diversity index that accounts for the potential interrelationship of characteristics on a multi-dimensional basis that could lead to a well-balanced board in terms of the dispersal of managers' skills across subgroups, increasing board efficiency and dealing with evolving business events. The United Kingdom (UK) Corporate Governance Code (hereafter, 'the Code') stresses the importance of balancing a diverse set of skills and attributes among directors (due to differences in demographic characteristics) with how the board works together as a unit (based on non-demographic factors) to ensure maximum efficacy and

effectiveness (Sealy 2018). In response, this thesis constructs an MDI that allows stakeholders to measure and assess levels of board diversity.

In view of the increasingly studied and generally recognised role of CG and board diversity in corporate social responsibility (CSR) (Michelon and Parbonetti 2012; Attig et al. 2013; de Villiers and Marques 2016; Jackson et al. 2019; Muslu et al. 2019a), little attention is paid toward the impact of multi-dimensional board diversity on social and environmental disclosure (SED) (Terjesen et al. 2009; Qiu et al. 2016). This thesis argues that the SED frequently requires large investments with multi-dimensional and quite unpredictable effects that can have a direct impact on different stakeholder goals.

Many organisations have agreed to integrate elements of board diversity into the annual report. It is not always clear whether diversity goals exist at the board and management levels, and if so, how they are accomplished and what their consequences are for organisational performance. Contemporary trends in diversity have led to a proliferation of articles that demonstrate how board diversity formulates corporate performance (Homroy and Slechten 2017; Kumar and Zattoni 2017b; Yoshikawa and Hu 2017).

There are several performance mechanisms with regard to board diversity ties to corporate performance, value-based (VB) measures (e.g., economic value added (EVA) and residual income (RI)) along with market-based performance measures (e.g., Tobin's Q), besides accounting profitability measure (e.g., return on assets (ROA) and return on equity (ROE)). To the best of this study's knowledge, VB management literature entails a limited understanding of how multi-level board diversity based on attributes of high-performing boards enhances corporate performance from different approaches.

Studies on faultlines categorise board faultline into (i) social (identity) characteristics (age, gender, ethnicity); (ii) informational characteristics (experience, education, tenure); and (iii) non-demographic characteristics (personality, location, ownership, salary) (Harrison and Klein 2007; Ben-Amar et al. 2013; Chapple and Humphrey 2014; García-Meca et al. 2015; Fang et al. 2018).

In the last decade, there was over-reliance on the demographic diversity aspect (Boiral 2016) rather than statutory, cognitive or non-demographic dimensions (Hafsi and Turgut 2013). Based on this, there is still a need to develop a diversity measure, which can be used to demonstrate the influence of directors' new demographic and non-demographic attributes of highly effective boards on performance (Ben-Amar et al. 2013; Ward and Forker 2017).

The increasing complexity of business strategies makes it difficult for investors to appreciate CSR information by itself without more detailed information on corporate environmental practices (de Villiers et al. 2011; Post et al. 2011; Cooper et al. 2014). One way to fulfil the needs of the stakeholders is improving communication skills and enhancing the value relevance of information through best practice disclosure. Therefore, this thesis investigates the drivers to increase corporate SED in the UK context.

Further to that, this study analyses firm performance concerning the proposed MDI for diversity. The analysis also considers board-level diversity (e.g., board size, stability, structure, succession, activity, attrition, nomination independence and CEO duality). By analysing VB performance, taking into consideration variances between different boardrooms and diverse director attributes levels, the present study aims to highlight new aspects in diversity research.

Three interrelated studies are therefore performed to fill the gap in the literature of diversity. There is a clear gap in corporate boardroom literature that diversity does not have a clearly defined multi-dimensional measure. The main aim of the first analysis is therefore to introduce a multi-dimensional and accurate measure of diversity. Further to that, increased attention is paid to board diversity (e.g., the latest revision of the UK Code in 2018) and corporate SED represents the main focus in study two. The third study explores an interconnection between diversity in boards and corporate performance, namely the integrated effects of the linkage between diversity and the corporate market and VB performance.

1.2. Rationale of the thesis

There are four fundamental reasons for conducting the current study, especially regarding general and specific motivations. There is a general research motivation to study board diversity, which is subdivided into three specific motivations in association with its implications on SED and corporate performance.

Regarding the first motivation, board diversity has recently attracted wide attention, both at the academic level (e.g., Ben-Amar et al. 2013; Hafsi and Turgut 2013; Ben-amar et al. 2017a; Nekhili et al. 2017; Bennouri et al. 2018; Cabeza-García et al. 2018; Sealy 2018) and at the professional and policymaker levels (e.g., FRC 2012; The UK corporate governance code 2018). This thesis moves away from the most traditional board diversity (single dimension approach) (Carter et al. 2010; Wang and Kelan 2013; Ali et al. 2014a; Chapple and Humphrey 2014; Liu et al. 2014; Carrasco et al. 2015) and facilitates instead a conceptualisation of diversity in relation to the cumulative impact of several demographic and non-demographic director characteristics at multiple levels

through linking the advanced faultline concept, whereby a hypothetical dividing line splits the boardroom into subgroups.

The second motivation is to build an MDI to capture multiple levels of diversity. Although the governance index (G-index) is an important element of governance, successful development in this field of research is the creation of an MDI.

In the third motivation, when reviewing the extant literature on the association between board diversity and SED, many limitations and research gaps have been identified, which reinforce the importance of the current research. The first research motivation arises from the significant challenge of measuring best practice social and environmental reporting, in a recent article (see, Loughran and McDonald 2016; Caglio et al. 2020) review of prior research that considers different proxies for corporate disclosure, thus making this the first research – to this study's knowledge – to be the most extensive scale study on textual SEDs which combines longitudinal with cross-sectional observations, at the same time. Further to that, there is a need to develop a computerised content analytical approach to allow large-scale disclosure studies to be carried out. Prior literature ordinarily analyses the content of the information manually (Wilmshurst and Frost 2000; Core 2001; Kolk et al. 2001; Ballou et al. 2006; Gibson and O'Donovan 2007; Caglio et al. 2020). This approach, however, is labour-intensive and thus the sample size is often small, raising concerns about results generalisation. Therefore, a computerised approach needs to be developed that is highly reliable and replaces the manual content analysis approach. The research underlying this is, therefore, important because it introduces a computerised approach to content analysis to assist in the implementation of large-scale divulgation studies.

The fourth motivation, despite much faultline research (Bezrukova et al. 2016; Spoelma and Ellis 2017; Antino et al. 2019; Meister et al. 2019), is the need to study the impact of diversity on the drivers of corporate value creation and which have attracted attention over the last decade. In a similar vein, the faultline concept and multi-level approach have evolved, describing board of directors' subgroup dynamics and VB practices which still need more analysis.

There is an increasing interest in adopting EVA in academia and policymaking (Ferguson and Leistikow 1998; Young and O'Byrne 2001; Malmi and Ikäheimo 2003; Ismail 2006; Forker and Powell 2008; Lee and Kim 2009; Stewart 2009; Chiwamit et al. 2017). EVA is entitled "*The Real Key to Creating Wealth*" Fortune (1993), "*A New Way to Find Bargains*" Fortune (1996). There are many companies that use EVA, for example, AT&T, Coca-Cola, Eli Lilly, Georgia Pacific, Polaroid, Quaker Oats, Sprint, Teledyne, and Tenneco.

The present study considers EVA to be the difference between the company return on invested capital (ROIC) and the weighted average cost of capital (WACC). For the following reasons, this performance measure is essential for diversity research. First, VB measures such as EVA extend and complement other performance measures, such as ROA, as it altogether accounts for the firm's overall capital costs. Second, VB measures are used as a proxy for stock performance where the higher VB measures are the higher security prices which are beneficial to stockholders and corporations (Machuga et al. 2002; Grant 2003; Malmi and Ikäheimo 2003). As VB measures are integrated into the company evaluation process, securities analysts and portfolio managers can improve their research recommendations' overall price accuracy. Also, VB measures provide corporate managers with an innovative tool to evaluate the balance between debt and equity costs so that they can achieve an optimum

capital structure. Also, the present study uses market-based performance measures (e.g., Tobin's Q) calculated based on the most usual proxy: the book value of total assets minus the book value of common equity plus the market value of common equity divided by the book value of total assets (Brown et al. 2011).

This thesis supplements the accounting literature on the relationship between board diversity at multiple levels and SED and VB measures. It also provides insights into the regulatory authorities and has certain political implications in the UK context. These points are discussed in the following paragraphs.

In line with previous motives, the current study explains and justifies the inconclusive and conflicting results surrounding the association between board diversity, SED, and corporate performance. These mixed results are probably due to embracing static or single-dimension board diversity. This assumption is consistent with the argument of investigating the determinants and consequences of corporate disclosure if it is not measured with sufficient precision (Beattie and Jones 1997; Patelli and Pedrini 2013; Garcia-Sanchez et al. 2014; Caglio et al. 2020). Therefore, the reason for the inconclusive results is the use of traditional proxies of CG when examining the association between board diversity *per se*, SED and corporate performance. As these proxies neglect the potential interactions between multiple dimensions of diversity, thus, they fail to provide a comprehensive picture of the effectiveness of CG mechanisms. Therefore, it is important to re-examine the effect of board diversity on corporations, to mitigate the mixed results in diversity studies; the current study strand is not tested in the literature, particularly in the UK.

The current research takes on its implications for corporate reporting in general, which therefore constitutes the other motivation for research. More specifically, developing a new, multi-dimensional measure of diversity in best practice opens up a way to re-examine relationships, especially in areas of research that lack convincing conclusions.

Finally, the motivation for the present study is to implement the proposed multi-dimensional measure in practice. The present study aims to give in-depth empirical feedback on the practical application of the concept of multi-dimensional diversity in the UK. Interestingly, regulatory bodies (e.g., the Accounting Standards Board (ASB)) can evaluate the scope of their guidance for a new best practice. The ASB can evaluate the strength and weakness of existing diversity assessment requirements and make decisions to promote current diversity standards or to induce new changes.

1.3. Research objectives

This thesis aims to expand this study's diversity knowledge, which is largely based on a few studies which analyse CG in the context of the board Faultline, as many articles consider it an important field which needs further research (Armitage et al. 2017; Black et al. 2017; Buttner and Lowe 2017; Huang et al. 2017).

To achieve the objectivity of this study, both diversity in boards (DIB) based on director attributes and diversity of board (DOB) i.e., boardroom structure configurations are considered following earlier diversity study recommendations (Hafsi and Turgut 2013). On the one hand, the multi-dimensional aspects of the highlighted MDI consider statutory/non-demographic diversity capture board composition, which is critical to building an effective boardroom. On the other hand, demographic diversity results in high-quality management through the directors' various skills related to demographic attributes (Gull et al. 2018).

In response to Parker's (2016) call for considering a sound understanding of board diversity and to directly derive a proper multi-dimensional measure from that developed conceptualisation of multiple diversity aspects, the current study's first objective is to construct a new multi-dimensional measure for board diversity. Thus, this thesis addresses the gap found in the extant literature by constructing an MDI for demographic and non-demographic board attributes that capture diversity at multiple levels and outperform traditional gender diversity measures. Relying on a secondary data set of collected data from BoardEx on directors of FTSE All-Share index non-financial firms, the current study constructs the MDI to assess the impact of the interconnection of directors' unique characteristics. The present study extends the use of director-related attributes that exist in diversity literature in this study's proposed measure and brings them all to faultline literature. For example, this thesis expanded director identity-related attributes (Mainieri et al. 1997; Wehrmeyer and McNeil 2000; Diamantopoulos et al. 2003; Kaczmarek et al. 2012; Cabeza-García et al. 2018) by including proxies to the group of identity attributes (e.g., director nationality). Further to that, information attributes Post et al. (2011); (Gupta and Raman 2014; Sun et al. 2015; Boiral 2016; Chen et al. 2017b; Katmon et al. 2017; Trittin and Schoeneborn 2017) are developed by considering unique attributes (e.g., director network size) and non-demographic director characteristics (Lau and Murnighan 1998; Harrison and Klein 2007; Stevenson and Radin 2009; Ben-Amar et al. 2013) by bringing in the director compensation aspect (e.g., director pay). Merging these principal attributes entails capturing board diversity at multiple levels, analysing the joint effect of these attributes at the meso-level of diversity, and providing a comprehensive proxy for the quality of board diversity.

The second objective is to pursue a different approach here compared to others (Katmon and Farooque 2017; Aguilera et al. 2019; Desender et al. 2020), as this study's proposed MDI combines three distinctive aspects. The first deals with board faultline at the meso-level, where diversity is measured according to the distribution pattern of several demographic director characteristics and analysed together with the non-demographic attribute as a driver of board diversity (e.g., director age, gender, nationality, role name, seniority, education, network size, director salary). Second, this research proposes a new approach to classify the FTSE All-Share index into firms with moderate and extreme board diversity to distinguish the impact of each group on SED based on analysing unique board attributes on a large scale. Third, the present study controls for eight board-level characteristics to generate a comprehensive view of how board diversity at multiple levels impacts SED (e.g., board size, stability, structure, succession, activity, attrition, nomination independence and CEO duality), thus, making this the first research, to this study's knowledge, to be the most extensive scale study on textual SEDs which combines longitudinal with cross-sectional observations, at the same time.

The third objective of the thesis is to provide potential explanations for the mixed results on research related to the association between board diversity and corporate performance, which in many cases contradicts stewardship theory. The present study contends that one of the possible reasons for such mixed results is the use of narrow proxies of board diversity corporate performance. Additionally, the current study argues that a well-developed board diversity measure might lead to a fundamental re-interpretation of certain relations associated with firm performance. Thus, using different proxies for diversity instead of faultline measures could also be a source for such mixed results. This

study explains how board diversity based on multi-level attributes of high-performing boards enhances corporate performance and addresses the gap in the extant board diversity literature by proposing an MDI to capture the causality relationship between meso-level (multi-layer) diversity and corporate profitability, value creation and market-based performance.

1.4. Research questions

To achieve the research objectives identified earlier, three research questions are formulated. The first research question is: Is it possible to provide a practical definition and a reliable measure for board diversity? If so, to what extent is the proposed multi-dimensional diversity index (MDI) recommended by diversity studies?

The first research question covers the first research objective (e.g., introducing an acceptable definition and a new reliable multi-dimensional measure for board diversity to respond to recent calls). This research question is answered through the first study as it introduces a new multi-dimensional measure for board diversity. The first study ends up by defining an aggregated board diversity measure composed of two (non-)demographic dimensions.

The second research question is: How does board diversity influence the United Kingdom (UK) firms to increase their levels of social and environmental disclosures significantly? This question is linked to the second research objective and empirically examines the extent to which board diversity provides a proper proxy for SED. This research question is answered in the second study as two highly reliable keyword lists of narrative reporting are developed (e.g., social- and environmental-related sentences). This improves the content analysis techniques and, more importantly, allows for the computerisation of the content

analysis. This research question is answered in the second study through three research hypotheses.

The third research question is: How does board diversity influence the United Kingdom (UK) firms' financial, market and value-based performance? Such a question corresponds to the third research objective. This research question is answered through the third chapter. Seven hypotheses are discussed throughout this thesis, which is concerned with the relationship between board diversity mechanisms, SED, and corporate market and VB performance.

1.5. Summary of findings

The three objectives are achieved through the three studies. In the first study, the framework is used as the basis for the proposed board diversity multi-dimensional measure. Afterwards, the proposed MDI is presented with a detailed discussion of its (non-)demographic dimensions. Finally, this study ends by elaborating on how each diversity dimension is captured to reach the overall MDI score. Accordingly, the first study fulfilled the first objective and introduced a new and reliable measure of board diversity and presented an innovative multi-dimensional tool to avoid the limitations of diversity measures *per se*. This thesis controls for the eight board-level characteristics to generate a comprehensive view of how board diversity at multiple levels impacts. These distinctive aspects, collectively, motivate this study to the expectation of new findings which are critical to researchers, regulators, and investors.

The first study employs a different approach here compared to others (Katmon and Farooque 2017) as this study's proposed MDI combines three distinctive aspects. It deals with board faultline at the meso-level, where diversity is measured according to the distribution pattern of several demographic director characteristics and analysed together with the non-demographic attributes as a

driver of board multi-dimensional diversity. Also, this research proposes a new approach to classify the FTSE All-Share index into firms with moderate and extreme board diversity to distinguish the impact of each group on SED based on analysing unique board attributes on a large scale.

The second study suggests that identity-level diversity and board meso-level diversity increase the likelihood of SED (in terms of the number of sentences that mutually inclusive indicate both social and environmental responsibilities in narrative sections of the annual report) in firms with moderately diversified boards. In contrast, board gender diversity (percentage of male directors), surface and demographic diversity decrease the likelihood of SED, which is inconsistent with recent studies (Post et al. 2015; Hoang et al. 2018).

The third study deals with the research gap associated with the relationship between board diversity and performance mechanisms, namely the mixed results problem that sometimes even contradicts the theory. The first probable reason for this problem is the use of different proxies for corporate performance, which is likely to mislead the analysis. The second reason is argued to be the use of narrow proxies of diversity. Results indicate that nationality and meso-level diversity of firms with moderate MDI scores (0.25 to 0.75) are positively and significantly related to VB, market-based and profitability measures. Moreover, the results suggest that gender and demographic diversity are negatively and significantly related to corporate performance.

The theoretical background of the association between board diversity, SED and firm performance is discussed. This thesis answers the research questions (objectives) and suggests that MDI is a proper proxy for diversity. It also presents the empirical results of the association between diversity, SED, and firm

performance mechanisms. Moreover, correlation analysis shows that all governance mechanisms are in line with diversity-related theory, with no contradictory results. Accordingly, the problem of mixed results is likely to be explained by improper diversity measurement and narrow proxies of CG.

Accordingly, the current study presents a novel contribution to both CG and disclosure literature, being timely and relevant in light of the recent worldwide appraisals of CG structure (e.g., the Code 2018) and disclosure regulations (the latest Management Commentary published by the IASB). Overall, this thesis introduces the first empirical evidence regarding what CG mechanisms – prevailing in the UK – influence SED and firm performance.

1.6. Implications

This thesis has implications of three research streams (e.g., board diversity, SED, and firm performance). The extant literature suffers from mixed and contradictory results. Through using a multi-dimensional measure for diversity and using a wide proxy for CG, the current study provides explanations for such mixed results.

The present research serves the interests of many groups and has several essential implications. At the academic and research levels, many implications are noticeable. Firstly, developing a novel MDI diversity measure evokes the possibility of re-shaping some unsettled diversity interrelationships because using different proxies is most likely to provide spurious conclusions. Therefore, this thesis opens up avenues for re-examining board diversity relationships, especially in research areas that do not have persuasive conclusions.

Secondly, the current research is important as a response to ongoing research calls and providing a sound economic definition of the quality of best practice disclosure. As such, the textual analysis technique used in this research improves

the ability to draw lessons from the study of board diversity. Thus, the present study successfully develops two highly reliable keyword lists about narrative reporting, which allows for the computerisation of the content analysis. Importantly, the current study provides an innovative measure, which is hoped to promote the efficiency of the related research areas with a low-cost, time-saving approach. Moreover, this would help in undertaking large-scale studies and, hence, derive more reliable results than previous findings based on small-sample, manual analysis studies.

Thirdly, many policy implications are emphasised throughout this study: (i) having reported the influential role of board diversity on the market, this thesis provides empirical support for the views put forth by Sir John Parker (2016) that investors pay special attention to board diversity aspects; (ii) the current study provides in-depth empirical feedback on the practical implementation of a multi-dimensional diversity concept. With the new MDI score, policymakers could measure the applicability of their guidance and accordingly make informative decisions to promote current reporting standards or induce new modifications. Results show deficiencies in some principles in the UK Code that need modification in order to improve the overall governance structure of firms.

1.7. Research contributions

The current research contributes to the extant diversity literature along various channels. Mainly, three types of contributions are distinguished: methodological, knowledge and theoretical contribution. The following paragraphs discuss each contribution.

Methodological contribution. The first sub-contribution is filling the gap in CG literature by moving beyond traditional diversity measures to the use of faultline methodology. This approach is different from what has been done before and

contributes to amplifying board diversity, by proposing an MDI as a response to the call made by Thatcher and Patel (2012). The current study highlights the importance of investigating the distribution of multiple diversity attributes simultaneously. The proposed MDI is responding to such a call and is designed to capture the joint effect of numeric and nominal director attributes at various levels from the surface (baseline) to meso-level diversity. This thesis responds to continuous and recent research calls (Nekhili and Gatfaoui 2013; Meyer et al. 2015a; Mo et al. 2017; Spoelma and Ellis 2017) for developing a sound measure for board diversity. In doing this, the current research extends prior work done in developing a multi-dimensional measure for diversity. Thus, it improves prior attempts at developing a multi-dimensional measure through overcoming current limitations in those attempts. There are three remarkable attempts in the relevant literature. The first pioneering attempt is presented by Thatcher et al. (2003). This research uses multiple dimensions to define board diversity. The second attempt to develop a diversity measure is developed by Thatcher et al. (2012). They propose a framework for analysing group faultlines. Meyer et al. (2015a) introduce the third framework for measuring diversity, where they refined their prior faultline framework. In summary, prior attempts to develop a measure for diversity represent a major step forward in the construction of a multi-dimension measure. However, the three aforementioned attempts have some limitations. The first concern is the accessibility of data on demographic characteristics: attributes such as age and gender encourage studies to consider social attributes rather than task-related characteristics such as education, experience, and non-demographic attributes (Harrison and Klein 2007; Nekhili and Gatfaoui 2013; Veltrop et al. 2015a; Mo et al. 2017). The arbitrary reliance on the specific director-related attributes might be due to the limited disclosure of diversity

information. Second, prior attempts limited to categorical format requirement: where diversity cannot be measured based on numeric attributes, some numeric attributes such as age can be converted into categorical terms; some other attributes such as tenure or behavioural attributes cannot be converted into a categorical format. Accordingly, the first contribution of the current study is developing a proposed measure of diversity that mitigates existing limitations.

The second sub-contribution is regarding the disclosure literature, whereas, the current research develops a highly reliable computerised content analysis approach. Arguably, current attempts to develop a computerised approach for content analysis show three key methods that could be considered for determining the information related to corporate social and environmental activities, namely word measurement (Neu et al. 1998; Deegan 2002; Campbell et al. 2005), sentence measurement (Ingram and Frazier 1980; Hackston and Milne 1996; Eric 1998; Milne et al. 2009) and pages proportion measurement (Cowen et al. 1987; Patten 1991). For this analysis, the word list does not stop short at a specific indicative word, but it also looks at relevant phrases that indicate SED. The present study counts the number of phrases rather than the number of words to avoid an overcounting problem that is likely to be associated with the coding of words; the SED is a continuous variable reflecting the number of social and environmental sentences found in the annual report of a corporation. This thesis develops two highly reliable keyword lists of narrative reporting (e.g., social- and environmental-related sentences). This improves the content analysis techniques and, more importantly, allows for the computerisation of the content analysis. Finally, this study's attention is dedicated to the amount of social and environmental releases found in company annual reports. The evaluation of the consistency of the disclosures, as noted in (Hooks and van Staden 2011), adds

another dimension to the evaluation of SED and brings more subjectivity to the content analysis. This, therefore, makes this the first research, to this study's knowledge, to be the most extensive scale study on textual SEDs which combines longitudinal with cross-sectional observations, at the same time.

Contribution to knowledge. The first sub-contribution is related to the association between diversity and SED; the current research contributes to extant evidence on SRD. Thus, the present study expands prior study (Hsu et al. 2017) in many aspects, as follows: developing MDI to quantify multiple levels of diversity as the current study provides new factors that affect the provision of SED;¹ moreover, presenting a robust method for capturing SED based on textual analysis techniques. Board diversity is a matter in deciding the corporate disclosure strategies toward social and environmental activities for the UK firms at a ratio of 3:1, respectively. Despite the limited research on CG and SED (Johnson and Greening 1999; Neubaum and Zahra 2006; Cho et al. 2015), since diversity and SED is a multi-dimensional construct and businesses adopt different approaches, no distinction is made in these studies (Katmon and Farooque 2017) between board diversity types and the impact of analysing the joint effect of different director attributes on SED. By considering board faultlines from multiple dimensions, and the classification of boards into moderately and

¹ Varieties of methods are used to assess diversity. Each has its advantages and drawbacks (Balian 1982; Meyer and Glenz 2013; Meyer et al. 2014; Meyer et al. 2015; Boyd et al. 2017; Meyer and Glenz 2018). More recent examples of studies within diversity can be found in the work of Meyer and Glenz (2013). One of the unique methods for estimating board diversity is the use of diversity faultlines. Meyer and Glenz (2014), in their research "Team Faultline Measures: A Computational Comparison and a new approach to Multiple Subgroups", give some reliable methods for calculating Faultline. In their major study which adopted a cluster-based approach to construct the (ASW) approach with critical attributes to split the group into more than two groups. By far, this measurement framework is considered the most widely accepted technique for Faultline research. Moreover, they succeeded to develop and provide free access through a software package (ASW) to measure Faultline. The unlimited accessibility to this measurement tool facilitates the standardisation of the outcomes and increase the comparability of its results to other findings (Meyer and Glenz 2013; Meyer et al. 2014; Meyer et al. 2015).

extremely diversified boards to differentiate the mixed inferences of each category on SED, this complicated organisational tendency is discussed in a closely oriented manner. Thus, there are unlimited opportunities for developing the link between faultline research and other business disciplines. Linking faultline research to SED expands CG literature significantly; moreover, analysing the influence of gender, nationality, and meso-level board diversity on non-financial disclosures (SED).

Considering the work done in earlier studies (Jizi et al. 2014; Li 2014; Harjoto et al. 2015; Galbreath 2016; Hoang et al. 2016; Hong et al. 2016; Hsu et al. 2017; Lanis et al. 2017), it becomes logical to infer the motives and contributions generated from investigating this fertile research area. The results improve this study's understanding of board diversity and CG involvement and are beneficial to government and policymakers concerned with the effect of the governance system on targets for SED. This study's findings add weight to the stakeholders' demand for a comprehensive structure to establish acceptable standards for reporting and verification of SED. Therefore, this thesis fills the gap in strategic disclosure research by answering the call to analyse the impact of board composition on disclosure (Jizi 2017), as diversity and governance need more societal and global attention besides the political aspect. Despite this, many researchers still do not fully correlate multi-dimensional board diversity to SED practices in the UK context.

The second sub-contribution is related to the association between diversity and firm performance mechanisms. Results reinforce the theoretical view and report a positive association between diversity and corporate performance. In this sense, results are mixed concerning which performance mechanism i.e., VB, market-based and profitability measures, are associated with diversity at the UK

level. The current study brings all this together into a single analysis to study the influence of diversity based on the three categories of (non-)demographic director attributes (e.g., identity-related, information-related, and non-demographic diversity) on firm performance using five performance measures (e.g., EVA, RI, Tobin's Q, ROA, and ROE). Moreover, eight board-level characteristics are considered. These associations are comprehensive and econometrically well-specified, though the solid analysis of the causal relationship between board diversity and board-level characteristics to corporate performance is taken into account by employing a simultaneous equation framework.

Therefore, this thesis focuses on capturing diversity based on (non-)demographic and board-level attributes, investigating the potential effect on firm performance.² Furthermore, this thesis aims to investigate the UK board-level characteristics and enhance the accountability of board members by linking boardroom diversity to corporate VB performance measures, moreover, to act as best practice's governance tool countering the moral-ethical relativism in the governance context (Clark and Brown 2015; Van Peteghem et al. 2017).

² One of the main objectives of this chapter is to fill the gap in diversity research by empirically analysing the transition effect between multi-layer diversity on moderating diversity and how board diversity at meso level (meso-diversity is proxied by Faultline strength, a hypothetical dividing line that splits board of directors into subgroups based on director identity characteristics (e.g., director age, gender, nationality), information (e.g., differences in number of educational qualifications, director role, seniority and director network size), and non-demographic attribute (e.g., director pay) impact corporate performance. The current literature emphasises the need to expand prior extended board diversity micro-level measures such as gender diversity and its effect on performance through constructing a multi-dimensional measure. Therefore, this study fills this gap by developing a more complex multi-dimensional measure for board diversity and how it stimulates corporate value creation. This chapter is also responding to a recent report, Board Diversity Reporting, published in 2018 by the Financial Reporting Council (FRC), which stated the importance of investigating the balance of skills in boardrooms and how the board works together as a unit. Also, this study aims to bring all these concerns while evaluating corporate value creation.

This study aims to end up with a replicable finding, reliable MDI, appropriate recommendations, and proper guidance to corporations on the diversity aspect, the UK market authorities by highlighting the viability of multi-dimensional firm-level governance. Although the Code considers diversity as a significant evaluation criterion for board effectiveness, it was unclear how companies should report diversity evaluation outcomes. Therefore, this thesis still emphasises the practicality of this study's analysis, not only in aiding the FTSE-All Share index corporations to evaluate board diversity, but nevertheless, as a manual for various stakeholders to understand where they should invest.

Contribution to the theory. Importantly, as a third main contribution, the current study has some reflections on faultline theory, which is used as the main platform in explaining the association among diversity, SED, and corporate performance. This thesis introduces the faultline theory to governance and VB management literature and offers a methodological approach to measuring faultlines at different levels, expanding diversity research by drawing on the multi-level approach (Bezrukova et al. 2016). In relation to the first sub-contribution to the theory, regression analysis confirms the stakeholder theory viewpoint regarding the association between board diversity and SED of the UK FTSE All-Share index non-financial firms. These are nationality (Katmon et al. 2017), meso-level diversity, board size (Abraham and Cox 2007; Cong and Freedman 2011; Mallin et al. 2013; Mallin et al. 2014; Liao et al. 2015), board stability and nomination committee independence of firms.

While prior literature does not provide conclusive evidence on this, the current study confirms the theory underpinning the association between board diversity, board-level characteristics, and SED and corporate performance, gender diversity (proportion of male directors) (Liao et al. 2015; Ben-amar et al. 2017a;

Cabeza-García et al. 2018), surface, demographic diversity and succession rate of firms.

1.8. Research outline

The introductory chapter provides a comprehensive and thorough discussion of the research methods used in the present research. Three interrelated studies are conducted in order to better achieve the research goals. The three studies address the research philosophy, theoretical context, research design and research method. Each study method is addressed in depth in various subsections, including sample selection, data collection, models and tests used for investigating relevant research issues (see Figure 1.1).

The first study is dedicated extensively to achieving a key research goal, which reflects a theoretical gap in the literature on diversity measurement. The first gap is the lack of a clearly defined multi-dimensional measure on diversity, and the main objective of this thesis is thus to implement a new measure for diversity which is accurate and reliable.

Thus, study one discusses board faultline and how it differs from traditional board diversity. Additionally, this thesis provides a wide review of various proxies for board diversity and discusses their limitations. Prior attempts to develop measures for diversity are also reviewed, and the analysis then introduces an overview of the faultline methodology, the basis for developing the proposed MDI. Accordingly, the analysis provides an innovative definition for various director attributes. It presents a detailed discussion of both (non-)demographic dimensions, detailing how each dimension is measured to reach the overall diversity score. Further to that, the present study discusses the main steps followed to reach an aggregated diversity score and highlight the methodology adopted.

Figure 1.1 Research outline

The transition from traditional diversity to meso-level board faultline

RQ1: How faultline research outcomes are over and above those from diversity per se research?
RQ2: What is the importance of considering the multi-level construct of diversity?

Proposing multi-dimension diversity measure

26,743 directors in a sample consisting of 3,357 FTSE All-Share index non-financial firms from 2005 to 2018.

Financial aspects
Firm performance

Non-financial aspects
SED Narrative section

Testifying
Annual Reports

Corporate value and market-based performance

Chapter 4

Chapter 3

Corporate Social and environmental disclosure

H1. Gender diversity (measured as the proportion of male directors on the board) affects corporate performance.
H2. Nationality diversity impact corporate performance.
H3. The joint effect of demographic identity and information-related attributes improve corporate performance.
H4. Meso-level diversity, based on the joint effect of demographic and director pay attributes, has a significant effect on corporate performance.

H1: The proportion of male directors on the board constrains SED levels compared to female board members
H2: Nationality diversity significantly affects SED
H3: Boards with moderate diversity score significantly increase SED + Significant

A well-diversified board incentivises managers to better disclosure and outperform firm performance.

The second study is concerned with the impact of board diversity on SEDs to be business information, which corporations reveal covering social and environmental performance. Thus, SED is any information about corporate social and environmental behaviour appearing in the narrative sections of corporate annual reports. Both forms of disclosure (e.g., social and environmental) are calculated using automated textual content analysis by the number of sentences containing social responsibility and environmental information that is commonly used in the accounting and financial literature (Li 2010; Kearney and Liu 2014; Lang and Stice-Lawrence 2015; Loughran and McDonald 2016; Dyer et al. 2017; Muslu et al. 2019a). The current study concentrates not only on distinctive aspects of board diversity which have the most critical impacts on SED score; but collectively, the present study utilises the proposed MDI to capture the multi-dimensional aspect of board diversity in a multi-level construct and its implications on SED. Corporate annual reports are considered the main channel for information to investors (e.g., Homroy and Slechten 2017; Kumar and Zattoni 2017b; Yoshikawa and Hu 2017). This suggests that investors rely on the quality of the board of directors as a basis for valuing corporate SED. Thus, the first research motivation is the need to enhance the quantity of best practice SED. Increased attention is paid to board diversity (e.g., the latest revision of the UK Code in 2018) and corporate SED represents the second general motivation of the present study. Therefore, the second study develops a textual analysis technique in this regard; in doing so, it employs a content analysis approach that uses computerised methods; two reliable keyword lists are developed. It then presents the aggregated SED score, to explain the effect of board diversity through the proposed MDI, along with other well-studied factors such as board-level characteristics on corporate SED.

Moreover, this thesis discusses the theoretical premise that backs the association between board diversity and its potential impact on SED. It then reviews prior literature on the association between diversity and SED mechanisms. Additionally, it develops individual research hypotheses for the potential association between eight CG mechanisms and disclosure level.

The third study handles the most prominent research gap in relevant literature by investigating the association between board diversity and corporate performance, namely the mixed results of the association between diversity and corporate market and VB performance. Generally, studies investigate either diversity *per se* with firm performance (e.g., age and gender diversity) or information-related diversity with performance (e.g., director experience and education). Accordingly, the third objective of this thesis is to cover the gap in diversity literature and investigate the joint effect of (non-)demographic diversity on firm performance. This objective is achieved in the third study.

Thus, the third study discusses the causal association between board diversity and corporate performance. This thesis develops four hypotheses to answer related research questions. Then the current study defines the sample and the variables tested, and the empirical tests are presented and interpreted. Finally, the current study presents the main findings and discusses the implications of the results for academia and regulatory bodies. Finally, the research limitations and suggestions for future research are discussed.

Chapter 2: A Proposed Multi-dimensional Index to Measure and Assess

Board Diversity

2.1. Introduction

A sizable body of corporate governance research (Thatcher and Patel 2012; Hafsi and Turgut 2013; Meyer et al. 2014; Chung et al. 2015b; Spoelma and Ellis 2017; Fang et al. 2018) sets out to derive a reliable proxy for board diversity based on macro-dimension director's attributes such as board structure, procedure, and conventional diversity attributes (such as gender). Considering the work done by Mathew et al. (2018) which demonstrate governance indices that measure external factors only such as shareholder rights (Gompers et al. 2003) and how different provisions of shareholder rights affect firm value (Bebchuk et al. 2009). Further to that, other indices include board-level characteristics as the Governance Risk Indicator (GRId). Yet, scant attention has been afforded to the development of a diversity index which accounts for the possible interrelationship of attributes on a multi-dimensional basis that might contribute towards a well-balanced board in terms of the dispersion of directors' skills across subgroups which increase board productivity and capabilities to interact with complex business events.

The UK Corporate Governance Code (hereafter, 'Code') stresses the importance of balancing a diverse set of skills and attributes among directors (due to differences in demographic characteristics) with how the board works together as a unit (based on non-demographic factors) to ensure maximum efficacy and effectiveness. In response, a theoretically informed multi-dimension diversity index (MDI) is constructed to allow stakeholders to measure and assess levels of board diversity. Moreover, the MDI allows managers to meaningfully appraise their current position and future direction in terms of diversity while

simultaneously allowing external stakeholders to better understand a board's cohesion and decision-making as a function of diversity.

This chapter moves away from the most common approach of capturing board diversity according to a single dimension (Carter et al. 2010; Wang and Kelan 2013; Ali et al. 2014a; Chapple and Humphrey 2014; Liu et al. 2014; Carrasco et al. 2015) and instead promote a conceptualization of diversity in terms of the joint effects of multiple demographic and non-demographic factors working at multiple levels. In so doing, drawing on relevant research in combination with resource dependence, multi-level, and faultline theories, this chapter proposes a comprehensive diversity measurement and assessment system, namely MDI. There is increasing recognition of the importance of a multi-level approach (Rousseau and House 1994; Kumar and Zattoni 2014). The objectives of the current research are twofold: first, this chapter seeks to derive a functional and theoretically-informed MDI; and second, this chapter demonstrates its utility by using UK FTSE-All Share board diversity data. In so doing, this chapter responds to calls from academics and practitioners alike for a multi-dimensional diversity index that measures and assesses board diversity (Lozano and Escrich 2017).

The current study adopts the under-utilized idea of faultlines and applies it to diversity research (Thatcher and Patel, 2012; Meyer et al. 2015; Chen et al. 2017c; Spoelma and Ellis 2017). In so doing, this chapter shows how models based on single conventional director identity-related attributes (Mainieri et al. 1997; Wehrmeyer and McNeil 2000; Diamantopoulos et al. 2003; Kaczmarek et al. 2012; Cabeza-García et al. 2018) are improved by addressing the joint effect of differences in director's other non-/demographic attributes. Put succinctly, this chapter employs faultline theory and its accompanying methodology as a mean

to understand how boards can be split into clusters based on the alignment of various characteristics of the directors at multiple diversity levels.

Faultline strength is measured as the percentage of aggregate differences in member's attributes as the highest split factor. Strength values range between 0 and 1, and the highest possible strength value is one (Thatcher et al. 2003; Bezrukova et al. 2009; Thatcher and Patel 2012; Chen et al. 2017c). Based on a combination of relevant research and the underpinning theoretical construct, this chapter proposes four dimensions of diversity, otherwise referred to as four 'faultlines'.

First is the surface-level faultline (baseline attributes), whereby the strength of the faultline is captured by calculating the degree of cohesion between two fundamental diversity attribute measures: gender and director age. To illustrate, the basic principle underlying faultline research is that if a board comprises two executives, say a CEO and CFO, whereby one is male and the other female then the faultline score increases. If both are male (or female), then this is a signal of a less diverse board, and the faultline score decreases. If one is 30 and the other 70, the faultline score increases as a signal of greater diversity; whereas if both are 50, then the score decreases. Of course, as one starts to add attributes and build a more complex multi-dimensional model, then the sophistication of the measurement system must improve correspondingly.

Second, this chapter incorporates an identity faultline which serves to reinforce the surface-level one. In this dimension, the faultline score strength is moderated by incorporating the nationalities of the directors that serve on the board. The score increases (decreases) corresponding to the greater (lower) level of diversity in the nationalities of the directors. This has been described as a crucial

area of diversity which has been historically neglected, and which needs to be urgently addressed. Sir John Parker (2016) recommended that boards of the FTSE 100 corporations should enforce minimum levels of ethnic diversity by 2021. In response, it is foreseen that by 2051 the FTSE 100 listed corporations increase ethnic diversity from 14% to over 30%. However, the pace of change rests on the effectiveness of board nomination committees (Yoshikawa and Hu 2017). Yet, there are other forms of diversity which are important and incorporating these into boards of directors has been described as a priority (Ferreira 2015; Parker 2016). Indeed, some argue that a lack of diversity is holding back the quality of boards and corporate governance, which in turn makes this a pressing issue among global leaders (World-Economic-Forum 2017).³

This chapter borrows from well-constructed theory in the faultline and diversity literatures to bridge demographic board attributes of boardrooms with non-demographic ones (Ben-Amar et al. 2013; Lau and Murnighan 1998; Stevenson and Radin 2009). Statutory diversity for non-demographic attributes is necessary to set up a comprehensive definition for board diversity. Therefore, there is a strong tie that connects attributes such as age, gender and ethnic background to director pay as a proxy for non-demographic board characteristics (Ben-Amar et al. 2013). Therefore, at the third level, this chapter introduces a *demographic* faultline as a set of further information-related diversity attributes to study model, namely qualifications, director role, seniority, and director network size.⁴ At the

³ It has been argued that diversity attributes (e.g., nationality) should be incorporated into the UK corporate governance code (Principle B.1: concerned with structuring a well-balanced board with diverse knowledge) rather than the current practice, which concentrates on single dimensions of diversity (Thatcher and Patel 2012; Carrasco et al. 2015; Ho et al. 2015; Isidro and Sobral 2015; Parker 2016).

⁴ Kaczmarek et al. (2012) find that the inclusion of task-related diversity as a stand-alone diversity metric (as suggested by some research) provides a limited understating of how board diversity influences levels of board effectiveness.

fourth and final level, this chapter adopts a meso view and incorporate the distribution patterns for the previously described seven diversity attributes (i.e., age, gender, nationality, qualifications, role, seniority, and network size), and include an eighth non-demographic factor: director salary. This non-demographic characteristic (i.e., salary) is argued to be an important dimension in the measurement of diversity research because pay diversity typically incites competition and differentiation among some unit members (Li and Hambrick 2005; Kaczmarek et al. 2012). In summary, this chapter incorporates key attributes to the MDI that define and determine how teams perform, namely knowledge, information, and incentives (Payne et al. 2009).⁵ Ultimately, this chapter expects that the diversity index to be used, challenged, and developed. The role of the faultline in diversity research has received increased attention, and the prevalence of board diversity is increasing at an alarming rate (Chung et al. 2015a; Bezrukova et al. 2016; Van Peteghem et al. 2017). Corporate leaders, however, ask for a perceptible indication to develop a new multi-dimensional measurement tool for diversity to assess its mixed inferences on other corporate disciplines (Lozano and Escrich 2017). Faultline methodology illustrates the split process of boards into clusters based on the alignment of various characteristics of the directors at multiple diversity level intended for analysis (see Figure 2.1: This figure illustrates the dynamics of faultline and alignment process of multiple attributes). This concept is embraced in the foundational process of the proposed diversity comprehensive proxy presented in the following sections.

⁵ This research uses the terms (multi-dimension) and (dynamic) interchangeably, to demonstrate multiple diversity attributes, as opposed to single attributes such as gender.

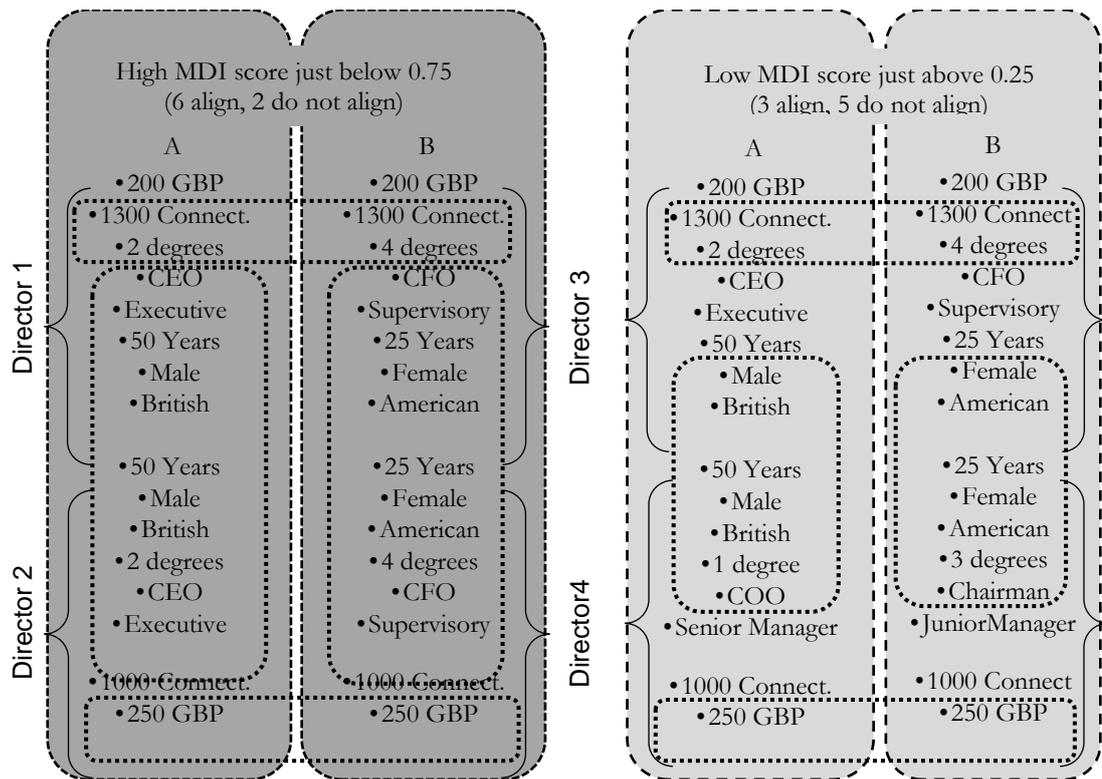


Figure 2.1 Faultline mechanism

Given the context of the UK, it is argued that considering other diversity attributes in the philosophy of the UK corporate governance code is critical (Principle B.1: concerned with structuring a well-balanced board with diverse knowledge) rather than the concentration on one dimension of diversity as gender diversity (Carrasco et al. 2015; Ho et al. 2015; Isidro and Sobral 2015; Parker 2016). Sir John Parker (2016) recommended that boards of the FTSE 100 corporations should enforce ethnic diversity by 2021. In 2051, it is foreseen that ethnic diversity will increase from 14 per cent to over 30 per cent, based on the effectiveness of board nomination committees for corporations listed in the FTSE 100 index (Yoshikawa and Hu 2017).

The increase in the UK's ethnic diversity comes from the importance of embracing ethnic aspects among director's in the UK corporate boards (Ferreira 2015; Parker 2016). The current narrow view is one of the main constraints on the quality of board diversity, and corporate governance becomes one of the pressing issues that global leaders have assigned priority for the coming few years (World-Economic-Forum 2017).

This chapter contributes to the extant body of research on corporate governance and diversity and fills the gap found by investigating the transition from traditional diversity *per se* (e.g., gender diversity) (Jia and Zhang 2013; Joecks et al. 2013; Ali et al. 2014a) to the board faultline (Kaczmarek et al. 2012; Meyer et al. 2014; Chung et al. 2015a; Meyer et al. 2015a; Veltrop et al. 2015b), by considering the joint effects of multiple directors less studied information, identity, and non-demographic related attributes simultaneously at multiple levels to highlight the moderating effect of one diversity level on the other.

The approach of this chapter is different from what is done before and contributes to amplify the multi-dimensional aspect of board diversity. Furthermore, Thatcher and Patel (2012) state that *“over the past decade, there has been an increasing interest in the meso-level effects of group composition whereby the distribution of multiple attributes is investigated simultaneously. One of the most compelling insights in this area of research is that group faultlines, the alignment of demographic attributes that lead to hypothetical dividing lines, may affect group processes and performance”*.

The proposed multi-dimensional index is responding to such call to capture the joint effect of numeric and nominal director attributes at various levels.

The findings are generally consistent with the expectations of this chapter. First, the MDI is a reliable proxy for multi-dimensional diversity as it employs multiple dimensions of diversity at multiple levels. Second, diversity scores led to classify boards into two categories, well-balanced boards with moderate faultline strength scores (e.g., 0.25 to 0.75) are determined here by eight (non-)demographic director attributes of highly effective boards that align and the possible ways to subdivide the based-on director age, gender, nationality, role name, seniority, education, network size, director salary.

Furthermore, boards with extreme faultline scores (close to 0 and 1) are diversified based on extreme different director's characteristics that hinder board cohesion which is consistent with earlier studies (Thatcher et al. 2003; Bezrukova et al. 2009; Thatcher and Patel 2012; Cooper et al. 2014). Third, through the use of the proposed comprehensive proxy MDI, a board of directors is considered effective when faultlines strength (e.g., 0.25 to 0.75), where director's identity, information and non-demographic attributes are matched and led to well-balanced board subgrouping, reducing the conflicts between subgroups. Board diversity positively enhances board functions where board members realise the open channels across subgroups (Chen et al. 2017b).

Finally, this chapter succeeded to capture the multi-dimensional aspect of diversity at multiple levels which show the moderating effect of information diversity layer on the moderateness of board diversity at the meso- level.⁶

⁶ This chapter incorporate a panel data methodology, which provides a more reliable picture than that the one arising from cross-sectional approach and allows the elimination of any unobservable heterogeneity that may be present among the companies in the sample (Haque 2017). The unbalanced panel dataset covers 26,743 director-year observation selected from the FTSE -ALL share index. The sample selection process is based on director-level data over a period of 14 years (2005-2018). This chapter start from the year of 2005 since the release of UK companies Act 2006 and when the IFRS become mandatory for all UK firms. This study stops in the year 2018 as the latest collected data from annual reports.

This chapter is structured as follows: the next section provides the institutional and theoretical background for (constructing) diversity. Section 3 synthesises prior relevant literature with a particular focus on measuring diversity. Section 4 introduces the proposed measure of diversity and highlights the construction of MDI. Section 5 summarises the primary research outcomes, which extend rather than substitute the documented results in diversity literature.

2.2. Theoretical and practical implications of the proposed measure

This study introduces a multi-level theory to faultlines literature and offers a methodological approach to measuring faultlines at different levels, to extend diversity research by drawing on the basic principles of multi-level theory (Bezrukova et al. 2016). As part of this perspective, this chapter re-introduces board faultline and propose a novel, integrative explanation of how faultline derived effects vary across various diversity levels consistent to the generally accepted definition of diversity as the allocation of diverse characteristics to group members concerning a shared attribute (Harrison and Klein 2007). Thus, this chapter expands board diversity literature by redefining diversity and refer to its multi-dimensional aspect. This chapter considers board diversity as “*the joint effect of differences in directors related attributes that led to clustering boardroom to achieve common corporate goals*”.

The current study aims to end up with a replicable finding, reliable MDI, appropriate recommendations, and proper guidance to corporations and the UK market authorities on multi-dimensional diversity aspect, by highlighting the viability of multi-dimensional firm-level governance (Clark and Brown 2015). This

The findings suggest that about 78 per cent of FTSE all-share non-financial firms have a moderate MDI score "well-balanced" (e.g., construction, media entrainment, and oil-gas industries). Moreover, only about 22 per cent have extreme MDI score (e.g., tobacco and automobile industries).

chapter considers enforcing an internal governance diversity disclosure code as it would be beneficial for various stakeholders to seek the international best practice governance. Although the Code considers diversity as a significant evaluation criterion for board effectiveness, it was unclear how companies should report diversity evaluation outcomes. Therefore, this chapter still emphasises the practicality of the analysis, not only in aiding the FTSE 100 corporations to evaluate board diversity, nevertheless, as a manual to various stakeholders to know where they should invest.

The UK governance code highlights the importance of considering the link between the balance *of* skills (due to differences in demographic characteristics) and *how the board works together as a unit* (based on non-demographic factors) in board diversity evaluation. In a similar vein, the present study uses the demographic identity faultline (age, gender, and nationality) and demographic information faultline (role name, seniority, education, network size, director salary). Besides, this chapter follows Principle B.6: Evaluation by including non-demographic attributes, which affects how the board works together as a unit (e.g., director salary). This chapter asserts that the UK should go beyond focusing on gender quota, (e.g., Norway was the first country to introduce a gender quota law for boards of directors in 2003, later followed by several other European countries) (Wang and Kelan 2013; Windscheid et al. 2017; Wahid 2018).

2.3. Institutional and theoretical background

2.3.1. The UK corporate governance code

Corporate governance is influenced by a country's regulatory infrastructure and governance framework. Where publicly listed corporations are an essential contributor to both the UK economy and British society as they provide jobs and prosperity of the nation. Therefore, the board of directors in these listed firms should consider the surrounding environment of their business. Multinational corporations are taking the lead, which increases the need to apply international board governance best practices (Armitage et al. 2017). The following section is dedicated to the analysis of internal corporate governance in the British context.

On the regulatory level, the UK corporate governance code (The Code) defined as the mechanisms that maintain how a board of directors administrate firms. Corporate management is aligned with a prominent level of governance critical to protect various stakeholder long term investments and rights . The Code has various principles concerned with diversity, structure, and independence of the board. The compliance concern of domestic companies listed in the Financial Times Stock Exchange (FTSE index), with corporate governance is critical, and this criticality is notable in the case of non-domestic the UK companies listed in the London Stock Exchange (LSE). The non-domestic companies are less compliant with the (The Code), especially those from high power distance territories (Rejchrt and Higgs 2015).

The governance system plays a key role and has multiple objectives. The main societal goals are to increase the percentage of ethnic diversity to around 30 per cent of the total UK population by 2050 (Parker 2016). Thus, corporate leaders are becoming more alert to establishing a diverse board, that represents the social composition, not only in the UK but also, in the global market, where

they operate (Lisak et al. 2016). As the essential report, Sir John Parker (2016) discussed several variables that influence board reforms and diversity concerns in the UK. These factors can be categorised into operational and corporate image drivers. Operational factors apply, where public corporations in Britain seek to construct boards, that are able to find creative solutions to complex problems based on the director's task-related backgrounds (Homroy and Slechten 2017). Also, board diversity facilitates interaction with global and diverse stakeholders (Crucke and Knockaert 2016). The second group is concerned with maintaining the corporate image, where board members show their compliance with diversity requirements (Fang et al. 2018). This set of factors also includes nominating board members who are able to create brand value, compete abroad and implement strategic goals (Aggarwal et al. 2015).

There is an immense pressure to focus on establishing a multi-dimensional proxy to have an effective and well-diversified board of directors aiming at the enhancement of British internal corporate governance (Sealy 2018). The UK corporate governance code (Code, Principle B.1) emphasises structuring a well-balanced board with diverse knowledge. However, the Code, Principle B.2 focuses on gender diversity only. To the best knowledge of this chapter, there is a tremendous need to reinvestigate this area so that a greater understanding of board diversity across the business community can be achieved. Recently, it has been witnessed a dramatic increase in non-domestic corporations in the LSE and the limited attention to the UK multi-dimensional diversity aspect is a gap found in governance literature. The current UK CG code is dedicated to assessing the distribution of board attributes to secure an effective board of directors. The Code covers board diversity, director's nomination, and size (Rejchrt and Higgs 2015). According to the UK CG Code published by the

Financial Reporting Council, the corporate governance code explain how the board of directors should be appointed (The Code) (Sealy 2018). The main function of establishing the MDI is to secure a healthy directorship environment and to govern the board of director's strategic decisions. Therefore, it is necessary to investigate the development process and move from traditional diversity to a multi-dimensional perspective of board diversity. This chapter asserts on the significance of capturing diversity in a multi-dimensional way and the need to move beyond the narrow view of diversifying boards based on the balance between independent executive and non-executive board members to a diverse board, to generate an unbiased strategic decision-making environment consisted with (The supporting principles; PA 20) (Sealy 2018).

2.3.2. Theoretical underpinnings

Board of directors typically known as a workgroup (team) who meet infrequently and hold a lot of influence and authority to administrate corporate resources. This term is developed, and a board of directors is defined as a group of members who possess diverse skills and backgrounds; however, they have common strategic goals (Payne et al. 2009). The former definition led to embracing new aspects related to director attributes of highly effective boards (e.g., knowledge and experience) and the cohesion in these groups to work together and circulate different views towards various corporate strategies know as board dynamics and effectiveness (Payne et al. 2009).

Recently, a considerable number of studies have grown up around the theme of establishing a concrete theoretical infrastructure supported with a multi-dimensional measurement tool for diversity, which is the faultline instrument (Zanutto et al. 2011; Chen et al. 2017c; Spoelma and Ellis 2017; Meyer and Glenz 2018). Moreover, faultline methodology has experienced unprecedented

growth over the past ten years (Hutzschenreuter and Horstkotte 2013b; Hillman 2015; Haslam and Ellemers 2016). This chapter proposes a novel and integrative explanation of how faultline effects vary from one layer to the next by measuring faultlines at different levels, expanding diversity research by drawing on the multi-level approach. The comprehensive view of board diversity is consistent with the generally accepted definition of diversity as the allocation to group members of a diverse range of characteristics with regards to a common characteristic (Harrison and Klein 2007).

Moreover, coordinating and control roles have been extensively studied by several research-based on stakeholder and agency theories (Crucke and Knockaert 2016; Buttner and Lowe 2017).

Therefore, the current research mainly relies on three theories. This chapter uses the resource dependence theory, which explains the linking role and how directors bring various resources to the organisation (Pfeffer and Salancik 1978). Further to this, the faultline theory (Lau and Murnighan 1998) is selected to explain how the director's diverse attributes are aligned and clustered to amplify the director's strategic role and board performance. Finally, the multi-level theory, which demonstrates how director attributes at different diversity levels can have moderating effects on each other (Kozlowski and Klein 2000). This chapter prioritises these theories over and above other corporate governance theories to construct a multi-dimensional diversity comprehensive proxy (see appendix 2.1).

Lau and Murnighan developed faultline theory in 1998, and this chapter relies on this theory to construct a multi-dimensional measure able to capture the dispersion of director's attributes, backed up by resource dependence theory to

focus on director characteristics and the resources they supply to their organisations.

In this respect, this chapter theories the proposed multi-dimensional measure to reflect resource dependence theory on board diversity attributes such as director's age, gender, education, and tied with non-traditional attributes such as director nationality and director network. Moreover, how they formulate board faultline. Analysing demographic attributes (e.g., identity and information), together with non-demographic attributes, construct the meso-level diversity. According to faultline theory, these attributes are measured jointly to capturing multi-dimensional diversity through multilayering the measuring mechanism to reach the cumulative meso-level diversity. Diversity research highlights that non-demographic group characteristics have equal importance in team dynamics as demographic attributes (e.g., age, sex, race, and job tenure-status), consistent with the theoretical framework of some prior measurement mechanisms (Hafsi and Turgut 2013).

According to faultline theory, the interdependence between subgroups significantly controls conflicts and arguments. However, allocating power between the divided subgroups is important to reduce any expected conflicts. This shows the significance of differences between board members and the generation of faultline (Thatcher and Patel 2012; Cooper et al. 2014; Bezrukova et al. 2016). Resource dependence theory relate qualities of directors, including professional experience and networking skills to board dynamics (Larcker et al. 2013; Renneboog and Zhao 2014; El-Khatib et al. 2015; Wong et al. 2015).

The current study integrates the faultline technique into board diversity research according to the following discussions, to increase the value of structuring a

multilayer diversity index, and to highlight the motives behind the theoretical structure of the proposed diversity comprehensive proxy. In this respect, prior research (e.g., Lau and Murnighan, 1998; Thatcher and Patel, 2011) theorise the simultaneous influence of multiple diversity characteristics on group performance. Faultline supports the existence of psychological clustering between members of subgroups. This hypothetical clustering is created because of differences in member's characters, values, and ethnic background. These differences lead to the generation of unique abilities to confront problems and entail various solutions (Brewer 1991).

The resource dependence theory is further guiding the choice of faultline attributes and the relationships that this chapter model with results. This theory describes how diversity characteristics of one level can influence other levels of diversity (Kozlowski and Klein 2000). This chapter relates the theoretical model directly to the basic principles of the multi-level theory. This chapter (a) clarify (emergence, homology, and contextual effects) how multi-level theory contributes to the way this chapter has built the multi-level diversity measure and (b) more substantial reason for choosing the faultlines illustrate the (structural view) that reflects how members are divided into groups and classes. Below this chapter explains how concepts drive the conceptual model as a faultline bottom-up effects (e.g., from the member-level to group-level).

2.4. Literature review

The current research identified 122 articles on board diversity. An article is considered relevant if it is published in journals ranked as 3* (A) and 4* (A*), according to CABS (ABDC) with the search parameters of (board diversity Faultline). These 122 articles are classified based on several determinants, including their main themes (see appendix 2.2), methods and contexts,

theoretical underpinnings, limitations, and their implications. In reviewing these articles, the current study focuses on highlighting how prior literature constructs its diversity measures and the associated shortcomings of such measures.

Considering the work done by Mathew et al. (2018) which demonstrate governance indices that measure external factors only such as shareholder rights (Gompers et al. 2003) and how different provisions of shareholder rights affect firm value (Bebchuk et al. 2009). Further to that, other indices include board-level characteristics as the Governance Risk Indicator (GRId). The main theme of the current literature classified as governance studies measuring diversity from board composition viewpoint (Mahadeo et al. 2012), strategic involvement (Zhu et al. 2016), operational diversity (Kabongo et al. 2013), diversity of virtues (García-sánchez et al. 2015; Karakas et al. 2017), the testing paradox of diversity initiatives (Windscheid et al. 2017), or studying board openness to the global world (Das Neves and Melé 2013; Melé and Sánchez-Runde 2013) to determine diversity types of highly effective boards.

In the literature on diversity, the relative importance of board faultline is subject to considerable discussion (Chen et al. 2017c). Since the seminal work by Mahadeo et al. (2012) and Buse et al. (2016), widespread literature classifies and quantify the implications of board diversity by studying the positive inferences of director gender, age or ethnic background on board governance practices. Nevertheless, prior research on board diversity focuses on the empowerment of specific aspect of diversity on account of balancing board skills while constructing their diversity mechanisms or testing the already existing diversity measures (Chapple and Humphrey 2014; Du 2016; Gao et al. 2016b; Reguera-Alvarado et al. 2017).

Arguably, there is a debate on a new complex diversity measure that provides a useful explanation that can be employed to objectively and directly enhance the current understanding of interpreting diversity research outcomes that led to the quality of the board of directors in addition to improving the reliance on the mixed outcomes in such kind of research as detailed in the following sections. Consistent with this notion, some studies shed light on less studied diversity dimensions: compensation (Joutsenvirta 2013; Lucas-pérez et al. 2015; Hong et al. 2016), professional background (Cho et al. 2017), and its usefulness in elucidating the source or the nature of director motives to shareholders value maximisation.

Further to that, there is little focus has yet been paid to director's demographic characteristics suggesting a number of potential venues for research opportunities. Nekhili and Gatfaoui (2013) study members of the SBF1 20 stock market index in France between 2000-2004. The present study demonstrates how women directors, who have special demographic characteristics (e.g., nationality, foreign experience, educational level, corporate expertise, and links to external sources) are most likely be directed to public affairs area instead of executive positions in the boardroom.

In the Canadian context, Zhu et al. (2016) discuss the various process that determines boards strategic involvement for a sample of 217 for-profits and 156 non-profit organisations, they find that the adoption of effective boards develops corporations, which complement the findings of another study that confirm the positive association between board diversity based on gender aspect and corporate effectiveness (Perrault 2015; Ward and Forker 2017).

In the UK context, there is a great demand to generate corporate-level governance solutions, to increase governance efficiency, focusing on boardroom and members characteristics (Armitage et al. 2017). However, although firms listed in FTSE 100 UK generate above 50 per cent of sales from foreign locations, major public corporations suffer from ethnic and gender minority in the boardroom (Maloney and Zellmer-Bruhn 2006; Das Neves and Melé 2013; Lozano and Escrich 2017). Besides, Ferreira (2015) conclude that the likelihood of corporate selection to their board diversity approach and the basis for nominating directors are derived from social networks. The various diversity approaches (e.g., diversity *per se*) led to a trade-off between demographic attributes (e.g., age, gender, or nationality) and its impact on corporations. Supporting these purposes, Huang et al. (2017), for example, designates the impact of such diversity approach on other corporate schemes (e.g., traditionalism vs innovation) to present an exhaustive view of board diversity conditions and prospects.

Meanwhile, due to several mixed outcomes in board diversity research that show the benefits of diversity due to director distinguished skills and diverse resources who bring to their corporations (Arfken et al. 2004), the costs of random diversity led to the lack of a well-balanced board (Masli et al. 2018), therefore, the findings of previous board diversity research are debatable.

That is why, on the one hand, faultline studies (Lau and Murnighan 1998; Thatcher et al. 2003; Thatcher and Patel 2012; Adams et al. 2015) resort to a so-called (faultlines) on the basis of incorporating directors attributes from different aspects of task-related diversity (e.g., director education or functionality), gender and age diversity in order to broaden the current understanding to board diversity as board faultline is a complex approach (see appendix 2.3). For example, (Mo et al. 2017) examine the relationship between ethical leadership and team

faultline and they find a curvilinear relationship toward team (e.g., board) creativity using multisource data from 50 teams of supervisors and 186 employees in the eight high-technology companies. They further find that team (e.g., board) faultline significantly moderated the relationship between ethical leadership and creativity of the team, so that there is an inverted U-shape on the relationship between weak faultline teams.

On the other hand, the inclusion of task-related diversity alone as suggested by some studies i.e., Kaczmarek et al. (2012) led to limited understating on how board diversity influence effectiveness using a panel of FTSE 350 companies from 1999 to 2008. The majority of evidence (Harrison and Klein 2007; Cooper et al. 2014; Chung et al. 2015a; Veltrop et al. 2015b) related to employing faultline in board diversity research is concentrated on considering the key diversity types, suggesting the construction of a complex measure that can go beyond the traditional diversity *per se* measures (Meyer and Glenz 2013).

Logically, this chapter infers having a well-diversified boardroom have an explanatory benefit that can be exploited to enhance board effectiveness. Therefore, based on the above arguments, *ceteris paribus*, this chapter hypothesises that this importance can be quantified by developing a more complex diversity measure based on Faultline, resource dependence, and multi-level theories.

Consistent with the literature on board faultlines which still reflecting mixed diversity outcomes (Li and Hambrick 2005; Flache and Mäs 2008; Van Dijk et al. 2012; Meyer et al. 2015a) due to the adoption of diverse director attributes and different computation strategies. The mixed diversity outcomes led us to classify these articles into a group (A) of faultline studies that find a positive diversity

outcomes by measure board faultline relying on task-related faultlines (Hutzschenreuter and Horstkotte 2013a), identity-related faultlines (Spoelma and Ellis 2017), and demographic faultline (Trezzini 2008; Bezrukova et al. 2009; Joshi and Roh 2009; Lawrence and Zyphur 2011). Group (B) of faultline studies that find diversity hinder effectiveness and performance due to considering bio-demographic faultlines alone (Hutzschenreuter and Horstkotte 2013a; Veltrop et al. 2015b), task-related faultlines (Spoelma and Ellis 2017) and boards with extreme faultline score results in communication obstacles and reduces board of directors focus on the goals of the organisation and, consequently, constrain boardroom operational task (Meyer et al. 2015a; Crucke and Knockaert 2016; Van Peteghem et al. 2017). This is seen as a competing argument (or implied as a plausible null hypothesis). Therefore, research on diversity to date (see appendix 2.4) has not fully accounted for the multi-dimensional aspects of board faultline due to either the lack of disclosed data on directors or computational limitations (Payne et al. 2009; Meyer and Glenz 2013). Much research on diversity has paid less attention to the correlation among various director characteristics and only concentrated on a single diversity dimension (Mäs et al. 2013; Veltrop et al. 2015a). That said, the competing argument derived from this broad theme still plausibly motivates research questions about first, whether the need to constructing a multi-dimension diversity measure is still not fulfilled; second, whether it is recommended to differentiate the impact of a board with extreme faultline from those with moderate faultline score to develop a proper interpretation of diversity research outcomes.

Research on diversity showed an inverse relationship between board functionality and the concertation of subgroup attributes (extreme Faultline). The immediate effect of dividing teams (moderate Faultline) generates a new

challenging environment that reduces conflict between group members (van Knippenberg et al. 2011; Mäs et al. 2013). However, extreme faultlines might constraint the exchange of information and destroy communication channels among subgroups. Therefore, to overcome high faultline negative impact on the categorisation of subgroups, more tremendous efforts are required to share information and experience between subgroups (Meyer and Glenz 2013). Teams with extreme faultlines suffer from slow communication flow (Cronin et al. 2011), and the absence of cohesion between group members (Meyer and Glenz 2013).

Whilst diversity underlines director's importance for group processes. Faultline studies create mixed and frequently contradictory results that leave us with immense untapped potential for the current understanding and conception of faultlines (Antino et al. 2019).

Current assumptions, in particular, fuel the empirical approaches that limit the ability to incorporate and study the essential role of time in relation to faultline type and their effects. The current understanding of faultlines is linked to assumptions that limit the ability in relation to faultlines and their effects to incorporate the crucial role of faultline type (Antino et al. 2019). Potential faultline exists in a variety of attributes, and in any group, there are several potential faultline (Meister et al. 2019). For example, one group can have an identity-based faultline and a knowledge-based faultline (Carton and Cummings 2012).

To this end, this chapter uses literature which calls for the multi-dimensional conceptualization of a traditional diversity to faultline approach (Wageman et al. 2012). The parameters are specifically used to explain faultline type shapes board diversity and its effects (Meister et al. 2019).

A key feature of a potential faultline is that they often consist of sets of conceptually similar attributes, but the faultline types are various in nature. Faultlines have formerly been conceptualised based mainly on demographic attributes (e.g., gender, age, and nationality)(Antino et al. 2019), but the literature has presented the faultline based on a range of other attributes, such as task-related background, educational background, tenure, personality, language skill, differences of objectives, status disparity and organisational background (Bezrukova et al. 2009; Carton and Cummings 2012; Hutzschenreuter and Horstkotte 2013a). The value for understanding the underlying attributes or identities forming a defect is that different types of possible defects operate via different mechanisms and vary in the extent of their effects. This chapter has developed such kind of research by drawing on the taxonomy for subgroup types in two major categories (Carton and Cummings 2012; Richard et al. 2019) specifically: identity-based subgroups (based on members' surface and deeper Faultline); knowledge-based subgroups (based on information processing Faultline). Up this incoherent picture of frequently investigating a single attribute or dimension of board diversity, the current chapter turns to investigate the effect of the alignment of multiple diversity dimensions at multiple levels on board outcomes. This chapter emphasises the importance to differentiate diversity outcomes from boards with moderate faultline from boards with extreme Faultline. Consistent with the faultline theory, prior literature, and the Code's principles, the first research question is formulated as follows:

RQ1: How faultline research outcomes are over and above those from diversity per se research?

There is little focus has yet been paid to combine diversity and faultline perspectives on faultline research (Thatcher et al. 2003; Bezrukova et al. 2009; Thatcher and Patel 2012). Research on diversity highlights the significance of investigating the interpretation provided by faultline outcomes over and above those are generated from traditional diversity assessment mechanisms (Van Dijk et al. 2012; Trezzini 2013; Veltrop et al. 2015a). Several different measures of diversity have been proposed, creating numerous controversies. Research on diversity has long debated the impact of traditional diversity on the creation and diffusion of board effectiveness (Giannetti and Zhao 2016).

Several articles investigate micro-dimension director's diversity or age/gender surface-level diversity, but few studies use the faultline technique for a cumulative meso-level diversity, although there is an upward trend in the utilisation of these mechanisms (Thatcher and Patel 2012; Meyer and Glenz 2013; Cooper et al. 2014; Meyer and Glenz 2018). The reason for this might be the complexity of this technique as it is much easier to study one diversity attribute at a time. However, it is insufficient to rely on (age – gender) surface-level diversity attributes alone to capture multi-dimensional diversity aspects. There is a large volume of published articles that describe the role of identity faultline on moderating the negative effect of extreme faultlines (Cooper et al. 2014; Meyer et al. 2014; Schmid et al. 2015). It is necessary to consider information related attributes and other non-demographic/statutory characteristics, to construct a well-functioning board at the cumulative meso-level diversity (Nekhili and Gatfaoui 2013).

The systematic review of faultline and diversity research led to conclude gaps and implications (e.g., demographic Faultline, group performance, organisational level Faultline, and disparity in organisations) (see appendix 2.5). Based on reviewing board diversity articles, it is notable that there is little focus has yet been

paid to the multi-dimensional diversity concept, suggesting a number of potential venues for research opportunities. Further to that, research on diversity has reached to mixed findings, suggesting there is a need to establish a multi-dimensional measure to capture this phenomenon (Gibson and Vermeulen 2003; van Knippenberg et al. 2011).

In the major study by Nielsen (2010), which considers the faultline methodology to be the most relevant board diversity research, he recommends that future research should expand the current understanding of non-demographic characteristics. However, the reviewed research shows that very little research focuses on upper echelons and group diversity (Adriaanse 2016; Ben-amar et al. 2017a).

Therefore, this chapter considers the moderating effect of the alignment of several variables at the same time from a multi-dimensional perspective at multiple levels. This chapter considers this led to a significant shift from traditional diversity *per se* toward multi-dimensional diversity research.

There is a new line of research (Bezrukova et al. 2016) that bring the multi-level theory to faultline research. In their research, team faultline is measured at different levels using identity-based attributes (e.g., age and racial attributes) of Major League Baseball (MLB) 30 teams from 2004 to 2008. This chapter also combines compensation research to the literature of faultline by showing how organisation-level effects pay-related factors and shape faultlines. They find that team identity-based faultline negatively related to group performance.

The existing literature on diversity has not considered the multi-dimensional aspects of Faultline, as it is heavily concerned demographic diversity (Cole and

Salimath 2013; Cui et al. 2015; Cho et al. 2017; Fauver et al. 2017)⁷ rather than statutory, cognitive, or non-demographic dimensions (Hafsi and Turgut 2013). This chapter categorises board members into subgroups according to predetermined attributes.

To guide the choice of faultline attributes, this chapter is building on prior research that studies the five attributes of high performing teams (e.g., knowledge, information, power, incentives, and opportunity). These attributes are found to be related to higher levels of board effectiveness (Payne et al. 2009), different demographic characteristics (Hutzschenreuter and Horstkotte 2013a; Hutzschenreuter and Horstkotte 2013b; Mäs et al. 2013; Veltrop et al. 2015a), and non-demographic director attributes (Hafsi and Turgut 2013; Carter et al. 2017).

The current study has considered identity-related characteristics (e.g., gender, age, and nationality) together with information or task-related attributes (e.g., number of educational qualifications, director role, seniority, and director network size). Further to that, this chapter included the non-demographic attribute (e.g., director pay). Setting up the proposed measure is supported with resource dependence, faultline and multi-level theories as the choice for the director faultlines set of attributes, and the multiple levels of diversity can have meaningful relationships. Turning to contextual factors, this chapter embraces recent methodologies measurement approaches while recognising faultline complex nature of group splits, disengagement various faultline effects using average

⁷ The term (traditional diversity) is a relatively new term for the previously well-known basic diversity concept, commonly referred to as measuring the influence of a single diversity attribute at a time on group outcome (Flache & Mäs, 2008).

silhouette width (ASW) cluster-based algorithm (Meyer and Glenz 2013; Meyer et al. 2015a).

These attributes are studied together to achieve a better understanding of measuring diversity, to understand the impact of diversity on board dynamics at the meso-level diversity based on faultline theoretical framework (Thatcher et al. 2003; Bezrukova et al. 2009; Thatcher and Patel 2012; Meyer and Glenz 2013; Cooper et al. 2014; Meyer and Glenz 2018). The core of the construction process of the proposed measure MDI is the choice of faultline attributes on the basis of multi-level theory. The selection process of the director's characteristics to be analysed is based on board objectives (monitoring management or providing guidance to management) and most boards do not consider these roles as mutually exclusive. Further to that, this chapter links faultline and compensation research boards can be shaped based on pay related attributes (e.g., director salary) (Joutsenvirta 2013; Lucas-pérez et al. 2015; Bugeja et al. 2016; Carter et al. 2017).

The selection criteria for the director's attributes of highly effective boards have been developed to include eight instead of five attributes, and based on board literature, this chapter sets into multiple classifications. For example, age, gender, and nationality are grouped under identity diversity (as in the current study), social, demographic, or non-task-related (Cui et al. 2015). And information (as in the current chapter) or task-related diversity (e.g., knowledge, experience, skills, conscientiousness, education, compensation). In further to that, another trend of studies investigated non-demographic attributes such as personality types, work location (Hafsi and Turgut 2013) or director pay (Wong et al. 2015; Bugeja et al. 2016). Pfeffer and Salancik (1978) describe knowledge as a supply of information or background expertise. This expertise contributes to the overall cognitive

resources and improves the scope, quality, and effectiveness of board decisions (Hillman and Dalziel 2003).

As the direct measurement of director information-related attributes, for example, the knowledge of the board is challenging to obtain.⁸ Over the years, several studies have used various proxies as strategic and operational measures of the board. These include interlocking of boards (Wong et al. 2015), the task-related background of a board member (Carpenter and Westphal 2001) and tenure of boards (Zajac and Westphal 1996). Although these various board knowledge measures are important, research also shows that the capacity to translate the board's knowledge into the right strategic decisions depends on many moderating factors. In order to promote a broad range of options (Hillman and Dalziel 2003), group norms and processes should be sufficiently diverse between board members to contribute to the openness of opinion (Sun et al. 2015), and, most significantly, the benefits of specific types of knowledge should be context-related. For example, Carpenter and Westphal (2001) find that the management's experience is improved due to the global challenges the company face (such as a sustainable competitive environment). In turn, this improves the performance of companies in certain contexts. Whereas the background and experience of board members certainly affect the results of board decision-making this chapter is more concerned about the knowledge, or expertise of the team that allows teams to function efficiently as groups. In the case of boards, this knowledge includes technical expertise, such as business strategy and how organisations work (Holloway et al. 2016; Ruiz-jiménez et al. 2016; Barroso-Castro et al. 2017;

⁸ This chapter shows the moderating effect of information-related (e.g., differences in the number of educational qualifications, director role, seniority, and director network size) on the moderateness of board diversity at the meso- level. The findings suggest that Faultline value has dropped to 0.434 by adding information-related attributes to demographic diversity level.

Chen et al. 2017a). Given the complexity of the information processing requirements placed on managers, boards need the necessary technical capability to assess options and make decisions efficiently.

Figure 2.2 highlights research questions regarding layering board diversity into multiple levels to capture the joint effect of several types of diversity on board dynamics.

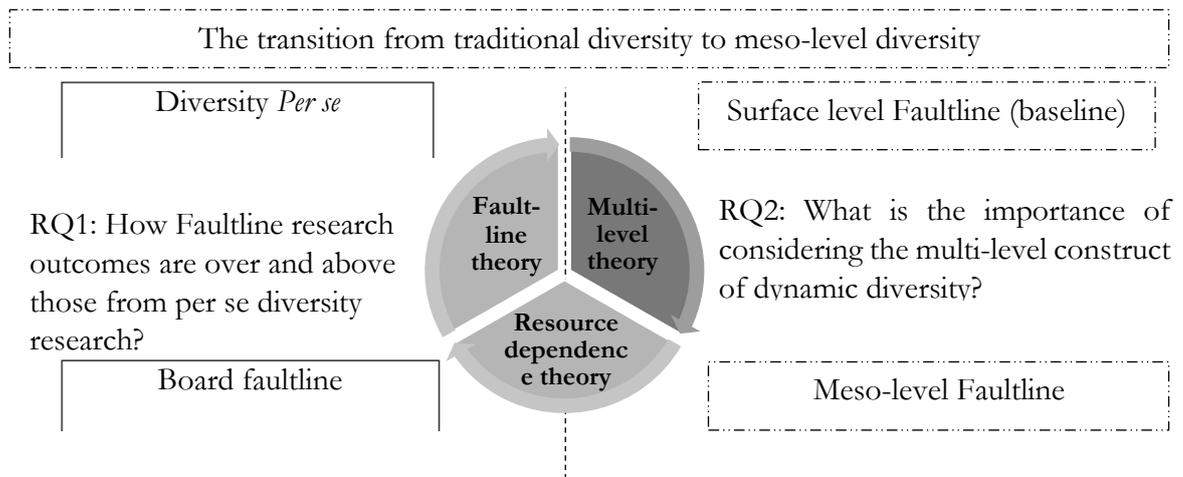


Figure 2.2 Research questions development

Consistent with Sir John Parker (2016) and prior literature, the second research question is formulated as follows:

RQ2: What is the importance of considering the multi-level construct of diversity?

2.4.1. Constructing the multi-dimensional diversity index (MDI)

There is extensive debate in diversity literature over diversity and corporate governance concerns in the literature. Research on diversity showed that diversity hinders the smoothness of board decision making and the formation of corporate strategies (Cole and Salimath 2013; Das Neves and Melé 2013). Moreover, other studies expose that diversity slows down the exchange of information among board members (Jaeger et al. 2016). The mixed outcomes find by prior studies are due to the use of diversity measures that did not differentiate between types of diversity and suffer from arbitrary reliance on

diversity *per se*. In contrast, the majority of research on diversity agree on the importance of diversity and its role in constructing diverse views for various business scenarios in the board of directors (Estélyi and Nisar 2016; Rao and Tilt 2016; Saeed et al. 2016; Sila et al. 2016; Carter et al. 2017; Ward and Forker 2017). One of the most significant current discussions in the new global trends toward developing a proper understanding of diversity to go beyond gender diversity measures (Parker 2016; Windscheid et al. 2017). In this respect, studies have called for establishing a solid hypothetical foundation to address various levels of diversity measures, to expand the current understanding of the complexity of faultline literature (Yoshikawa and Hu 2017). Another concern with the current work on diversity is that several articles to date have relied on a self-report methodology and questionnaires, rather than the empirical analysis (Chen et al. 2017c) using archival (secondary) data rather than questionnaires and experiments.

This chapter classifies diversity measures into simple and complicated proxies. For example, binary variable coding measure whereas it is equal to 1 when at least one woman sits on the board and 0 otherwise for firm *i* at time *t*, or as the percentage of women on the board, calculated as the number of female directors divided by the total number of directors for firm *i* at time *t*. Another example, propensity score-matched measure where female executives are matched with male executives most similar in firm-level and executive-level characteristics. Also, Zanutto et al. (2011) showed more complicated diversity measures which consider single director attributes at a time. For example, the index of heterogeneity whereas, the number of gender categories (male/female) and the evenness of the distribution of board members among them for firm *i* at time *t*. For example, Blau index proxy the proportions such as 3 females and 7 males do

result in a different answer 0.30 is 0.09 and 0.07 is 0.49. added together we have 0.58 to subtract from 1 and a diversity index of 0.42) (Conklin 1979). Another example is the Shannon index which proxy the percentage of board gender diversity ranging from 0 to a maximum of 0.5, which occurs when the proportion of women and men is equal (Shannon 1948), Further to that, diversity or entropy index (Teachman 1980), and coefficient of variation (Allison 1978). Therefore, the used measures in recent diversity literature are constrained by considering one attribute at a time (Zanutto et al. 2011; Hoang et al. 2016; Mo et al. 2017).

There are a few later attempts to consider cumulative proportions of variables, such as demographic attributes, which have a significant effect on various behaviour patterns of variation. In this respect faultline literature, highlights eight tentative frameworks due to the development of statistical packages, it has become more achievable to develop the arithmetic measures, and several studies quantified diversity from different angles (see appendix 2.5). For example, Gibson and Vermeulen index, Thatcher, Jehn, and Zanutto index, Shaw index, Latent Class Analysis 'LCCA', Polarised Multi-dimensional Diversity Index 'PMDcat', Multivariate Cluster Analysis, Hierarchical Linear Modelling (HLM), and Multiple Linear Regressions.

This chapter has been guided by a faultline-based framework that takes into consideration the multi-dimensional composition of multiple attributes influencing factors on various group outcomes in contrast to demographic diversity *per se* (i.e., age, gender, or nationality) (Lau and Murnighan 1998). In demographically divided subgroups, individuals who have the same demographic traits bond to form distinct group clusters within the board. The total strength of a demographic faultline is proportional to the number of attributes through which the two subgroups are split.

On that basis, individuals draw on their demographic characteristics as a basis for social identification and have a preference to interact with others who are similar. Thus, diverse teams will be split according to the demographic distribution of the team members (Conklin 1979; Lau and Murnighan 1998).

Notably, Lau and Murnighan (1998) emphasised that individuals can exist simultaneously within different groups and serve various roles (e.g., identities simultaneously based on gender, age, and ethnicity). When multiple demographic characteristics overlap, the interactions occur, because all members of the team can influence only the other people who have a matching demographic identity. Similarly, Lau and Murnighan (1998) pointed out that multiple identities can be held by the same person (e.g., identities simultaneously based on gender, age, and ethnicity). Consequently, as more factors of a team's demographic makeup tend to coincide, social interactions are more dependent on that it on demographic groups. Extreme faultline can result in interaction segregation in the team social processes create and reinforce pre-existing subgroup divisions in attitudes, entailing sub-group polarisation.

In 2013, Meyer and Glenz succeeded to develop a new cluster-based approach that led to a new generation of diversity measures which consider the most complex forms of faultline for large sample size and various variables types, which is the case in this chapter. Faultline strength is measured as the percentage of aggregate differences in member's attributes as the highest split factor. Therefore, strength values range between 0 and 1, where a high strength value is close to one (Thatcher et al. 2003; Bezrukova et al. 2009; Thatcher and Patel 2012; Chen et al. 2017c).

As Allen et al. (2007) illustrated for measures that quantify team diversity in terms of a single attribute, such as the Blau index, a severe impact of missing data can be expected (Conklin 1979). Faultline measure, on the other hand, tends to be more stable in the face of missing attribute data (Meyer and Glenz 2013; Meyer et al. 2015b). Thus, faultlines are important, previous measures of diversity (e.g., the Blau index do not account for faultlines) have missed a major aspect of diversity and do not account for faultlines based on (non-)demographic director attributes. Therefore, this chapter has selected this cluster-based algorithm to construct the multi-dimensional diversity index. This chapter builds on prior research by Mo, Ling, and Xie (2017) and measured board faultline strength using the average silhouette width (ASW) which is considered as the most robust and versatile algorithm developed by Meyer and Glenz (2013). This algorithm considers all entered attributes in the clustering process and generates small size subgroups based on similar member attributes. After that, the balancing role among all subgroups based on size is achieved. In the final stage, subgroup's average silhouette width (ASW) is quantified with respect to subgroup cohesion and division to determine the optimal number of clusters. Based on that, ASW is defined as the aggregation of differences among members of subgroups; the interpretation of this figure is the extent to, which members of subgroups are harmonised with their groups, which is called a member to subgroup association.⁹

2.4.2. Challenges to measuring board diversity

The first concern is the accessibility of data on demographic characteristics: attributes such as age and gender encourage studies to consider social attributes rather than task-related characteristics such as education, experience, and non-

⁹ The process of splitting into subgroups has been done according to the extent of similarities between members of a subgroup. This measurement technique is processed in two levels. The first level includes the use of dividing analytic mechanism to split group. In the second level, each member is allocated to a specific subgroup and this process is known as hierarchical clustering.

demographic attributes (Harrison and Klein 2007; Nekhili and Gatfaoui 2013; Veltrop et al. 2015a; Mo et al. 2017). The review of earlier attempts to construct a multi-dimensional diversity index by considering non-demographic or demographic faultline (e.g., identity and information faultlines) characteristics¹⁰ show the arbitrary reliance on the specific director-related attributes might be due to the limited disclosure of diversity information-related attributes (Harrison and Klein 2007; Adams et al. 2015).

Second, high sensitivity to homogeneous/heterogeneous group, group size, and the number of subgroups, for example, (Latent class analysis-LCCA) (Barkema and Shvyrkov 2007), Multivariate cluster analysis (Euclidean distances) (Bezrukova et al. 2009), Polarised multi-dimensional diversity Index (PMDcat) (Trezzini 2013). Also, board attributes are proposed to be weighted equally in most prior measures, which is expected due to the lack of data (Black et al. 2017).

Third, categorical format requirement: where diversity cannot be measured based on numeric attributes, for example, (Shaw index) (Shaw 2004) and (Fau index) (Thatcher et al. 2003), however, some numeric attributes such as age can be converted into categorical terms, some attributes such as tenure or behavioural attributes such as cannot be converted into a categorical format. Moreover, this measure also has limited validity to consider a member to subgroup association.¹¹

¹⁰ This research uses the terms 'Information Faultline' and 'Identity characteristics Faultline' interchangeably, to demonstrate the relationship between distinct types of directors' demographic attributes on the cumulative Faultline strength.

¹¹ Gibson and Vermeulen used a developed tool to measure subgroup strength. The methodology used in this measurement is relatively close to Thatcher's approach, where extreme faultlines exist when group characteristics under analysis are identical. This technique has several limitations. First, there is an operationality concern with regard to numeric attributes and for large group size with more than two subgroups. Second, the outcomes are sensitive to scaling especially when comparing these outcomes to other calculation techniques. Finally, this tool did not consider member to subgroup association.

Fourth, faultline strength cannot be generated in one figure: in factions faultline tools the calculation did not determine the immense faultline value over specific attributes of a particular team (Li and Hambrick 2005). It is rather intended for a case where faultline concerning a particular attribute of interest. This attribute forms the factions; the measure is therefore called factional faultline strength. Measures adopt factions approach limits the covered approaches to the case of multiple attributes (Harrison and Klein 2007).

Fifth, the number of subgroups limitation: some measures are limited to two subgroups only, for example, (Fau index) (Thatcher et al. 2003). Finally, member to subgroup association concern: it cannot calculate the faultline strength for groups that are entirely similar in one attribute as all-male groups in a faultline gender-related study, for example, (Multiple Linear Regressions) (van Knippenberg et al. 2011) and Multi-Dimensional Polarized Diversity Index (Trezza 2008). These measures return a value of 0 for the faultline strength, even if there is some overlap in the other attributes in the group.

Similar to clustering-based methods, due to computational process, most current faultline mechanisms do not extend to tasks-related team attributes (Bahargam et al. 2019). For example, Trezza (2008) proposed the costs of divisive diversity measure increases exponentially with the number of attributes. Carton and Cummings (2012) relies on the exhaustive assessment of every possible group division of two or more subgroups. Similarly, Shaw's faultline strength (FLS) measure (2004) relies on computing and combining all possible internal alignments and cross-product alignments of each feature concerning each other's subgroups. Because each of these constructs should be modified whenever an individual is added or removed from a team, the faultline strength (FLS) formula cannot be modified in constant time.

Van Knippenberg et al. (2011) propose a measure that uses regression analysis to calculate the variance of each attribute explained by all other attributes. Despite this, its advantages in calculation perspective, multiple regressions for each candidate team, are not a practical choice in a team setting.

Literature focuses on the identification and measurement of faultline strengths in existing teams, and clustering algorithms have become the milestone for this purpose in recent years (Barkema and Shvyrkov 2007; Bezrukova et al. 2009; Lawrence and Zyphur 2011; Meyer and Glenz 2013; Meyer et al. 2014). This line of work is illustrated by 3-step Average Silhouette Width (ASW) approach (Meyer and Glenz 2013). For a team of people, the first step involves using a group-clustering algorithm for pre-clustering the members of the team. Agglomeration starts with the assignment of each member to its cluster. The two most similar clusters are then linked iteratively until all points are within the same cluster. Meyer and Glenz (2013) adopt Ward's algorithm and its average linkage as the two most common parameters.

Further to that, the ASW of any possible configuration is determined. The silhouette $s(i)$ of a single person tests how well a team member fits in its cluster relative to all other clusters. The ASW is all team members' average silhouette. The third step uses a post-processing method to optimise the ASW of each configuration, moving members over subgroups temporarily and recomputing the ASW after each shift. The move leading to the highest increase is permanent. The process continues until there is no further improvement. Finally, the overall ASW score of all configurations is shown as the strength of the faultline structure of the team (Meyer and Glenz 2013).

According to Meyer and Glenz (2013), faultline values differ by the change in the computation process. The average silhouette width (ASW) algorithm developed by Meyer and Glenz (2013) guarantees a high-quality clustering process with respect to subgroup cohesion and the optimal number of clusters. Therefore, the new cluster-based algorithm average silhouette width (ASW), developed by Meyer and Glenz is the most suitable and reliable approach for the proposed comprehensive proxy, as it, overcomes all the limitations of LCCA by using various categorisation tools to determine the subgroup with the highest cohesion and measure faultline strength. The LCCA technique was designed to deal with small groups and to analysing categorical attributes (Meyer and Glenz 2013). However, ASW goes beyond LCCA as it works well with large group size and all types of member attributes. Also, there is a positive relationship between faultline strength and a number of subgroups, except when LCCA is used. Generally, faultline measures are more sensitive to missing data in comparison to *per se* traditional diversity measures. ASW subgroup strength is recommended for research, where overestimating faultline strength generates misleading research outcomes (Mo et al. 2017).

Moreover, the proposed comprehensive MDI proxy considers member-to-subgroup association, which is another critical factor in the adoption of the ASW cluster-based algorithm as the core of the multi-dimensional measure MDI. Further to that, the proposed measure considers the issue of assigning arbitrary weights (e.g., a difference in ten years of age equals a difference in gender) to diversity attributes. As a response to Bezrukova et al. (2009) who recommend scaling numeric attributes by their standard deviation, this chapter also recommends employing this scaling when calculating ASW faultline (Meyer et al. 2014; Meyer et al. 2015a; Meyer and Glenz 2018). Moreover, this chapter

considers the correlation among board attributes controlling for the correlation by employing the Mahalanobis metric in determining how similar members are for attributes such as age and tenure. Further to this, embracing the ASW approach increases the soundness of the proposed multi-dimensional measure, as this cluster-based algorithm considers homogeneity of differences among subgroups is known to be accurate in quantifying subgroups, and missing data do not affect the reliability of outcomes. In this chapter, the cluster-based algorithm developed by Meyer and Glenz (2013) is testified in a different context. They used this approach ASW on 100 groups, where the average number of individuals was eight and sixteen members for small and large groups, respectively. Besides, they analysed only three demographic attributes. This chapter evaluates ASW reliability as a unified diversity measure by using it on a broader scale and for the more complex structure of member attributes, including demographic and non-demographic characteristics.¹² Faultline strength quantifies the level of alignment among board members (Li and Hambrick 2005). This is achieved by using the faultline algorithm developed by Meyer and Glenz (2015) and implemented by Crucke and Knockaert (2016). This approach is adopted by several faultline articles (Meyer et al. 2015a; Mo et al. 2017).

Despite the mentioned constraints in prior diversity measure, as highlighted before, this chapter attempts to reuse all these measures over a sample of 26,743 director-year observations derived from FTSE-All shares for 3,357 non-financial companies from 2005 to 2018 in the United Kingdom (see Table 2.1). However, they failed to capture multiple dimensions of diversity.

¹² This measurement tool is processed in an ASW. cluster package, which is available for the open-source statistical environment R (R Development Core Team, 2018).

Table 2.1 Sample selection process

FTSE All-share Index 2005 - 2018	8,904 firm-year observations
Less financial UK firms	4,270
Total	4,634
Less firms with missing director characteristics	1,277
Full data set	3,357 firm-year observations 26,743 director-year observations

Table constructed by the author. The above table sets out the sample breakdown analysis for FTSE All-Share index 2005 – 2018.

This study embraces a wide window sample of 26,743 director-year observations derived from FTSE-All shares for 3,357 non-financial companies from 2005 to 2018 in the United Kingdom to provide stability and reliability of outcomes in the context of diversity research. This study stops in the year 2018 as the latest I can collect this study's data from annual reports. This chapter has chosen the annual reports as they are the most significant documents by which the company conveys their major activities. Furthermore, this source is the major channel through which outsiders, especially investors and creditors, can obtain information about the company. Further to that, this chapter uses historical and secondary financial data from Thomson Worldscope database (Thomson ONE), BoardEx, DataStream, and Bloomberg that collect corporate data from the official annual returns statements (e.g., balance sheet, income statement, cash flow statement). Furthermore, for assessing the hypothesis, this chapter uses simple and multivariate regression, correlation coefficient, coefficient of determination. Our research investigates governance and diversity for non-financial corporations listed in FTSE All shares (Nonfinancial firms) - London stock exchange LSE - the UK market. Our research concentrates on a single market to investigating homogenous data, which might generate generalization concerns (Rejchrt and Higgs 2015; Chen et al. 2017a)—using an unbalanced panel dataset of non-financial companies between 2005 and 2018. This chapter constructs the sample

based on companies that exist at least for one year in the study period. Therefore, this sample cover active and inactive firms; thus, the data set is unbalanced (Schmid et al. 2015). Companies are chosen from British FTSE-All shares because not only it is widely used and covers the most important companies, but also, the commercial and ethical concern to solve the UK board of directors' diversity deficit and their fatal consequences but understudied. This motivates the investigation of diversity problem for both British readers and global audience. To answer the main question of this investigation, this chapter use firm-level data for 14 years to analysing differences in corporate governance data and besides, adhering the theory of clean surplus, which recommend studying long serious of accounting observations to overcome accounting data unreliability concern (Cornett et al. 2010). Data is collected from the Thomson Reuters database. This data source, among others, is considered as a widespread and reliable data platform on corporate governance information (Trumpf et al. 2015; Qiu et al. 2016). The emphasis of Quantitative research is on collecting and analysing archival data from published annual reports such as balance sheet, income statement, cash flow statement, and firm's corporate governance report to study most important faultlines variables. This type of research, although harder to design initially, is highly detailed and structured and results can be easily collated and presented statistically.

The current study takes into consideration that all prior attempts stem from the faultline methodology and aim to measure multiple individual attributes simultaneously. Further to this, these measures are considered a developed generation over and above the *per se* mechanisms. The replication process of these prior measures using a large sample failed to calculate the faultline for eight nominal and numeric, complex attributes simultaneously. However, when this

chapter captures the joint effect of age and gender variables, only Gibson and Vermeulen's (2003) measure succeeded in generating faultline strength. Nevertheless, for the remaining measures, the first group require all attributes to be nominal scaled (Shaw, 2004; Trezzini, 2008). The second group are limited to only two sub-factions (Thatcher, Jehn, and Zanutto, 2003; Bezrukova, Jehn, Zanutto, and Thatcher, 2009).¹³

2.4.3. The three-dimensional aspects of diversity mechanism

This line of work is illustrated by earlier studies on the three-step ASW approach (Barkema and Shvyrkov 2007; Bezrukova et al. 2009; Lawrence and Zyphur 2011; Meyer and Glenz 2013; Meyer et al. 2014).¹⁴ For a team of people, the first step involves using a group-clustering algorithm for pre-clustering the members of the team. Agglomeration starts with the assignment of each member to its cluster. The two most similar clusters are then linked iteratively until all points are within the same cluster. (Meyer and Glenz 2013) adopt Ward's algorithm and its AL as the two most common parameters. The combined results from the two alternatives, therefore, give a total of 2μ for each possible number of clusters for a team of n members (2 for each possible number of clusters). In the second

¹³ The measure developed by van Knippenberg, Dawson, West, and Homan (2011) accept nominal and numeric attributes. However, it showed inconsistency in Faultline values with the large sample size used in the current study and with twelve board attributes. The outcomes of the calculation process were extremely low for the joint effect of age and gender attributes and extremely high for the twelve board attributes simultaneously.

¹⁴ Thatcher et al. (2011) suggest a method for measuring the share of the total variance described by a particular division of a group into subgroups. Their final faultline measure F_{avg} is then defined as the segmentation score that maximises the formula. Nevertheless, this measure can be applied only to segments of the two subgroups because it is the detailed nature of the search for the best split that makes costs prohibitive in the team creation environment; and because, where there is an arbitrary variance in the number of subgroups, the solution to maximise the total variance is to assign each member to its subgroup.

Another important model is the Gibson and Vermeulen (2003) Subgroup Strength Metric. Although this calculation is not built for faultline calculation, its emphasis on subgroups makes it important. Its developers claim that there are large subgroups where there is a high variability as attributes overlap within a team. Their estimation is also based on the calculation of similarities between the team members across all attributes. The power of the team is then determined as a standard deviation for all possible pairs of members. Although this method is not explicitly designed to quantify faultlines, the team-formation model makes it simple to calculate and update.

step, the ASW of any possible configuration is determined. The silhouette $s(i)$ of a single person tests how well a team member fits in its cluster relative to all other clusters. The ASW is all team members' average silhouette. The third step uses a post-processing method to optimise the ASW of each configuration, moving members over subgroups temporarily and recomputing the ASW after each shift. The move leading to the highest increase is permanent. The process continues until there is no further improvement. Finally, the overall ASW score of all configurations is shown as the strength of the faultline structure of the team (Meyer and Glenz 2013).

Meyer and Glenz (2015), in their research "*Team Faultline Measures: A Computational Comparison and a New Approach to Multiple Subgroups*", give some reliable methods for calculating Faultline. In their study, a new cluster-based approach is developed to determine the strength of faultline that could potentially divide a team into subgroups using the ASW algorithm; the ASW package considers all entered attributes in the clustering process according to the Ward algorithm. The ASW calculation process, which is established on the Ward algorithm, is the most suitable and reliable faultline algorithm (Balian 1982; Meyer and Glenz 2013; Meyer et al. 2014; Meyer et al. 2015a; Boyd et al. 2017; Meyer and Glenz 2018).¹⁵ This technique produces small subgroups based on the attributes of similar directors. This means categorising board members into subgroups relying on predetermined attributes. This chapter studies the attributes together to achieve a better understanding of the impact of diversity on corporate performance. Table 2.2 demonstrates the subgrouping process based on the directors' attributes.

¹⁵ Meyer and Glenz (2015) managed to create and provide free access to the R application package (ASW) for measuring Faultline. This programme is unlimitedly accessible so that results can be replicated.

Table 2.2 Interpretation of faultline strength

Group	Moderate Board Diversity				Faultline Strength	
	Subgroup A		Subgroup B			
	Director 1	Director 2	Director 3	Director 4		
1	Age	50	50	25	25	A high score close to 0.75 (7 align, one way)
	Gender	Male	Male	Female	Female	
	Nationality	British	British	American	American	
	Educational qualifications	2	2	4	4	
	Director role	CEO	CEO	CFO	CFO	
	Director seniority	Executive director	Executive director	Supervisory director	Supervisory director	
	Director network size	1000	1000	800	800	
Director pay	200	250	500	550		
2	Age	50	25	25	50	A low score close to 0.25 (3 align, five-way)
	Gender	Male	Male	Female	Female	
	Nationality	British	American	American	French	
	Educational qualifications	2	4	4	2	
	Director role	CEO	CFO	CFO	CEO	
	Director seniority	Executive director	Supervisory director	Executive director	Senior manager	
	Director network size	1000	800	800	700	
Director pay	200	500	250	550		

Table constructed by the author. The above table sets out the subgrouping process based on the identified director attributes, which led to boards with moderate MDI score (0.25 – 0.75).

This study measure board faultline strength using the average silhouette width (ASW) which is considered as the most robust and versatile algorithm developed by Meyer and Glenz (2013).

ASW is defined as the aggregation of differences among members of subgroups; the interpretation of this figure is the extent to, which members of subgroups are harmonised with their groups, which is called a member to subgroup association. This algorithm considers all entered attributes in the clustering process and generates small size subgroups based on similar member attributes. After that, the balancing role among all subgroups based on size is achieved. In the final stage, subgroup’s average silhouette width (ASW) is quantified with respect to subgroup cohesion and division to determine the optimal number of clusters. The process of splitting into subgroups has been done according to the extent of similarities between members of a subgroup. This measurement technique is

processed in two levels. The first level includes using a group-clustering algorithm for pre-clustering the members of the team. In the second level, each member is allocated to a specific subgroup and this process is known as hierarchical clustering. Then we come to the post-processing method to optimise the ASW of each configuration, moving members over subgroups temporarily and recomputing the ASW after each shift. The move leading to the highest increase is permanent. The process continues until there is no further improvement. Finally, the overall ASW score of all configurations is shown as the strength of the Faultline structure of the team (Meyer and Glenz 2013).

The ASW package quantifies subgroups concerning subgroup cohesion to determine the optimal numbers of clusters. In other words, to what extent subgroup members are aligned to their groups, which is called the member association to subgroup (Meyer and Glenz 2013). The ASW package is run over a data set containing the members of one or more boards as rows, and their diversity attributes that are used for calculating a given faultline measure as columns (Meyer et al. 2014). For each diversity attribute contained in the data frame, this chapter specifies its scale (either numeric or nominal), for example, as in Table 2.2, if the data set contains the variables age (numeric in years) and nationality (character factor) (Meyer and Glenz 2018). Then, this chapter specifies a weight for each diversity attribute with the attribute weight parameter. These weights indicate how strong a difference of 1 (in case of numeric attributes) or a different category (in case of nominal attributes) is factored into the faultline. To circumvent the issue of assigning arbitrary weights (e.g., a difference in ten years of age equals a difference in gender) to diversity attributes, Bezrukova et al. (2009) recommended to scale numeric attributes by their standard deviation and to dummy code nominal attributes with 0 and $1/\sqrt{2}$ and used it to employ this

scaling when calculating ASW faultlines (Meyer et al. 2014). ASW clustering techniques estimate how various board member characteristics can simultaneously divide boards of directors into subgroups. This process can be interpreted into one figure, which is faultline overall strength with values between 0 and 1. By employing quantitative methodology, this chapter attempts to illuminate various diversity faultlines measurement techniques (Mo et al. 2017).

Faultline strength in this chapter quantifies the level of alignment among board members based on demographic and non-demographic attributes. This chapter employs the faultline algorithm developed by (Meyer et al. 2015a), which is an approach adopted by several faultline studies (Black et al. 2017).¹⁶ Diversity in this chapter is assessed at four levels, as follows: surface diversity (baseline), identity diversity, demographic diversity and meso-level board diversity.

At surface level (baseline), age-gender faultline is measured based on the joint effect of differences for two characteristics of board members (e.g., differences in age and gender) (Meyer et al. 2015a; Mo et al. 2017). At the identity level, faultline is measured based on the joint effect of differences for three characteristics of board members (e.g., differences in age, gender, and nationality). At the demographic level, faultline is measured along with identity and information directors' characteristics (e.g., education, director title, seniority level and network size). In the meso-level, faultline is measured along with seven demographic characteristics (e.g., differences in age, gender, nationality,

¹⁶ Although, this study agrees with prior faultline study on the complexity of multi-dimensional diversity literature and the theoretical foundation because diversity literature is remarkably diverse (Harrison and Klein 2007). This chapter borrows from well-constructed theory in the faultline and diversity literatures to bridge demographic board attributes of boardrooms with non-demographic ones (Ben-Amar et al. 2013; Lau and Murnighan 1998; Stevenson and Radin 2009). Statutory diversity for non-demographic attributes is necessary to set up a comprehensive definition for board diversity. Therefore, there is a strong tie that connects attributes such as age, gender and ethnic background to director pay as a proxy for non-demographic board characteristics (Ben-Amar et al. 2013).

education, director title, seniority level and network size) and non-demographic attributes (e.g., director pay: annual salary in cash for each director in a reporting period) (Chung et al. 2015a; Spoelma and Ellis 2017).

In guiding this study's choice of board diversity attributes and linking its model with identity and information faultlines, this chapter builds on prior research (Payne et al. 2009) that employs the five attributes of high-performing teams (e.g., knowledge, information, power, incentives and opportunity) which are found to be causally related to higher levels of performance (Kaczmarek et al. 2012; Ferreira 2015; Meyer et al. 2015a; The UK corporate governance code 2018). The current study has additionally considered identity-related characteristics together with information or task-related attributes (e.g., number of educational qualifications, director role, seniority, and director network size). Further to that, this chapter included the non-demographic attribute (e.g., director pay).

Moreover, education, experience and network size are proxies for the information faultline (Bezrukova et al. 2016; Spoelma and Ellis 2017). Ignoring faultline type, whether informational or identity, faultlines have led to many conflicting diversity outcomes (e.g., the information faultline enhances group performance, however the identity aspect constraints group dynamics) (Bezrukova et al. 2009; Larcker et al. 2013; El-Khatib et al. 2015; Wong et al. 2015). This chapter highlights the importance of layering board diversity into multiple levels to capture the joint effect of several types of diversity on firm performance.

The importance of capturing diversity at multiple levels to explain situations when this chapter moves up a level of analysis and considers diversity at the complex cumulative meso-level faultline is argued further. This chapter also needs to capture board diversity based on nationality attributes and their impact on the

surface-level Faultline, where director attributes such as age and gender are merged. Thatcher and Patel (2012) call for future research to study demographic faultline composed of years of work experience, type of task-related background, degree major, sex, age, race, and country of origin, along with other non-demographic attributes. For this study, this chapter selected board size, stability, structure, succession, activity, attrition, nomination independence and CEO duality as proxies for board-level diversity, known as diversity of board (Parker 2016). Therefore, this chapter seeks to develop a multi-dimensional mechanism that measures board diversity at four levels: surface diversity (baseline), identity diversity, demographic diversity, and meso-level board diversity. Moreover, this study's proposed measure considers member-to-subgroup association, which is another critical factor in the adoption of the ASW cluster-based algorithm as the core of this study's multi-dimensional measure. Therefore, board faultlines are the independent variables quantified by faultline strength which quantify the level of alignment among board members based on demographic and board-level diversity attributes known as diversity of board (Veltrop et al. 2015a).

Diversity can vary from prominent levels to moderate levels, and then to low levels. High level of faultline strength is indicated where faultline values are close to 1. Low level of faultline strength is where faultline values are close to 0 (Mo et al. 2017). Moderate levels of faultline strength are where the directors' identity attributes (age and gender) are matched and led board subgrouping, reducing the conflict between subgroups. Boards with moderate diversity scores positively increase board performance where board members realise the open channels across subgroups (e.g., $0.25 < \text{Fau} < 0.87$) (Thatcher et al. 2003; Bezrukova et al. 2009; Thatcher and Patel 2012; Cooper et al. 2014; Chen et al. 2017a).

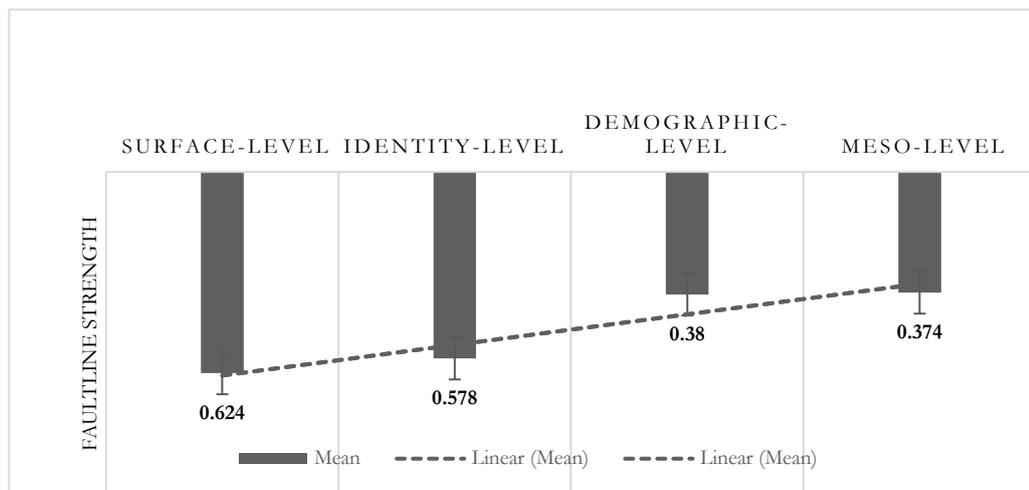
As discussed in previous sections, this chapter builds on prior research that finds attributes such as age, race, and nationality to be aspects of individual demographic identity (Bezrukova et al. 2016; Spoelma and Ellis 2017). Moreover, education, experience, and network size are proxies for the information faultline (Bezrukova et al. 2009; Larcker et al. 2013; El-Khatib et al. 2015; Wong et al. 2015). This research supports the comprehensive MDI proxy with, not only, identity and information faultlines (see appendix 2.6), as ignoring faultline type, whether informational or identity faultlines have led to many conflicting diversity outcomes (e.g., the information faultline enhances group performance; however, the identity aspect constraints, group dynamics (Chung et al. 2015b). But also, with non-demographic attributes (e.g., director salary).

The current research further argues the importance of capturing diversity at multiple levels to explain situations when this chapter moves up a level of analysis and considers diversity at the complex meso-level Faultline. Also, when there is a need to capture board diversity in the micro-dimension, such as *per se* nationality attribute and their impact on the surface level faultline (baseline), where director attributes such as age and gender are merged (Parker 2016). “Diversity is inherently a multi-level construct. It describes a unit in terms of the collective composition of its members. Still, most studies of diversity are single-level articles, focusing on unit-level outcomes of within-unit diversity” (Harrison and Klein 2007). Thatcher and Patel (2012) call for future research to study demographic faultline composed of years of work experience, type of experience, degree major, sex, age, race, and country of origin, along with other non-demographic attributes. Therefore, this chapter seeks to develop a multi-dimensional mechanism that measures multi-dimensional diversity by considering homogeneity of the subgroups and the intra-subgroup composition

through categorising members of subgroups according to predefined attributes, to a relevant homogenous subgroup.¹⁷ Board faultline in this chapter is assessed at four diversity levels as follows: surface-level (baseline), identity, demographic, and meso-level diversity. These are measured along with eight (non-)demographic attributes.

First, surface-level faultline (baseline): faultline strength is captured by measuring the level of alignment for director age and gender attributes). Second, the identity-level faultline where faultline strength is moderated by including director nationality into faultline strength to form identity diversity layer proxied by director age, gender, and nationality.

Figure 2.3 MDI score at multiple diversity levels



The preliminary analysis shows that faultline values are considerably high at (age – gender) level with a mean value of 0.624, which decline to 0.578 by adding nationality attribute to ASW calculation process (see appendix 2.8). Third, demographic faultline where diversity is assessed by combining director identity

¹⁷ The faultline methodology become obvious in moderately diverse boards (Meyer & Glenz, 2013). Based on the accuracy of analysing member to subgroup association, it increases the capability in relating faultline outcomes to group dynamics, taking into consideration that the more complex member attributes, the more time is needed, to generate figures of faultline strength using R statistical applications.

characteristics and information related attributes (e.g., differences in the number of educational qualifications, director role, seniority, and director network size). Four, the meso-level where the demographic information and identity dimension is considered in the developed comprehensive proxy. This index is tested to capture the joint effect of the identity dimension, whereby the faultline is proposed to be measured based on three characteristics of board members (e.g., differences in director age, gender, and nationality). In, the information dimension, the faultline is proposed to be measured based on four characteristics of board members (e.g., differences in director’s number of educational qualifications, director role, seniority, and director network size).

Table 2.3 Descriptive statistics

Variable	Mean	S.D.	Median	Min	Q1	Q3	Max
Gender Diversity	0.863	0.875	0.120	0.429	0.778	1.000	1.000
Nationality Diversity	0.252	0.200	0.253	0.000	0.000	0.400	0.900
Surface Diversity	0.624	0.608	0.179	0.000	0.520	0.717	1.000
Identity Diversity	0.578	0.561	0.190	0.000	0.458	0.673	1.000
Demographic Diversity	0.380	0.337	0.191	0.000	0.272	0.411	1.000
Meso-level Diversity	0.374	0.327	0.191	0.000	0.269	0.397	1.000

Table constructed by the author. This table presents summary statistics for all variables: the entire data set and scores over the period 2005 to 2018 for entire sample of 3,357 firms.

The preliminary descriptive of this chapter (see figure 2.3) shows that faultline values are considerably high at (age – gender) level with a mean value of 0.624, which has declined to 0.578 by adding nationality attribute to ASW calculation process. Notably, these results have dropped to 0.380 and 0.374 by adding information-related attributes (e.g., educational qualifications, director role, seniority, and director network size) and non-demographic (e.g., director salary) at meso-level (see Table 2.3). Therefore, this chapter responds to fill in the gap in diversity literature and measures the foundation framework by merging demographic and non-demographic diversity attributes. This brief review demonstrates the shortcomings of setting measure concentrate on traditional

demographic diversity attributes, with the scope limited to gender diversity alone (McCabe et al. 2006; Nekhili and Gatfaoui 2013; Gregoric et al. 2017).

2.5. Conclusion

There is immense pressure to discuss the significance of board of director's aspects in formulating financial and managerial decisions as well as, the importance of electing board members who are skilful and capable of operating in a multicultural environment (Jizi et al. 2014; Lanis and Richardson 2015; Boiral 2016; Hoang et al. 2016; Hsu et al. 2017). This chapter takes into consideration the influence of resource dependence theory, which can identify how board diversity provides vital resources to the boardroom of multinational corporations MNEs such as/by combining diverse knowledge into global corporate strategy and solving problems efficiently, in a way that saves corporate resources (Marquardt and Wiedman 2016). In addition, board diversity increases the likelihood of success of these MNEs in the international market by controlling uncertainty risk and improving diversification of corporate resources (Reguera-Alvarado et al. 2017).

This chapter fills the gap in corporate governance literature by proposing a multi-dimensional diversity measure to investigating the relationship between traditional diversity concepts and the advanced and complex faultline method. In the UK context, the proposed multi-dimension diversity index is assessed to capture board diversity at several diversity levels. This chapter has succeeded in measuring diversity identity and demographic dimensions by considering the mediating joint effect of information faultline on age, gender, and nationality diversity. The mechanism of this index embraced non-demographic attributes while quantifying multi-dimensional diversity. Therefore, this chapter makes a

significant contribution to research on diversity and corporate governance by reasonably quantifying multi-dimensional diversity and demonstrating the establishment of multi-dimensional measurement mechanisms that expand the current knowledge on how to develop the traditional understanding of analysing *per se* attributes as a sign of board diversity, which is used in many previous studies. Based on the report by Sir John Parker (2016), which discussed several attributes that reflect board reforms and diversity concerns in the UK due to operational and corporate image drivers, drawing on the governance code in Britain, the UK Financial Reporting Council (FRC) claimed in 2014 to amend the corporate Code to enforce reporting on ethnocultural diversity. Therefore, the results of this chapter have significant implications for regulators and academics in the UK and in European markets to speed up the process of updating the corporate governance code, specifically with regard to board diversity index disclosure.

Chapter 3: The Impact of Board Diversity on Textual Social and Environmental Disclosures

3.1. Introduction

Appointing directors with diverse skills helps corporations in identifying ways to cope with new challenges. Developing corporate strategies suitable for stakeholders' needs should be ensured, where stakeholders are concerned with the impacts of industrial emissions of their investments on the environment (e.g., global warming) (Stern 2006; Libecap 2014; Liao et al. 2015; Tauringana and Chithambo 2015). Thus, corporate trade and resources are affected by the potential for progressively profound climate change. Subsequently, firms ought to secure their operations against such negative impacts and to acquire friendly environmental activities (Pinkse and Kolk 2009; Peters and Romi 2014; Muslu et al. 2019b). Hence, social, and environmental information around a firm's practices and their effect on society are imperative. While the role of CG and board diversity in CSR has recently been studied and widely recognised (Michelon and Parbonetti 2012; Attig et al. 2013; de Villiers and Marques 2016; Jackson et al. 2019; Muslu et al. 2019a), little attention is paid toward the impact of traditional board diversity (diversity *per se* such as gender diversity) on SED (Gibson and O'Donovan 2007; Terjesen et al. 2009; Qiu et al. 2016). Moreover, to the best of this study's knowledge, there has been no prior investigation into the relationship between board Faultline, known as the presumptive isolating lines that split a boardroom into moderately homogeneous subgroups dependent on individual directors' characteristics and SED. Thus, this study fills this gap by examining board diversity at multiple diversity levels as one of the pillars of CG and SED.

This chapter argues that a company's social and environmental policy often requires significant investments with complicated and quite uncertain implications which can have a distinct effect on stakeholders' different goals. For example, some stakeholders concentrate on financial returns, while others are concerned about the adverse environmental effects of the company's operation. Thus, the board of director's environmental decision represents a compromise of competing stakeholder demands. A boardroom must, therefore, be well-diversified and inclusive of tackling problems posed by different stakeholders. In this context, a diverse boardroom is more likely to deliver better CG by sharing a more exhaustive and different range of experiences and opinions related to SED (e.g., Singh et al. 2001; Hoang et al. 2016; Hoang et al. 2018); ultimately, to represent distinct interest groups, including financial and non-financial objectives of various stakeholders (Wang and Dewhirst 1992; Mallin et al. 2013; Aguilera et al. 2019) (Desender et al. 2020).

Despite the significance of this distinction, emphasised in CSR disclosure empirical research (e.g., Hsu et al. 2017; Jackson et al. 2019; Muslu et al. 2019a), more focus is required to study how multi-dimensional board diversity i.e., diversity based on (non-)demographic dimensions, influences these disclosure practices over time.

A proliferation of articles that demonstrate how board diversity formulates CSR strategies, these studies analyse factors that constrain environmental disclosure in business enterprises (Haque 2017; Homroy and Slechten 2017). These articles emphasise the role of the board of directors to incorporate a social and environmental policy. An important trend is shaped on the viability of appointing environmental expertise of directors (EEDs). Recent studies (Haque 2017; Homroy and Slechten 2017) show that selecting directors based on unique

environmental experience increases the opportunity cost for boardroom effectiveness. Specialised environmental directors have limited industrial experience in comparison to their peers (Homroy and Slechten 2017), and lack of specific industrial experiences in the boardroom leads to inefficiency in the decision-making process (Haque 2017).

The trend toward environmental disclosure (e.g., Albertini 2014; Liao et al. 2015; Tauringana and Chithambo 2015; Haque 2017) has flourished over the cost of the EEDs' representation in the corporate boardroom (Post et al. 2011; Hafsi and Turgut 2013; Harjoto et al. 2015; Galbreath 2016). Therefore, studies on SED are attractive because of how vital the boardroom is to corporate disclosure (Zeitoun and Pamini 2015; Kumar and Zattoni 2017c). The complexity of business operations increases the need to establish a proper outlet for corporate board functionality where diversity concern is a key determinant in the effectiveness of CG (Clark and Brown 2015; Yoshikawa and Hu 2017).

Little is known about the interrelationships between board heterogeneity and the disclosure level of corporate environmental (de Villiers et al. 2011) and social performance (Hsu et al. 2017). Moreover, studies on the implications of boardroom diversity on corporate environmental reporting still need more investigation compared to social disclosure (Post et al. 2011; Byron and Post 2016; Hsu et al. 2017; McGuinness et al. 2017). Board diversity literature documents the necessity to construct an integrative/multi-dimensional diversity framework to study SED (Lau et al. 2016; Katmon and Farooque 2017). Although there are numerous methods to capture board diversity, the faultline concept remains the least studied aspect concerning the environmental corporate social responsibilities (ECSR) domain. Few CSR studies recognise the distinction

between DIB (director age, gender, experience, ethnicity) and DOB (board size, board leadership) (Hafsi and Turgut 2013).

Additionally, and more importantly, prior research does not differentiate the impact of boards with moderate and extreme diversity scores, and the extent to which board diversity at multiple levels motivates corporations to disclose more social and environmental information.

This study addresses this gap by answering the following main question: How does board diversity influence the UK firms to increase their levels of social and environmental disclosures significantly?

A different approach is pursued here compared to others (Jain and Jamali 2016; Ben-amar et al. 2017b; Katmon and Farooque 2017) as this chapter proposes an MDI which combines three distinctive aspects. The first deals with board faultline at the meso-level, where diversity is measured according to the distribution pattern of eight demographic director characteristics and is analysed together with non-demographic attribute as a proxy for board diversity. Second, this study's research proposes a new approach to classify the FTSE All-Share index into firms with moderate and extreme board diversity to distinguish the impact of each group on SED based on analysing unique board attributes on a large scale. Third, this chapter controls for eight board-level characteristics to generate a comprehensive view of how board diversity at multiple levels impacts SED.

The current research considers SEDs to be corporate information, which businesses disclose. Thus, SED is any information about corporate social and environmental behaviour appearing in the narrative sections of corporate annual reports. Both forms of disclosure (e.g., social and environmental) are calculated using automated textual content analysis by the number of sentences containing

social responsibility and environmental information that is commonly used in the accounting and financial literature (Li 2010; Kearney and Liu 2014; Lang and Stice-Lawrence 2015; Loughran and McDonald 2016; Dyer et al. 2017; Muslu et al. 2019a). These distinctive aspects, collectively, motivate this study to the expectation of new findings which are critical to researchers, regulators, and investors.

This research is limited to the UK FTSE All-Share index non-financial companies where social and environmental concerns are prominent. More specifically, these businesses have various stakeholders with multiple vested interests. Moreover, all listed companies are expected to adopt the latest UK Code established by the UK Financial Reporting Council (FRC) as of 2010. One of the key features of this Code is the apparent support of a well-balanced board with an appropriate mix of directors' qualities based on company expertise, education, independence, and competence (the Code, Principle B.1). Furthermore, the Code advises that the appointment of directors should take into account these attributes along with the board's gender diversity (the Code, Principle B.2) (FRC 2012; The UK corporate governance code 2018).

Remarkably, while there has recently been increasing interest in studying SED (Jizi 2017), little attention is paid toward the board diversity of UK firms. Thus, this chapter extends prior literature in multiple ways, concentrating on the UK as one of the world's leading carbon emitters, and a number of new greenhouse gas (GHG) laws (such as the emissions trading scheme (ETS)), which have been enforced by the EU and the UK Government, allowing many businesses to take action to minimise carbon emissions (The UK Department of Energy and Climate Change 2013; Liao et al. 2015). In this context, the UK Law sets a specific target of containing its pollution around 80 per cent by 2050 through

setting legally enforceable carbon policies that limit the amount of GHG emissions and implement a renewable energy incentive programme that would enable corporations to increase energy efficiency and save the UK around £1.9 billion (The UK Department of Energy and Climate Change 2013). Using the UK data helps this study to provide an additional explanation that goes above and beyond that of previous articles in the US context (Aguilera et al. 2006; Post et al. 2011; Jizi et al. 2014) and Europe (e.g., Haniffa and Cooke 2005; Cong and Freedman 2011; Nekhili et al. 2017; Cabeza-García et al. 2018; Hoang et al. 2018).

Since the release of the UK Companies Act 2006, FTSE companies are obligated to publish annual reports that cover corporate social and environmental practices.¹⁸ Therefore, the current literature (e.g., Homroy and Slechten 2017; Kumar and Zattoni 2017b; Yoshikawa and Hu 2017) urges investigation of the influence of diversity in the UK boards on the length of SEDs.

In this context, the current research employs an SED disclosure index (The number of sentences mutually inclusive indicates both social and environmental responsibilities in narrative sections of the annual report.). This chapter concentrates not only on distinctive aspects of board diversity which have the most critical impacts on SED score but collectively, this chapter utilizes the

¹⁸ The accounting corporation E&E publish for many years a survey on corporate CSR information used in its annual reports by Fortune 500 companies in the industrial sector. These reports clearly showed that the CSR disclosure appeared to be growing over time, but it differed drastically among industries (Attig et al. 2013; Cho et al. 2015). These reports were based on the annual reports and included detailed information on CSR disclosure areas for each of the companies surveyed. Based on that, this chapter collect SED in the UK context, using annual reports over the period from 2005 to 2018 for FTSE All-share index. This is discussed in more details in the research methods section. This chapter is concerned with finding variations in CSR disclosure over this wide panel data set with respect to the quantity of the SED disclosure, drivers that explain variations in firm disclosure, and, if any, the relationship between board diversity and SED.

proposed MDI constructed in previous chapters to capture board diversity in a multi-level construct.

It is thus making this the first research, to this study's knowledge, to be the most extensive scale study on textual SEDs, which combines longitudinal with cross-sectional observations at the same time. This enables this study to reliably examine how previous factors influence a firm's decision on these disclosures. Unlike other textual analysis articles (see, Loughran and McDonald 2016; Caglio et al. 2020), the word list does not stop short at a specific indicative word, but it also looks at relevant phrases that indicate SED. This chapter counts the number of phrases rather than the number of words to avoid an overcounting problem that is likely to be associated with the coding of words (Kravet and Muslu 2013).

The results reflect this study's expectations. First, the proposed MDI improves the ability to explain the mixed outcomes in prior literature by introducing multi-layering board diversity; therefore, standing central in diversity, faultline and SED literature. Results show that identity-level diversity and board meso-level diversity increase the likelihood of SED (in terms of the number of sentences mutually inclusive indicate both social and environmental responsibilities in narrative sections of the annual report) in firms with moderately diversified boards.¹⁹ In contrast, board gender diversity (percentage of male directors) decreases the likelihood of SED which is consistent with recent studies (Post et al. 2015; Hoang et al. 2018).

¹⁹ The proposed index quantified the board diversity for boards with moderate faultline strength scores (0.25 to 0.75) increases the likelihood of SED. In contrast, extreme faultline strength score (close to 0 and 1) based on eight (non-)demographic director characteristics shows a negative and insignificant effect of board diversity with extreme faultline scores (close to 0 and 1) on SED. The potential ways of subdividing the group are based on the alignment of director age, gender, nationality, role name, seniority, education, network size, salary.

Results suggest an inverse relationship between the dominance of male directors and SED, whereas female directors show a strong inclination toward CSR compared to male directors who are more interested in financial performance (Ibrahim and Angelidis 1994; Ben-amar et al. 2017a; Cabeza-García et al. 2018). In contrast, the proportion of directors from different nationalities relative to board size has a significant positive impact on disclosure levels consistent with earlier diversity studies (Parker 2016; Katmon et al. 2017). Collectively, the feasibility of these outcomes is to be replicated at no cost. Thus, this study's results complement rather than substitute the documented results on corporate environmental disclosure literature.²⁰

The structure of the current study is as follows: Section 2 discusses the theoretical and institutional background; Section 3 highlights the literature review; Section 4 introduces research methods; and Section 6 concludes and provides several avenues for future research.

3.2. Research contributions

This study contributes to extant evidence on SED as this chapter expands prior literature (Hsu et al. 2017) in many aspects, as follows. First, developing MDI (i.e., moving beyond traditional diversity measures) to the use of faultline methodology to quantify multiple levels of diversity as it provides new dimensions for diversity that affect the provision of SED.²¹ Second, this chapter presents a

²⁰ Board size, stability (measured as std. dev. of population of the number of boards quoted on overtime for all directors), and nomination committee independence are significantly and positively associated with the tendency to SED length. Besides, corporations with high succession rate (measured as the clustering of directors around retirement age at the annual report date selected) to incorporate less SED.

²¹ Varieties of methods are used to assess diversity. Each has its advantages and drawbacks (Balian 1982; Meyer and Glenz 2013; Meyer et al. 2014; Meyer et al. 2015; Boyd et al. 2017; Meyer and Glenz 2018). More recent examples of studies within diversity can be found in the work of Meyer and Glenz (2013). One of the unique methods for estimating board diversity is the use of diversity faultlines. Meyer and Glenz (2014), in their research "Team faultline Measures: A Computational Comparison and a new approach to Multiple Subgroups", give some reliable methods for calculating Faultline. In their major study which adopted a cluster-based

robust method for capturing SED based on textual analysis techniques by counting number of phrases rather than the number of words to avoid an overcounting problem that is likely to be associated with the coding of words. Whereas, the word list does not stop short at a specific indicative word, but it also looks at relevant phrases that indicate SED.

Despite the limited recent research on CG and SED ties (Johnson and Greening 1999; Neubaum and Zahra 2006; Cho et al. 2015), since diversity and SED are a multi-dimensional construct and businesses adopt different approaches (Katmon and Farooque 2017), no distinction is made in these studies between board diversity types and the impact of analysing the joint effect of different director attributes on SED. By considering board faultline from multiple dimensions, and the classification of boards into moderately and extremely diversified boards to differentiate the mixed inferences of each category on SED, this chapter discusses this complicated organisational tendency in a closely oriented manner.

There are unlimited opportunities for developing the link between faultline research and other business disciplines. Linking faultline research to SED expands CG literature significantly, moreover, analysing the influence of gender, nationality, and meso-level board diversity on non-financial disclosures (e.g., SED).

approach to construct the average silhouette width (ASW) approach with critical attributes to split the group into more than two groups. By far, this measurement framework is considered the most widely accepted technique for faultline research. Moreover, they succeeded to develop and provide free access through a software package (ASW) to measure Faultline. The unlimited accessibility to this measurement tool facilitates the standardisation of the outcomes and increases the comparability of its results to other findings (Meyer and Glenz 2013; Meyer et al. 2014; Meyer et al. 2015).

Considering the work done in earlier studies (Jizi et al. 2014; Li 2014; Harjoto et al. 2015; Galbreath 2016; Hoang et al. 2016; Hong et al. 2016; Hsu et al. 2017; Lanis et al. 2017), it becomes logical to infer the motives and contributions generated from investigating this fertile research area. To put the current study in context, this chapter investigates the impact of board faultlines at multi-level diversity on SED, and the results improve this study's understanding of board diversity and CG's involvement, and are beneficial to government and policymakers concerned with the effect of the governance system on targets for SED. This study's findings add weight to the stakeholders' demand for a comprehensive structure to establish acceptable standards for reporting and verification of SED.

This chapter aims to conclude with appropriate recommendations and valid consultations on corporate mechanisms to gauge diversity and SED. Board diversity and CG are considered as one of the urgent research areas. The current study goes beyond and above the previous articles in this area, which investigated the relationship between board diversity and CSR, by developing this study's understanding of the influence of directors' (non-)demographic attributes at multiple levels on SED.

This chapter fills the gap in strategic disclosure research by answering the call for analysing the impact of board composition on disclosure (Attig et al. 2013; Jizi 2017). As board diversity and corporate disclosure need more societal and global attention besides the political aspect, despite this, many researchers still do not fully correlate multi-dimensional board diversity to SED practices in the UK context.

3.3. Theoretical and institutional background

3.3.1. Theoretical underpinnings

This section introduces faultline theory, links this theory to CSR literature, and offers a methodological approach to measuring faultlines at different levels. Within this framework, this chapter implements diversity and provides a new integrative description of how faultline-derived effects differ across different levels of diversity. By doing so, it helps to develop this definition to accommodate the multi-dimensional aspect of diversity not and to be consistent with the widely accepted concept of diversity as a distribution of various attributes to members of groups concerning the alignment of director attributes (i.e., age, gender and nationality) (Harrison and Klein 2007). Thus, this chapter relies on faultline theory to construct its MDI to capture the dispersion of the qualities of the boardroom and to focus on the characteristics of directors. our adoption for faultline explains how the different characteristics of directors are balanced and combined to maximise the directors' strategic decisions (Lau and Murnighan 1998).

In linking diversity to SED, this chapter uses one further theory which stakeholder theory. These theories tend to be generally applicable and sufficient to clarify SED reporting trends and relevant theoretical perspective in this study's context, in which stakeholder expectations from one boardroom about SED practices are not compatible with those of other boards. So, this study's research expands stakeholder theory applicability and predictive capacity.

Stakeholder theory demonstrates the competing stakeholder demands regarding corporate awareness to social and environmental reflections of their business practices, and offers a plausible explanation for SED in terms of the sensitivity of businesses to global warming. It explains board-level orientation toward social and environmental responsibility, and the trade-off between

financial and environmental goals (Macve and Chen 2010; Gamerschlag et al. 2011) by analysing other parts of the annual report in particular, the narrative sections in general and the social and environmental information (SED) as this chapter suggest that a well-diversified board incentivises managers to disclose more information on social and environmental activities. Thus, some studies (Healy and Palepu 2001; Harjoto et al. 2015; Liao et al. 2015) promote a broader approach and recommend stakeholder over agency theory. This theory expands the traditional view to a broad range of legitimate individuals or groups that impact or are affected by corporate behaviour. Stakeholder theory acknowledges that such stakeholders are eligible to gain and retrieve information, although the objectives for all stakeholders are not ego-evident and many corporate stakeholders seem to have opposing interests (Collier 2008; Adams and Whelan 2009; Mallin et al. 2013; Thijssens et al. 2015). One perspective of stakeholder theory, which concentrates on corporate strategic aims, for example, the creation of value for shareholders, is conclusive evidence of managers' accountability (e.g., Clark and Brown 2015; Kumar and Zattoni 2017c), securing shareholders' rights (e.g., Hung 1998; Clark and Brown 2015; Kumar and Zattoni 2017a) and environmental concern (Post et al. 2011; Hafsi and Turgut 2013; Harjoto et al. 2015; Liao et al. 2015; Tauringana and Chithambo 2015).

Companies should take strategic decisions that have long-term implications for their future growth. Ultimately, these policies would influence various stakeholders in different contexts, and thus would undoubtedly be embraced by some stakeholders but rejected by others at the same time. Subsequently, a company's disclosure on social and environmental performance is highly relevant, and the company's SED strategy needs to clarify explicitly how the

intended environmental policies would help the company and its stakeholders, even those lacking commercial interests. In this regard, stakeholder theory adopts a specific definition of a board's overall dual-responsibilities to various stakeholders with conflicting ideologies, which is likely to provide a more explicit reason for the disclosure practices examined in this analysis.

To this end, this chapter theorises the proposed MDI to quantify diversity for various characteristics of corporate boards, for example, age of the director, gender, education and non-traditional characteristics, such as the nationality of the director and the network of directors. Also, how they design board faultline based on demographic attributes (e.g., identity and information) and of non-demographic (e.g., director pay) attributes to construct a meso-level diversity. According to the theory of faultline, these attributes are measured together in order to capture diversity through multi-layered measurements to achieve deep diversity.

3.3.2. The UK Corporate Governance Code

The UK Code (2012) describes CG as follows: corporate governance is the mechanism that guides and governs businesses. The aim of the UK Code, according to the (FRC 2012; The UK corporate governance code 2018), is to encourage efficient, creative and prudent management that can achieve the company's long-term success. The Code is based on the basic principles of accountability, integrity, probity, and long-term sustainable performance of an entity. The Code discusses board composition, and some significant observations are noted. First, it emphasises that an effective board should maintain long-term corporate value. Second, the Code focuses on the importance of board diversity quality. The Code highlights diversity in the board as follows: the board and its committees should have the balance of skills, expertise,

independence and organisation knowledge to allow them to carry out their specific obligations and responsibilities adequately (FRC 2012; The UK corporate governance code 2018). Furthermore, the Code expressly addresses gender diversity as a factor for diversity in boards.

In the UK, the standard legislative bodies had significantly increased the course and criteria for social and environmental reporting by the beginning of 2006, owing to the changing institutional aspects. For example, all authoritative guidance related to the recognition of social and environmental responsibilities during this time, including prior studies (e.g., Campbell et al. 2005), were provided by the FRC, the Financial Policy Committee (FPC) and the Financial Conduct Authority (FCA). In addition, Aguilera et al. (2006) suggest that the disclosure of environmental responsibility information by the mid-2000s continued to be carried out by an increasing number of UK businesses. Brammer and Pavelin (2006) show that increased information about environmental exposures is correlated with increased, encouraging environmental data, so environmental information is expected to be more inclusive in 2018, higher than in 2005.

In contrast to the corporate social arena, since late 2005, the corporate social policy remained unchanged with regard to other aspects of corporate social impacts. By the mid-2010s, almost all legislation relating to workplace welfare, public protection and fair jobs were effective, however, standard-setting organisations in the UK did not issue announcements and recommendations on disclosing social issues (Haque 2017). Nonetheless, other factors have also impacted the release of social information (as well as environmental), and these factors (e.g., board diversity) are discussed further in this study.

3.4. Literature review and hypothesis development

The literature addresses a wide variety of CG concerns, whereas some studies attempt to define CG as social and environmental transparency (Cheng and Courtenay 2006; Bebbington et al. 2008; Kathyayini et al. 2012). Other articles analyse the influence of the board of directors' characteristics (e.g., structure) on decisions regarding the environment. Further to that, some studies on boardroom characteristics entail board independence (e.g., Eng and Mak 2003), female directors and institutional investors (e.g., Kathyayini et al. 2012), the board size, chief executive (CEO)-chair duality and non-executive directors (e.g., Gul and Leung 2004); García-Meca and Sánchez-Ballesta (2010); (Khan et al. 2013; Jizi et al. 2014), and the involvement of a CSR environmental committee (Michelon and Parbonetti 2012).

Disclosure and governance literature explain the incomplete disclosure of information to mislead or confuse stakeholders (Forker 1992) and constrain the effectiveness of monitoring role assigned to boardroom (Gibbins et al. 1990).

CSR reporting has increased dramatically in the last decade. In 2011, KPMG showed in the CSR survey analysis that 95 per cent of the Global Fortune 250 companies released some kind of ego-serving CSR report (Patten 2015). The growing information accessibility, proliferating integrated CSR reports and board diversity are expected to lead to a higher SED level (Gibbins et al. 1990; Forker 1992). The substantial rise in social responsibility investment is another factor that this chapter contends raises the probability of more effective SED practices. While invested funds in CSR disclosure date back at least to the beginning of the 1970s in the UK, as Spence (2009) has noted, they were relatively recently a major component of the analysis of corporate performance and investment

opportunities. To demonstrate that social investors are willing to pay high director salary to socially responsible practices, socially concerned investors are shown to have increased company incentives by approximately 28 per cent in 1995 and 2005, respectively (Holder-Webb et al. 2009; Dhaliwal et al. 2012). One way businesses can increase their appeal to disclosure requirement to build a social responsibility identity and, as such, the willingness to reach this target, also leads over time to increased CSR release. Finally, and maybe regarding the above justifications, this chapter concludes that the establishment of specialised institutions that measure and rate companies on their CSR activities (Attig et al. 2013) also contributed to a rise in SED. Institutions, like Kinder, Lydenberg, Domini (KLD), attract significant interest and publicity globally (Chatterji et al. 2009; Post et al. 2011). By evaluating the social activities of corporations and investments in the social and environmental domains, they are trying to make the social activities of corporations more accessible, based on company CSR reports. In the same vein, transparency in socially responsible indices, such as the Dow Jones Sustainability Index and the FTSE4Good, tends to have a role in business inclusion (Cho and Patten 2013). CSR ratings, since they can foster enhanced stakeholder ties in the fields of social responsibility investments (e.g., Attig et al. 2013; Thijssens et al. 2015), are encouraged to increase their SED in firms seeking a better ranking and improved score of inclusion in indexes.

The emergence of the Global Reporting Initiative (GRI) and the proliferation of autonomous CSR reporting are among the major developments driving this study's expectations for increased CSR disclosures. In the Environment Program and the Economic Coalition established by the United Nations in the late 1990s, the GRI entails guidance on SED, not just in environmental but also in social terms. In this sense, it provides knowledge about the climate and the economy.

Earlier articles claim that the GRI guidelines are the most influential in the corporate disclosures (Ballou et al. 2006; Adams and Whelan 2009; Hsu et al. 2017), and many organisations around the world had adopted GRI by 2006.

3.4.1. Board diversity *per se*, social and environmental disclosure

Board diversity and CG are the two factors that are most frequently correlated with SED, and that empirical evidence indicates a significant impact over time on its connection with the disclosure of CSR (Kumar and Zattoni 2016c; Cabeza-García et al. 2018; Nadeem 2020), and this chapter expects levels of SED to increase from 2005 to 2018.

This chapter shows how board diversity increases SED, however, other investigations support such an approach (Byron and Post 2016; McGuinness et al. 2017). The review of heterogeneity issues in boardroom literature classifies board heterogeneity into two categories: social and occupational. Social heterogeneity includes gender, nationality, and age. Examples of occupational heterogeneity are co-working experience and education level. Recent articles have studied the positive impact of board expertise on environmental disclosure (Homroy and Slechten 2017) and the significance of obtaining environmental directors in the boardroom (Haque 2017; Hsu et al. 2017). The review of board diversity literature shows that assigning outside directors positively improves corporate disclosure and firm image (Hafsi and Turgut 2013; Gupta and Raman 2014; Strand 2014; Harjoto et al. 2015; Liao et al. 2015). In this context, it is foreseen that a firm with good CG is more open to calls for restrictive environmental activities and is correlated with better social/environmental efficiency and disclosure (de Villiers et al. 2011; Post et al. 2011; Hoang et al. 2018).

Gender is a strongly disputed aspect of board diversity. In the boardroom, gender diversity is an essential aspect of CG, since men and women are biologically, culturally and sociologically different (Byron and Post 2016). For example, the current literature (e.g., Feingold 1994; Buss 2005; Liao et al. 2015; Nekhili et al. 2017) shows that women vary in attitude from men, in networking skills, level of education, and work experience and knowledge.

On the one hand, some studies indicate that female directors play an insignificant role in environmental aspects based on sexual stereotypes (Hayes 2001; Rodriguez-Dominguez et al. 2009; Galbreath 2011). On the other, it is widely recognised in the literature (see appendix 3.1) that female directors can make a substantial contribution to a board, and therefore the diversity *per se* is highlighted in recent policy reform initiatives (FRC 2012; The UK corporate governance code 2018). Huse and Solberg (2006) found that women are more dedicated, active, more attentive and, in the end, produce a healthy environment on a board. Likewise, female directors are found to be less ego-interest-oriented, thereby boosting the decision-making process and board productivity (Coffey and Wang 1998; Galbreath 2016). Therefore, women's engagement in management has a positive effect on the socially responsible actions of an organisation (Barako and Brown 2008; Rao and Tilt 2016).

The mixed empirical results (appendix 3.1) show that it is also argued that female directors provide a competitive advantage to the boardroom (Rodriguez-Dominguez et al. 2009), provide insights that can be beneficial on CSR disclosure (Bear et al. 2010), a step toward cultural, social and environmental sustainability faster, and are more assured than male members (Cabeza-García et al. 2018). Special characteristics posed by female directors, such as cooperativeness, courtesy, compassion and empathy have contributed to this (Jizi 2017).

As a result, female directors are more likely to be appointed and to take on board roles related to environmental and sustainable development challenges (Bord and O'Connor 1997; Hayes 2001; Bear et al. 2010; Liao et al. 2015; Post et al. 2015; Byron and Post 2016; Rao and Tilt 2016; Shaukat et al. 2016; Nekhili et al. 2017; Cabeza-García et al. 2018), as these types of roles are more closely allied with their societal roles. So, the presence of women on a board is predicted to increase the propensity for SED. The hypothesis is consistent with stakeholder theories, stated as follows:

H1: The proportion of male directors on the board significantly constrains SED levels compared to female board members.

Remarkably, while there has recently been an increasing interest in studying the impact of diversity *per se* (e.g., gender diversity) on SED, little attention is paid to nationality diversity. Board diversity based on director nationality, culture or ethnicity categorisation is made up of members who have conventional behaviour patterns (e.g., Hoang et al. 2018) and who have the same origins (Horowitz 1985; Post et al. 2011). It is important to recognise that values can differ even within the same boardroom (e.g., Specter and Solomon 1990; Katmon et al. 2017), especially when different groups want to retain their ethnic identity (Haniffa and Cooke 2005). The ethnicity (e.g., nationality and culture) of many shareholders of a company would influence disclosure strategies of the company. For example, with regards to nationality, British shareholders would be concerned with ensuring that business activities are environmentally friendly (Post et al. 2011; Hafsi and Turgut 2013; Kumar and Zattoni 2015; Masulis and Reza 2015; Tauringana and Chithambo 2015; Kumar and Zattoni 2016b; Hoang et al. 2018).

Diversity research considers diverse board experience results from board nationality diversity as an important source of institutional competencies (Hillman and Dalziel 2003; Estélyi and Nisar 2016; Homroy and Slechten 2017); thus, previous experiences with CSR considerations, such as the public health, organisational engagement and transparency in overseas markets, are useful inputs to improve the consistency of CSR disclosure for the company. Moreover, multi-national directors are frequently instrumental in protecting the interests of the minority and various parties in the business (Estélyi and Nisar 2016). Nevertheless, they concluded that a multi-national board member's presence is related to shareholder heterogeneity and the company's international business practices, suggesting that multi-national board members are more effective than local peers. Further to that, another recent research confirmed the significant positive of director nationality on CSR disclosure (Katmon et al. 2017). Research by Fakoya and Lawal (2020) on Malaysian firms shows that directors' nationality positively affects CSR disclosure. Khan et al. (2013) report a positive effect on the transparency of the CSR on the effects of the boards' nationality composition. The board of directors thus reveals that nationality diversity raises consciousness and helps protect the rights of society and, in turn, increases the disclosure of CSR (e.g., Rao and Tilt 2016; Gantowati and Agustine 2017). Accordingly, this study's second hypothesis on nationality diversity is provided in line with stakeholder theories and the previous literature as follows:

H2: Nationality diversity significantly increases SED.

3.4.2. Multi-dimensional board faultline

Increased attention has been paid to investigating the impact of board diversity on corporate disclosure practices over the past few decades (Liao et al. 2015; Tauringana and Chithambo 2015; Jizi 2017). Diversity research attempts to set a

reliable proxy for board diversity, however, a shared factor in such kind of research is the imperfection of capturing joint effects of multiple diversity attributes.

This study fills this gap by embracing the faultline concept to study board diversity at four levels to move from traditional diversity *per se* to a more complex form at the meso-level diversity as described in the following sections.

The literature on board diversity reveals several contrasting themes by emphasising the impact of group faultline, and the group split impact on board diversity (Bai 2013; Dixon-fowler et al. 2017; Haque 2017; Homroy and Slechten 2017). This study extends ECSR literature (see appendix 3.2) by expanding the basic understanding of diversity that analyses director attribute *per se* (e.g., gender diversity or nationality diversity). It does so by investigating the transition from traditional diversity (static diversity) to board faultline (multi-dimensional diversity), which considers the joint effects of multiple director characteristics simultaneously.

Faultline strength quantifies the level of alignment among board members based on (non-)demographic attributes. This chapter adopts the faultline concept (Thatcher et al. 2003; Thatcher and Patel 2012) and the resulting definition of a faultline is developed and extended in numerous research (Meyer and Glenz 2013; Meyer et al. 2014; Meyer et al. 2015a; Meyer and Glenz 2018). Several recent faultline studies have followed this approach (Nekhili and Gatfaoui 2013; Meyer et al. 2015a; Mo et al. 2017; Spoelma and Ellis 2017; Wu et al. 2021a). Board faultline in this chapter is assessed at four levels, as follows: surface diversity (baseline), identity diversity, demographic diversity, and meso-level board diversity.

Surface-level diversity is measured as the joint effect of differences in age and gender attributes; identity-level diversity is measured as the joint effect of differences in board identity-related attributes (e.g., age, gender, nationality).

Demographic-level diversity is measured as the joint effect of differences in identity and information-related attributes (e.g., age, gender, nationality, number of educational qualifications, director role, seniority, and director network size).

Meso-level board diversity is measured as the joint effect of differences in (non-)demographic board attributes and director pay. A multi-dimensional structure needs to be designed to capture board diversity from several levels to the (complex) meso-level faultline (Thatcher and Patel 2012). The diversity layering process can be described according to figure 3.1.

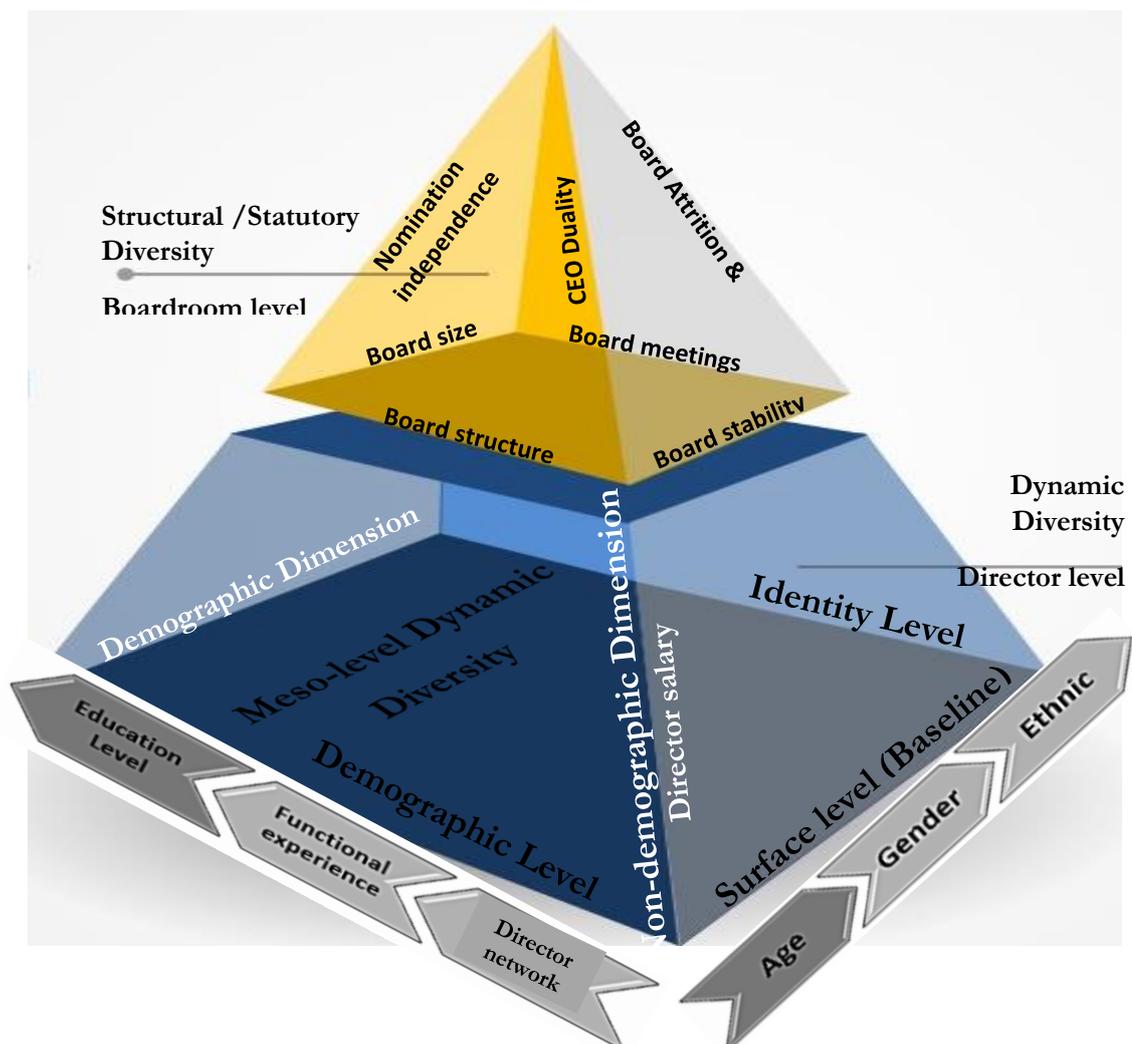


Figure 3.1 Multi-layering diversity

The constructed MDI in this study is critical to proxy various diversity types in a sensible way to measure its influence on SED. This chapter expands the current understating of diversity to gauge diversity distribution of boards. The micro aspect, diversity, is captured at four levels – surface, identity, demographic, and meso-level board diversity – as described earlier. Also, this chapter has not ignored the structural/macro-CG aspect of board-level or statutory board characteristics as in figure 3.1.

To sum up, this chapter considers diversity on the basis of eight (non-)demographic director attributes, along with the board-level diversity based on eight board-level statutory characteristics and their effect on SED. Faultline strength is determined here by the number of demographic attributes that align and the possible ways to subdivide the group on the basis of these attributes (Thatcher et al. 2003). This chapter subsequently calculates diversity score using the statistical programme R and the average silhouette width (ASW) cluster package developed by Meyer and Glenz (2014). A faultline score is between 0 and 1 in this study, and the average score is 0.50 (moderate). Diversity ratings of 1 point to very strong faultline (extreme) in which directors have the same qualities, while a score of nearly 0 points to very weak (extreme) faultline with very diverse members (random diversity) (Crucke and Knockaert 2016). The relationships between diversity faultlines and corporate disclosure are consistent with the suggestions of earlier faultline articles, which are a more complex relationship between diversity and group process and outcome variables than typically described in prior diversity research (Thatcher et al. 2003; Post et al. 2011).

The following section highlights how different director attributes, in accordance with the faultline theory, influence board disclosure practices to construct a

definite motive and clarify the selection criteria for these attributes and to be studied all together to extend the findings of earlier studies that adopt a single type of board diversity.

Director age attribute. One of the cornerstones of the “human capital of companies” is the diversity in the age of board members which fosters innovation and hence increases competitive advantages (Katmon et al. 2017). Ararat et al. (2015) argue that diversity in the age of board members can lead to varieties in beliefs and viewpoints because each generation is special and distinctive, in that its view of the world is shaped through a different experience, social, political, and economic contexts.

More knowledge is evolved by the older director subgroup, while the mid-aged subgroup is the leading executives, who efficiently use their industry experience. A combination of different ages of directors is vital for a productive board to disseminate information and experience from an elder group to a younger age group of executives which can help make sound decisions. Younger board members are correlated with lower CSR disclosure, while older directors are more conservative and willing to increase CSR disclosure due to their considerable experience. Age diversity, therefore, helps to balance the boardroom disclosure attitude of CSR with input from different generations. More connections between senior executives and junior directors are evident here through mentoring and sharing views on new ideas.

Ali et al. (2014a) show that the age of the CEO and the chairman contribute positively to the firm SED. Moreover, Hafsi and Turgut (2013) claim that age differences lead to better CSR disclosure. In contrast, some articles have shown an inverse relation (Post et al. 2011). Based on the empirical evidence, younger

and older members are more environmentally friendly (Post et al. 2011), therefore, this study integrates director age to increase the value of structuring multiple levels of diversity index.

Director gender. Much existing research shows that female directors are typically more preoccupied with environmental concerns than male directors (Mainieri et al. 1997; Wehrmeyer and McNeil 2000; Diamantopoulos et al. 2003; Cabeza-García et al. 2018). Furthermore, they are more willing to employ mechanisms that reduce potential environmental hazards (Bord and O'Connor 1997; Fukukawa et al. 2007; Jizi 2017). Prior studies show that female members support environmental and CSR transparency, especially when the number of female directors exceeds three or more (Webb 2004; Bear et al. 2010; Frias-Aceituno et al. 2013; Ben-amar et al. 2017a). This chapter concludes that because women play a different role from men in society, this affects the attitudes of female directors and inspires them to play a different role in environmental disclosure on a company board. There is broad consensus that women are more concerned with health and well-being than with financial targets, which offers a strong link with environmental disclosures (Hofstede et al. 2010; Liao et al. 2015). Therefore, this study integrates director gender to increase the value of structuring multiple levels of diversity index by considering the joint effect of differences in identity-related attributes (e.g., director age and gender).

Director nationality attribute. Diversity studies acknowledge the existence of foreign human capital as one of its most valuable corporate resources (Kaczmarek et al. 2012). In order to gain a competitive advantage, businesses need a diverse board to reach worldwide demands as they increase the level of firm revenue diversification (Yoshikawa and Hu 2017). The recruitment of directors of different nationalities, on the one hand, enhances the disclosure of

the CSR by the company, as follows. In the first instance, the transfer of experience on CSR technology culminates, as technological advancement and innovation diverge between countries (e.g., measuring carbon dioxide emissions and improving compliance to social and environmental concerns) (Zhang et al. 2013; Katmon et al. 2017). Therefore, this study integrates director nationality to increase the value of structuring multiple levels of diversity index by considering the joint effect of differences in identity-related attributes.

Director education attribute. The educational level of a board member is one of the important resources of the company that are essential, unique, and complicated to replicate. Boards consisting of multiple directors with different educational backgrounds can be used by the companies to help businesses make strategic decisions and gain competitive advantage (Katmon et al. 2017).

Although directors with a lower level of education are likely to enjoy a comparatively higher degree of boundless knowledge, either in the workplace or in some other environment, as opposed to managers with a higher level of education where the education programme in which they are engaged is tied to the restricted syllabus and curriculum (Barney 1991; Milliken and Martins 1996; Katmon et al. 2017), Hsu et al. (2017) state that the educational level is a cognitive pillar for a person and contributes to an enhanced capacity to interpret and comprehend knowledge. It improves the cognitive capacity of boards generated from several different viewpoints that eventually boost creativity and innovation in problem-solving.

The diversity of education among board members is considered to be of benefit to a company. Kaczmarek et al. (2012) show that the educational diversity of boards is positively linked to boards' effectiveness. As CSR includes not only

financial and economic knowledge, but also social and environmental interaction (e.g., employee, product, community problems), it would not be sufficient for CSR disclosure to enhance only the financial experiences of the board members. The involvement of many educational backgrounds in boardrooms enriches board discussion on legal, political, moral, technological and stakeholder welfare between the board members. Therefore, this study integrates directors' number of educational degrees to increase the value of structuring multiple levels of diversity index by considering the joint effect of differences in information-related attributes (e.g., director education).

Director task-related attributes. Optimal SED depends on boardrooms that hold an experienced member as they are those who are fully aware of business operations in comparison to outsider directors. On the one hand, empowering boards with experienced directors increase corporate efficiency and revenues. On the other hand, due to their practical experience, a board should be under the control of executive directors. This professional background entails a boardroom with a high-quality level of business information (Gupta and Raman 2014; Sun et al. 2015; Boiral 2016; Buse et al. 2016; Chen et al. 2017b; Trittin and Schoeneborn 2017).

Several articles show that well-diversified boards lead to high-quality CG by an enhanced view of corporate strategic objectives, besides a better decision-making process (Gupta and Raman 2014; Sun et al. 2015; Boiral 2016; Buse et al. 2016; Chen et al. 2017b; Trittin and Schoeneborn 2017). It is widely acknowledged that director experience encourages problem-solving, enhances the efficacy of governance, and facilitates more productive global networks (Robinson and Dechant 1997; Homroy and Slechten 2017). Therefore, this study integrates director experience to increase the value of structuring multiple levels

of diversity index by considering the joint effect of differences in information-related attributes (e.g., director role and seniority).

Prior research shows that the relationship between board diversity and CSR disclosure is mixed (Ben-amar et al. 2017a; Cabeza-García et al. 2018; Hoang et al. 2018). This chapter sheds some light on this subject by emphasising the moderating role of the director information-related attributes (number of educational qualifications, director role, seniority, and director network size) on firm disclosure. When executives have various information-related characteristics and share common socialisation experiences with other members, board diversity is significantly altered. This study's research shows that board diversity at different levels of diversity is crucial.

As diversity research accumulates, this chapter recognises more and more the importance of understanding how board diversity impacts organisations (Finkelstein et al. 2009). A key diversity type for board function is the presentation of a knowledge-based faultline that is defined as the alignment of director experience attribute of team members which splits the team into coherent subgroups of knowledge and expertise (Bezrukova et al. 2009). Such kind of subgroup formation is relevant for boards because it represents the information clusters formed by information-related characteristics of team members (Carton and Cummings 2012), and how top executives make strategic decisions to influence corporate outcomes (Hutzschenreuter and Horstkotte 2013a). While the importance of knowledge-based faultlines is already acknowledged, literature does not clearly establish their disclosure implications.

Director network size attribute. An earlier study contended that the board of directors' diversity stimulates the chances under which the decision-making

process take into account different domains, viewpoints and ideologies Post et al. (2011). They claim that board diversity (in terms of exposure to various information sources or networks), diversity of social categories (e.g., significant, and metaphorically worthwhile discrepancies in the affiliation of social classes) and diversity of values (e.g., variations in CSR beliefs) (Jehn et al. 1999; Homroy and Slechten 2017). Professional networking is a critical skill that should be developed in the board, called social capital (Larcker et al. 2013; Renneboog and Zhao 2014; El-Khatib et al. 2015; Wong et al. 2015). Therefore, this study considers the joint effect of differences in director information-related attributes (e.g., director network size).

Existing diversity research highlights the key role of board members in capitalising on the various information networks of subgroup members (Friedrich et al. 2009). To successfully fulfil this role, directors should have a variety of networks, covering different functional domains and institutional settings, which allows them to interact and thus effectively exploit opportunities in the overall network of the team (Rodan and Galunic 2004). Directors with experience from different functional areas and countries, therefore, have the necessary leverage to gain a strong network position within boardrooms with task-related and international experience based on knowledge. These superior management-facilitating capacities make better use of board members' access to information and the sharing of knowledge (Carmeli et al. 2012), leading to innovation and responsibility (Rodan and Galunic 2004). As Cohen and Levinthal (1990) emphasised, as the diverse team networks are integrated, the understanding of the skills and expertise of others is increased and that results in positive organisational outcomes.

Director pay attribute. Carbon reductions entail long-term investments without immediate financial returns, and corporate managers are hesitant in their own self-serving mentality to invest so massively (Liao et al. 2015). To this end, the main role of managers is to be recognised through an executive compensation system that integrates long-term environmental perspectives that balance the interests of shareholders and managers, and improve the social and environmental efficiency of companies over time (Haque 2017). Berrone and Gomez-Mejia (2009) point out that the pay structure of an organisation should reward current managers and recruit experienced staff to increase environmental performance that will, directly and indirectly, benefit the firm.

Focusing on the effects of faultlines highlights the importance of diversity as separation (Harrison and Klein 2007) and its effects on the corporate level (Cooper et al., 2014). According to Harrison and Klein (2007), teams with strong subgroups often have team members who amplify differences and conflicts (Lau and Murnighan 1998; Li and Hambrick 2005). An integrative force is needed within these teams to minimise fragmentation processes between subgroups of knowledge (Carton and Cummings 2012). In this approach, the work emphasises the importance of understanding how different forms of boardroom composition influence directors' diversity formation (Harrison and Klein 2007; van Knippenberg et al. 2011; Thatcher and Patel 2012; Meyer and Glenz 2013).

This chapter agrees with prior faultline studies on the complexity of multi-dimensional diversity literature and the theoretical foundation because diversity literature is remarkably diverse (Harrison and Klein 2007). This chapter borrows from well-constructed theory in the faultline and diversity literature to bridge demographic board attributes of the boardroom with non-demographic ones (Lau and Murnighan 1998; Stevenson and Radin 2009; Ben-Amar et al. 2013).

Statutory diversity for non-demographic attributes is necessary to set up a comprehensive definition of board diversity. Therefore, there are strong ties that connect attributes such as age, gender and nationality to director pay as a proxy for non-demographic board characteristics (Ben-Amar et al. 2013).

While diversity emphasises the importance of director skills for boardroom processes and results, faultline studies produce mixed and often contradictory findings which require this study to investigate faultlines to understand board diversity in an immense, untapped way (Antino et al. 2019). Earlier studies on faultline is bound to assumptions that restrict this study's ability to incorporate the critical role of diversity type in relation to faultline (Antino et al. 2019). There is potential faultline in a wide range of aspects, and there can be several potential faultlines in any group (Meister et al. 2019). For example, in this study's context, one boardroom can be categorised based on identity-based faultline or a knowledge-based faultline that is corporate resource-based (Carton and Cummings 2012).

To this end, this chapter emphasises the concepts of the faultline approach to developing traditional diversity (Wageman et al. 2012). The multiple dimensions are explicitly used to explain faultline type and its effect on diversity (Meister et al. 2019).

A major feature of a potential faultline is that often they contain sets of conceptually similar characteristics, but the faultline types are different in nature. Formerly, faultlines were conceptualised mainly based on demographic attributes (e.g., gender, age, ethnicity, and nationality) (Antino et al. 2019). The faultline is investigated based on a variety of other attributes, such as functioning, educational background, tenure, personality, language skills, objective

differences, status disparities and organisational background (Bezrukova et al. 2009; Carton and Cummings 2012; Hutzschenreuter and Horstkotte 2013a). The significance of comprehending the attributes or director identities that form a faultline is that the different types of potential faultlines operate via different mechanisms and vary in their impact. This chapter develops such research by drawing on the taxonomy of subgroup types in two broad categories: identity-based subgroups (based on member's surface and deeper faultline); knowledge-based subgroups (based on information-processing faultline).

There is extensive debate over diversity and CG concerns in the literature. Some empirical research shows that diversity hinders the smoothness of board decision-making and formation of corporate strategies i.e., disclosure policy (Thatcher and Patel 2012; Cole and Salimath 2013; Das Neves and Melé 2013). Moreover, other empirical research exposes that diversity slows down the exchange of information among board members (Jaeger et al. 2016). The main limitation of these studies is that they did not differentiate between types of diversity, so the current study uses the faultline concept to investigate diversity at multiple levels simultaneously. In contrast, empirical research agrees on the importance of diversity and its role in constructing diverse views for various business scenarios. Therefore, it is significant to solve the contradictions in the relationship of diversity outcomes on SED by considering multi-dimensional diversity rather than diversity *per se*.

This study, therefore, considers the joint effect of differences in director information-related attributes (e.g., director pay proxied as the annual salary in cash for each director in a reporting period) (Harrison and Klein 2007). Accordingly, this study's third hypothesis on meso-level board diversity is consistent with faultline theories, and the previous literature, as follows:

H3: Considering the multi-level construct of diversity, meso-level diversity significantly affects social and environmental disclosures.

3.5. Research methods and design

3.5.1. Sampling technique and data collection

This chapter incorporates a panel data methodology, which facilitates a more reliable picture than that arising from cross-sectional studies and allows the elimination of any unobservable heterogeneity that is present among the companies in the sample (Haque 2017). The unbalanced panel data set (each entity in a data set has different numbers of observations) covers 26,743 directors in a sample consisting of 3,357 FTSE All-Share index non-financial firms from 2005 to 2018 (see Table 3.1). This chapter uses non-financial firms as these firms have a different nature from financial firms which also follow a distinct set of reporting schemes.²² This study starts from the year 2005, since the release of the UK Companies Act 2006 and when the International Financial Reporting Standards (IFRS) became mandatory for all UK firms. This chapter stops in the year 2018 as the latest this chapter can collect this study's data from annual reports. This chapter has chosen the annual reports as they are the most significant documents by which the company conveys their major activities.

Furthermore, this source is the major channel through which outsiders, especially investors and creditors, can obtain information about the company. This chapter collects data on CG from several sources, including the BoardEx database. This

²² This study's sample covers all industry sectors, except the financial sector. There are 1,277 missing firms due to unavailability of annual reports; missing data regarding some firm and director characteristics which could not be obtained elsewhere; and an inability to convert PDF-format annual reports to text files for textual analysis purposes. It is worth discussing whether the sample selection process has a survival factor. Survival bias is a tendency that failed firms are excluded from performance studies due to the fact that they no longer exist (e.g., those firms that have not survived enough until the end of the analysis period). The present study excluded companies for which annual reports were not available for the 14-year analysis during the sample selection process. These companies are not exclusively excluded due to survival problems (e.g., companies which were unsuccessful enough to survive until the end of the analytical period).

data source, among others, is considered as a widespread and reliable data platform on CG information. This chapter also collects SED from the narratives section in corporate annual reports, imputing missing data on disclosure, directors' diversification, and governance, and this results in 3,357 firm-year observations.

Table 3.1 Sample selection process

FTSE All-share Index 2005 - 2018	8,904 firm-year observations
Less financial UK firms	4,270
Total	4,634
Less firms with missing director characteristics	1,277
Full data set	3,357
Panel A: firms with moderate faultline scores (0.25-0.75)	2,612
Panel B: firms with extreme faultline scores close to 0 & 1	745
Table constructed by the author. The above table sets out the sample breakdown analysis for FTSE All-Share index 2005 – 2018.	

As noted earlier, CG and, consequently, CSR disclosure differ among countries (Crane et al. 2008; Mallin et al. 2014). In order to create a homogeneous data set, this chapter chooses to concentrate on companies with a similar political, social and environmental background. This chapter chooses the UK because it does not have any official policy on how to report social and environmental practices, hence, the reporting of SED is completely voluntary. Companies are chosen from the FTSE All-Share index because it is not only extensively used and holds many important firms in the UK economy, accounting for 80 per cent of the overall market capitalisation of the British listed companies, but also to respond to calls to analyse the diverse composition of the UK board of directors and to view the inconsistent implications in the literature (Cong and Freedman 2011; Jizi et al. 2014; Cahan et al. 2016; Hoang et al. 2018). This chapter is motivated to discuss the influence of board diversity and CG as drivers for better SED for both British readers and a global audience. To answer the main question of this investigation, this chapter uses firm-level data over 14 years to analyse

variances in CG data. This chapter chooses this wide time frame as it is recommended to study a long series of accounting observations to overcome accounting data unreliability concerns (Cornett et al. 2010). The emphasis of quantitative research is on collecting and analysing archival data from published annual reports.

For several reasons, this chapter utilises annual company reports as the primary source of CSR disclosure information. First, a number of previous CSR articles have taken this approach, and this chapter aims to be aligned with those studies (Clarkson et al. 2008; Post et al. 2011). Second, annual reports are the main source form of corporate disclosure that is consistently issued on a regular basis (Buhr 1998), and that is widely available for analysis (Unerman 2000). Third, the data is widely recognised as having a high degree of legitimacy in business annual reports (Tilt 1994; Neu et al. 1998; Unerman 2000). Fourth, numerous environmental groups find annual reports to be a significant source of information about the success of a company's CSR practices (Epstein and Freedman 1994; Tilt 1994; Deegan 2002; Morhardt et al. 2002; Attig et al. 2013).

Moreover, the use of a report as a means of communicating with stakeholders is also firmly in line with the concept of stakeholder theory. Gibson and O'Donovan (2007) noted that one way of illustrating good governance was to use the annual report. Also, Spence (2009) reports on the fact that the most frequent target audience for SED are investors, based on an in-depth interview with UK managers, as the yearly report represents the main, if not the single, source of data for most investors, providing more evidence for this study's analysis on the information collected from annual reports. In 2011, Hooks and van Staden found a strong correlation across a wide variety of media, such as annual reports,

standalone reports and the internet, in relation to the size and content of SED practices.

This type of research, although at first difficult to design, is highly detailed and structured, and results can be collected and statistically presented. Moreover, for testing the hypothesis, this chapter uses 3SLS regression models, correlations coefficient and coefficient of determination.

3.5.2. Measuring dependent variables: social and environmental disclosure-textual analysis

The content analysis, according to recent research, has a long history of use (Neuendorf 2017). It is defined as the technique of research to produce replicable and valid inferences from data into their context (Neuendorf 2017). Therefore, this chapter considers this technique as the research method which is used to evaluate in a computerised way (image, word, norms) the symbolic content of all forms of recorded communications (e.g., annual reports) and thus creates a domain of research opportunities. The concept behind the content analysis is that the numerous words of a text be classified into many smaller categories of content, with each category being one word or many similar phrases, with each word or sentence being counted and the counts objectively paled in comparison (Kothari et al. 2009). Therefore, textual automated content analysis is suitable for this study's large sample size and thus the credibility of results increases, and the generalisability improves.

CSR disclosure has been described differently in a variety of ways (Mathews 1997; Khan et al. 2013). Within this review, CSR disclosure is defined as the information given in an annual report of an organisation relating to its social and environmental operations, and the use of resources deemed to impact both the public and particular groups of stakeholders. Such reports go beyond standard

information on financial statements and include environmental data, energy usage, staff, goods, community resources and fair market practices (Mathews 1997; Loughran and McDonald 2016).

A review of the literature shows three key methods that could be considered for determining the information related to corporate social and environmental activities, namely word measurement (Neu et al. 1998; Deegan 2002; Campbell et al. 2005), sentence measurement (Ingram and Frazier 1980; Hackston and Milne 1996; Eric 1998; Milne et al. 2009) and pages proportion measurement (Cowen et al. 1987; Patten 1991).

Hackston and Milne (1996) are cautious of implementing a word count-based approach, defining it as an arbitrary practice. The number of words is controversial since no purpose is expressed by individual words without a sentence to provide the context (Hackston and Milne 1996; Milne et al. 2009). Ingram and Frazier (1980) used sentences as their unit of study since a sentence is easily defined, is less subject to judgemental inconsistencies than words, classes and themes, and is tested as a suitable unit in prior research. It has also been criticised for using the number of pages dedicated to CSR disclosure because of the subjectivity inherent in the estimation process and because print sizes, column sizes and page sizes vary from one company's annual report to another. Much empirical research still challenges how blank sections of a page should be viewed (Gray et al. 1995; Gamerschlag et al. 2011).

Using sentences overcomes the issues related to allocating portions of a page and avoids the need to compensate for, or standardise, the number of terms (Hackston and Milne 1996). For the purposes of this analysis, therefore, SED sentences count is used as a unit of measurement; the SED is a continuous

variable reflecting the number of social and environmental sentences found in the annual report of a corporation (see Table 3.2). Finally, this chapter has directed this study's attention to the amount of social and environmental releases found in company annual reports. The evaluation of the consistency of the disclosures, as noted in (Hooks and van Staden 2011), adds another dimension to the evaluation of SED and brings more subjectivity to the content analysis.

Table 3.2 Definition of variables and data sources

		Measure	
Dependent variables	Social Disclosure	The number of sentences indicates social responsibilities in narrative sections of the annual report.	Annual reports
	Environmental Disclosure	The number of sentences indicates environmental responsibilities in narrative sections of the annual report.	
Social and environmental disclosure:			
Automated Textual Content Analysis	Environmental Disclosure		
SED_i			
independent variables	Gender diversity	The proportion of male directors relative to board size at the Annual Report Date selected	
Diversity per se	Nationality diversity	The proportion of directors from different countries relative to board size at the Annual Report Date selected	
	Surface level diversity	The joint effect of differences in age and gender attributes.	
	Identity level diversity	The joint effect of differences in board identity attributes age, gender, nationality.	BoardEX
Multi-dimension Diversity	Demographic diversity	The joint effect of differences in demographic board attributes age, gender, nationality, number of educational qualifications, director role, seniority, and director network size.	
	Meso-level board diversity	The joint effect of differences in (non-)demographic board attributes age, gender, nationality, number of educational qualifications, director role, seniority, director network size, and director pay.	

Table constructed by the author. The above table sets out the definitions of the main dependent and independent variables, where column 1 & 2 lists the SED and diversity mechanisms and the abbreviations of the dependent variables that will be used hereafter in italics. Column 3 defines the measures used to reflect SED mechanisms. Column 4 presents the data source used to collect each variable.

In terms of content analysis, Abbott and Monsen (1979) described it as a technique of collecting data which consists of the codification of qualitative data in the form of anecdotes and literary, into categories to extract quantitative scales of diverse levels of complexity.²³

3.5.2.1. Unit of analysis

The unit of analysis is a significant issue in the analysis of annual reports and narrative sections content – a unit can be defined as an interaction unit that measures the variables (Parker 1970; Ford 2004; Neuendorf 2017). There are many ways to use content analysis depending on the analytical tool, such as by counting sentences, phrases or pages, or reading the entire text variables (Neuendorf 2017). Advanced software packages can also be used to gather information (e.g., Chen and Bouvain 2009; Tate et al. 2010). This chapter chooses to use sentences as the research unit because the coder does not have to give a subjective opinion. The quest for specific terms in the text is often considered the most reliable method of content analysis: in repeated tests, it often yields the same results, as it can easily be reproduced (Abdolmohammadi 2005; Beck et al. 2010; Li 2010).

3.5.2.2. Identification of keywords

The keywords for this study's content analysis were extracted from the GRI in line with earlier work (Guthrie and Farneti 2008; Holder-Webb et al. 2009). Although

²³ Preparing the text for coding, annual reports are downloaded in PDF format from corporate official websites. Software is used to code the narrative statements. Its codes text files only, therefore, each annual report is then converted to a text file. Afterwards, the file is saved in a separate text file.

it is not exempt from criticism – in the sense of the disclosure of CSR (Moneva et al. 2006) – the GRI is considered to be the most important entity and also the foundation of the global standard. Due to the existence of the guidelines, companies can decide the information to be disclosed. Given the economic, environmental, and social dimensions, the GRI framework covers every aspect of CSR. Since businesses are obligated to report economic and financial information, this study's coding frameworks provide only social and environmental perspectives. CSR perspectives are suggested in the GRI guidelines as they can be split into central and additional measures. Most stakeholders have main indicators of significance and are also important to most businesses, while some stakeholders and businesses have additional indicators of only value (Milne and Gray 2013). The keywords for this study were drawn from the core indicators by defining one or more keywords for each indicator, taking into account the uncountable and plural type of the indicators (equal opportunities) as well as British and American spellings (labour/labor). The results are enhanced with the keywords extracted from a comprehensive structure, such as the GRI guidelines, as the guidelines can be presumed to represent the real meaning of CSR.

This chapter measures the SEDs as the number of sentences that mutually inclusive indicate SED in the narrative sections of annual reports. These annual reports are getting longer and becoming more complex (Dyer et al. 2017). With such complexity, identifying a firm's social and environmental activities is becoming difficult compared with shorter annual reports in the last few decades (Patten 2015). This chapter relies on an automated method to capture the related scores that can be applied by other studies with minimal cost and time compared with the manual method.

To that end, this chapter generates two-word lists from relevant prior academic literature, for social keywords (Gamerschlag et al. 2011; Lee et al. 2013); for environmental keywords (Gamerschlag et al. 2011; Wu 2013; Albertini 2014) according to professional databases (GRI (G4) and Asset 4 ESG); and also by reading the narrative sections of a number of annual reports that were chosen randomly.

For environmental disclosure. The word list includes the following words: recycle, water, biodiversity, emissions, effluents, waste, reuse, composting, spills, transport, and pollution. This chapter also includes derivatives of the original words, thus the list further includes the following phrases: recycled input materials, renewable materials, non-renewable materials, packaging materials, reduced packaging, energy consumption, energy intensity, energy use, renewable energy use, renewable energy products, renewable energy, alternative fuels, energy efficiency, fuel efficient, fuel efficiency, fuel saving, energy footprint, ecological footprint, carbon footprint, water withdrawal, water recycle, water recycled, water use, water efficiency, water technology, water technologies, water, emissions reduction, emissions reduction policy, greenhouse gas emissions, greenhouse, greenhouses, ozone-depleting substance, NO_x, SO_x, CO₂, equivalents emission, air emissions, climate change, water discharge, water pollutant emissions, hazardous waste, waste reduction, waste recycling, non-hazardous waste, environmental impact, environmental impacts, environmental impacts of products and services, product life cycle analysis, environmental laws, environmental requirements, environmental requirement, ISO 14000, environmental regulation, environmental regulations, environmental risk, environmental risks, environmental protection expenditure, environmental expenditures, environmental supply chain, environmental supply

chain management, green supply chain, sustainable supply chain, certified suppliers, environmental R&D expenditure, environmental innovation, green building, green procurement, green manufacture, green manufacturing, environmental policy, environmental stewardship, environmental damages, environmental damage, environmental assessment, eco-conception, sustainability, trip bottom line, green logistic, green logistics, sustainable transportation (Gamerschlag et al. 2011; Wu 2013; Albertini 2014).

For social disclosure. The list includes the following words: labor, labour, employment, community, sustainable, stewardship, donation, donations, social, responsible, moral, ethical, equity, the common good, citizen. This chapter also includes derivatives of the original words. Thus, the list further includes the following phrases: employment quality, employment policy, employment salary, employment salaries, employment awards, employment award, employee turnover, employee turnovers, employee satisfaction, employees leaving, employee relations, employee benefits, employees' benefit, bonus plan, bonus plans, retention rate practice, labour practices, labor practices, collective bargaining, collective arguments, occupational health, occupational safety, health and safety policy, health and safety, training, training and education, training cost, training costs, training hours, management training, diversity, diversity and opportunity policy, equal opportunity, equal opportunities, women employees, women managers, flexible working day care service, day care services, grievance mechanisms, human rights, human rights policy, discrimination, non-discrimination, freedom association, child labour, child labor, forced labour, forced labor, compulsory labor, compulsory labour, indigenous rights, indigenous people, local community, local communities, corruption, anti-corruption, public policy, public policies, political contributions, anti-competitive behaviour, anti-

competitive behavior, anti-trust, monopoly practices, compliance, non-compliance, complaints, complaint, fines, sanction, sanctions, product responsibility, customer health, customer safety, customer satisfaction, banned product, banned products, disputed product, disputed products, customer privacy, customers privacy (Gamerschlag et al. 2011; Lee et al. 2013; Wu 2013).

To conclude, social disclosure is the number of sentences that indicate social responsibilities relative in narrative sections of the annual report. Environmental disclosure is the number of sentences that indicate environmental responsibilities in narrative sections of the annual report.

3.5.3. Measuring independent variables: multi-dimensional board diversity

Six main interest variables are extracted. The variable gender diversity (board diversity *per se* based on male director representation in the boardroom) and nationality diversity (board diversity *per se* based on director nationality proxied as the ratio of the number of different nationalities of directors to the board size). Moreover, multi-layering board diversity into four independent variables: surface, identity, demographic, and meso-level faultline based on the differences in different directors' attributes (e.g., director age, gender, nationality), information (e.g., the number of educational qualifications, director role, seniority, director network size and director salary) (see Table 3.2). Board faultline is quantified as the standardised strength values. Meyer and Glenz (2015), in their research "*Team Faultline Measures: A Computational Comparison and a New Approach to Multiple Subgroups*" give some reliable methods for calculating Faultline. In their study, which adopted a new cluster-based approach to computing the strength of the faultlines that can potentially split a team into subgroups using the ASW algorithm, faultline strength quantifies the level of alignment among

board members based on (non-)demographic attributes. This chapter uses the faultline algorithm developed by Meyer and Glenz (2014), which is adopted by the recent faultline article (Mo et al. 2017).

In line with the subgroup algorithm (Carton and Cummings 2012), this chapter determined whether the presence of moderate diversity-based subgroups could be assumed or not for each team by employing a (conservative) cut-off value: following conventions in moderation analysis. The proposed MDI divided our sample into four quartiles for a similar approach see (Ben-Amar et al. 2013; Hutzschenreuter and Horstkotte 2013b; Meyer et al. 2015a; Van Peteghem et al. 2017). With this in mind, this chapter considers extreme high faultline strength (mean value plus one standard deviation) and extremely low level (mean value minus one standard deviation). This resulted in the detection of 745 boards in the first and fourth quartiles and 2,612 boards in the second and third quartiles.

Diversity score can vary from prominent levels to moderate levels, and then to low levels. A prominent level of faultlines strength is indicated where faultline values are close to 1, and the directors' characteristics are almost identical. A low level of faultline strength is where faultline values are close to 0 and board is diversified based on extremely different directors (Thatcher et al. 2003; Bezrukova et al. 2009; Thatcher and Patel 2012; Cooper et al. 2014). Moderate levels of faultline strength (e.g., 0.25 to 0.75), where directors' identity, information and non-demographic attributes are matched and lead to well-balanced board subgrouping, reducing the conflict between subgroups, reduces the gap between subgroups, thus improving the cohesion of boards where board members realise open channels through subgroups (Chen et al. 2017b). Therefore, this chapter distinguishes firms with moderate and extreme faultline scores to overcome the curvilinear characteristic of faultline strength (Thatcher et

al. 2003), and to investigate the relationship between board diversity and firms' SED.

Similar to clustering-based methods, due to computational constraints, most current faultline mechanisms do not extend to team-related tasks (Greene 2003; Haque 2017). For example, (Bahargam et al. 2019) proposed divisive diversity measures stability and accuracy are reduced exponentially with the number of attributes. Carton and Cummings (2012) rely on the exhaustive assessment of every possible group division of two or more subgroups. Similarly, Shaw's faultline strength (FLS) measure (2012) relies on computing and combining all possible internal alignments and cross-product alignments of each feature concerning each other's subgroups. Because each of these constructs should be modified whenever an individual is added or removed from a team, the FLS formula cannot be modified in constant time.

Van Knippenberg et al.'s (2011) proposed measure uses regression analysis to calculate the variance of each attribute explained by all other attributes. Despite this, its advantages in the calculation process, multiple regressions for each candidate team, are not a practical choice in a team setting.

Thatcher et al. (2003) suggest a method for measuring the share of the total variance described by a particular division of a group into subgroups. Their final faultline measure – $F_{au\ g}$ – is then defined as the segmentation score that maximises the formula. Nevertheless, this measure can be applied only to segments of the two subgroups because it is the detailed nature of the search for the best split that makes costs prohibitive in the team creation environment; and because, where there is an arbitrary variance in the number of subgroups, the solution to maximise the total variance is to assign each member to its subgroup.

Another important model is the Gibson and Vermeulen (2003) subgroup strength metric. Although this calculation is not built for faultline calculation, its emphasis on subgroups makes it important. Its developers claim that there are large subgroups where there is a high variability as attributes overlap within a team. Their estimation is also based on the calculation of similarities between the team members across all attributes. The power of the team is then determined as a standard deviation for all possible pairs of members. Although this method is not explicitly designed to quantify faultlines, the team-formation model makes it simple to calculate and update.

Literature concentrates on the identification and measurement of faultline strengths in existing teams, and clustering algorithms have become a milestone in recent years in this respect (Barkema and Shvyrkov 2007; Bezrukova et al. 2009; Lawrence and Zyphur 2011; Meyer and Glenz 2013; Meyer et al. 2014). This line of work is illustrated by the (Meyer and Glenz 2013) three-step ASW approach. The first step for a team is to use a group-clustering algorithm to preclude team members. Agglomeration begins with each member's assignment to its cluster. The two closest clusters are then iteratively connected until each point is within the same cluster. Meyer and Glenz (2013) adopt Ward's algorithm and its average linkage (AL) as the two most common parameters. The combined results from the two alternatives, therefore, give a total of 2μ for each possible number of clusters for a team of n members (2 for each possible number of clusters).

The ASW of any possible configuration is determined in the second level. The silhouette of a single person verifies how well a team member fits into his cluster compared to all other clusters. The ASW is the average silhouette of all team members. The third step employs a post-processing method to optimise the ASW

of each configuration, move members temporarily over subgroups and recalculate the ASW after each shift. The move leading to the highest increase is permanent. The process continues until there is no further improvement. Finally, the overall ASW score of all configurations is shown as the strength of the faultline structure of the team (Meyer and Glenz 2013).

This measurement framework is by far the most widely accepted technique for faultline research. Moreover, Meyer and Glenz (2014) succeeded to develop it and provide free access through a software package (ASW) within R application to measure Faultline. The unlimited accessibility to this measurement tool facilitates the standardisation of the outcomes and increases the comparability of its results to other findings (Balian 1982; Meyer and Glenz 2013; Meyer et al. 2014; Meyer et al. 2015a; Boyd et al. 2017; Meyer and Glenz 2018). The ASW package takes into consideration all entered attributes according to the Ward algorithm in the clustering process. The Ward algorithm and ASW calculation process are the most suitable and reliable faultline algorithms (Mo et al. 2017). This technique generates small groups based on the attributes, which are of the same director, by categorising board members into subgroups based on diversity attributes, as illustrated in Table 3.3. These attributes are studied together to achieve a better understanding of the impact of diversity on SED.

Table 3.3 Board diversity and the clustering process

Moderate Board Diversity								
Group	Subgroup A			Subgroup B		Faultline Strength		
	Director 1	Director 2	Director 3	Director 4				
1	Age	50	50	25	25	A high score close to 0.75 (7 align, one way)		
	Gender	Male	Male	Female	Female			
	Nationality	British	British	American	American			
	Educational qualifications	2	2	4	4			
	Director role	CEO	CEO	CFO	CFO			
	Director seniority	Executive director	Executive director	Supervisory director	Supervisory director			
	Director network size	1000	1000	800	800			
	Director pay	200	250	500	550			
	2	Age	50	25	25		50	A low score close to 0.25 (3 align, five-way)
		Gender	Male	Male	Female		Female	
Nationality		British	American	American	French			
Educational qualifications		2	4	4	2			
Director role		CEO	CFO	CFO	CEO			
Director seniority		Executive director	Supervisory director	Executive director	Senior manager			
Director network size		1000	800	800	700			
Director pay		200	500	250	550			
Extreme Board Diversity								
Group	Subgroup A	Subgroup B	Subgroup C	Subgroup D	Faultline Strength			
	Director 1	Director 2	Director 3	Director 4				
3	Age	50	40	30	25	Extreme high close to 1		
	Gender	Male	Female	Male	Female			
	Nationality	British	French	Italian	American			
	Educational qualifications	5	4	3	2			
	Director role	CEO	Independent NED	CFO	Chairman			
	Director seniority	Executive director	Senior manager	Supervisory director	Executive director			
	Director network size	1000	600	300	200			
	Director pay	1000	600	300	100			
4	Age	50	50	50	50	Extreme low close to 0		
	Gender	Male	Male	Male	Male			
	Nationality	British	British	British	British			
	Educational qualifications	2	2	2	2			
	Director role	Independent NED	Independent NED	Independent NED	Independent NED			
	Director seniority	Executive director	Executive director	Executive director	Executive director			
	Director network size	1000	1000	1000	1000			
	Director pay	200	200	200	200			

Table constructed by the author. The above table sets out the subgrouping process based on the identified director attributes, which led to boards with moderate MDI score (0.25 – 0.75) and extreme MDI score (close to 0 & 1).

The ASW package quantifies subgroups concerning subgroup cohesion to determine the optimal numbers of clusters, whereas, the extent to which members of subgroups are harmonised to their groups which are called a member to subgroup association. Therefore, Meyer and Glenz (2014) consider ASW as the most suitable and reliable faultline measure in terms of the quality of clustering process with respect to subgroup cohesion and the optimal number of clusters.

3.5.4. Measuring control variables: board-level variables

The following eight sets of CG control variables, based on a review of prior studies of CG and board diversity, have been selected. The variable board size is measured as the number of directors serving on the board (Kang et al. 2007; Lim et al. 2007), and board activity is measured as the total number of meetings held in the year and is a proxy for the level of activity (Laksmana 2008; Hahn and Lasfer 2016). CEO duality equals 1 if the CEO and chairperson are different individuals and 0 otherwise (Ho and Shun Wong 2001; Gul and Leung 2004; Barako et al. 2006; Berrone et al. 2010). Board structure is a dummy variable, which equals 1 if a portion of the board members are elected each year instead of all members being elected annually (staggered board structure), 2 if board members serve different term lengths (classified structure) and 3 otherwise (mixed structure). Furthermore, board stability is measured as the Std. Dev. of the population of the number of quoted boards that have been sat on overtime for all the directors at the annual report date selected. Nomination committee independence is proxied as a percentage of independent board members on the nomination committee as stipulated by the company. Attrition ratio is measured as the number of directors that have left a role as a proportion of the average number of directors for the preceding reporting period at the annual report date

selected, however, succession ratio is measured as the clustering of directors around retirement age at the annual report date selected.

3.5.5. Descriptive statistics and univariate tests

The preliminary analysis of 26,743 directors shows that approximately nine directors on average serve on each board, which is consistent with Aburaya (2012). This chapter finds that the average number of male directors in this study's sample is 22,961, which represents approximately 86 per cent of directors who are male, and 14 per cent of the members who are female. Further to that, the summary statistics show a mean, minimum and maximum value of this study's independent variables. For example, gender diversity has an average of 0.860, a minimum of 0.430 and a max of 1.000.

Also, director age (Age) has a mean of 62.620, and the minimum and maximum director ages are 35 and 95, respectively. Board of directors' number of educational degrees varies from 0 to 9 degrees. On average, more than 60 per cent of board members hold a supervisory director title, and only less than 5 per cent are senior managers. 9,028 directors – about 34 per cent of this study's sample – are executive directors. Also, the dispersion of nationality among boards is 82.93 per cent, 5.21 per cent and 1.60 per cent of directors who hold British, American, and Irish nationalities, respectively. Dutch executives represent less than 1 per cent in this study's sample. Moreover, only 27 per cent of boards adopt the staggered structure, and the remaining boards are classified as mixed structure. Further to that, board size and activity in this study's sample have an average of nine directors and hold 12 meetings per year.

This study's findings should have theoretical and practical implications whereas board diversity is a matter in deciding the corporate disclosure strategies toward social and environmental activities for the UK firms at a ratio of 3:1, respectively. The following graphical representation in figure 3.2 shows that SED section length has witnessed an annual increase over the last 14 years, and the length of social disclosure is almost three-fold environmental disclosure.²⁴

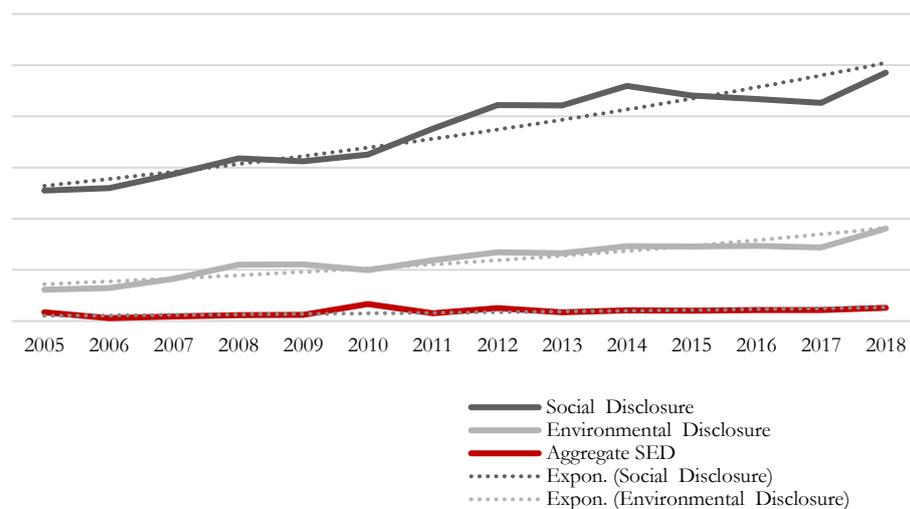


Figure 3.2 SED comparisons of mean values

Table 3.3 reports summary statistics for all explanatory variables for the final sample, which consists of 3,357 firm-year observations. It also presents the descriptive statistics for the entire data set, the dependent and independent variables examined in the current study. Results show that social disclosure reports a mean and a median of 76.619 and 49.167, respectively. The highest mean values are 86.300 per cent for gender diversity *per se*. Further to that, outcomes indicate that male directors dominate the FTSE All-Share boards. Moreover, board diversity based on the alignment of age and gender director-

²⁴ There is a significant increase in the narrative section's SED length of the annual report from 2005 up till 2011, and then a slight decrease was observed in 2012, and it remains consistent over the year of 2018. Over 14 years (2005-2018), the percentage of information-related to social activities is almost, on average, three times higher than information-related to environmental activities.

related attributes at the surface level has a mean value of 62.400 per cent. As described in Table 3.4, the mean and median of surface diversity variable for the joint effect of differences in age and gender directors' attributes are 0.624 and 0.179 respectively, which show the descriptive statistics for the independent variables.

Table 3.4 Descriptive statistics aggregate level

Entire data set							
Variable	Mean	S.D.	Median	Min	Q1	Q3	Max
Dependent Variables: Social and environmental disclosure							
Social Disclosure	76.619	71.000	49.167	0.000	45.000	99.000	592.000
Environmental Disclosure	23.435	16.000	24.974	0.000	7.000	30.750	171.000
Independent Variables: Board diversity							
Gender Diversity	0.863	0.875	0.120	0.429	0.778	1.000	1.000
Nationality Diversity	0.252	0.200	0.253	0.000	0.000	0.400	0.900
Surface Diversity	0.624	0.608	0.179	0.000	0.520	0.717	1.000
Identity Diversity	0.578	0.561	0.190	0.000	0.458	0.673	1.000
Demographic Diversity	0.380	0.337	0.191	0.000	0.272	0.411	1.000
Meso-level Diversity	0.374	0.327	0.191	0.000	0.269	0.397	1.000
Control variables: Board-level characteristics							
Board Activity	12.872	6.000	15.033	2.000	4.000	9.000	49.000
Succession	0.339	0.300	0.123	0.100	0.300	0.400	1.000
Attrition	0.040	0.000	0.056	0.000	0.000	0.100	0.400
Board Size	8.318	8.000	2.202	3.000	7.000	9.000	19.000
Board Structure	1.952	2.000	0.739	1.000	1.000	3.000	3.000
Board Stability	2.632	2.400	1.495	0.000	1.900	3.100	21.400
CEO duality	0.070	0.000	0.255	0.000	0.000	0.000	1.000
Nomination com. Independence	52.668	66.670	38.999	0.000	0.000	83.330	100.000

Table constructed by the author. This table presents summary statistics for all variables: the entire data set and scores over the period 2005 to 2018 for entire sample of 3,357 firms.

Table 3.4 shows that the mean score has moderated by almost 50 per cent from 0.624 to 0.380 and 0.374 at meso-level diversity due to the impact of considering information-related director attributes and director pay.

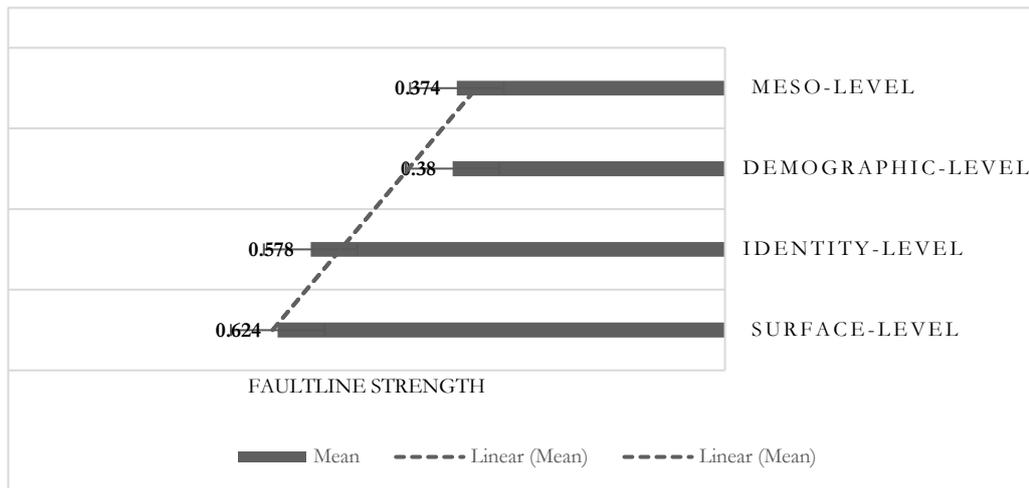


Figure 3.3 MDI score at multiple diversity levels

The surface level is considered as a baseline before this chapter investigates faultline score at the demographic diversity level. In figure 3.3, faultline score is calculated and developed based on the joint effect of differences in identity and information director attributes.

The following figure 3.4 show the moderating effect of moving deep into Meso-level diversity lead to improving the extreme low diversity score below 0.25. For example, Unilever UK suffer from extreme low diversity score at identity level (based on differences in director age, gender, and nationality) in contrast to the mover to meso-level diversity (based on differences in age, gender, nationality, number of educational qualifications, director role, seniority, director network size, and director pay) moderated diversity score to be approximately 0.520.

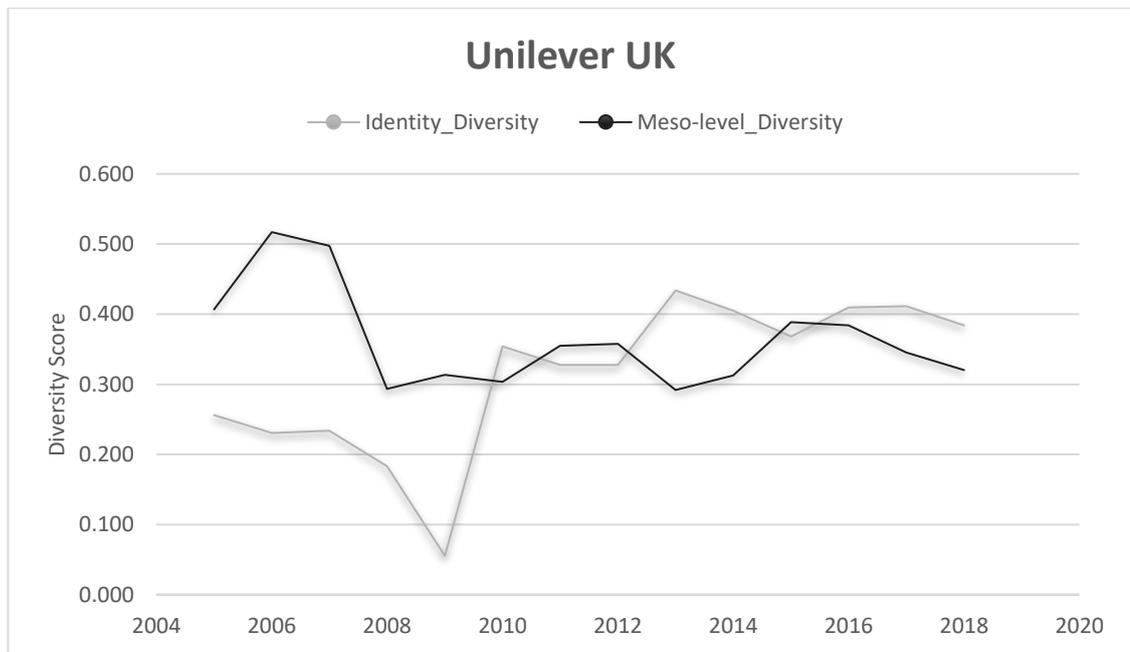


Figure 3.4 MDI score at multiple diversity levels

Further to that, panel A in Table 3.5, the descriptive statistics for this study’s variables for the moderate and extreme panels, shows the median values of social and environmental disclosure, to be, as expected, higher in firms with moderate diversity score. Results show that moderate and extreme panels share very low nationality diversity (<30 per cent) and relatively very minor female representation in boards of both panels (<15 per cent) and other control variables are similar in both panels.

In panel A, 25 and 75 centiles for surface diversity, which measure the joint effect of differences in age and gender directors’ attributes, are 0.507 and 0.644 respectively with a median value of 0.576. The moderating effect of information-related attributes shows greater influence on moderately diversified boards rather than the extreme ones.

Table 3.5 Descriptive statistics sublevel

Variable	Panel A: boards with moderate faultline strength (0.25-0.75)			Panel B: boards with extreme faultline strength close to 0 and 1.			Difference
	Q1	Median	Q3	Q1	Median	Q3	t-statistics
Dependent Variables: Social and environmental disclosure							
Social Disclosure	45.000	72.000	98.000	45.000	69.000	103.000	1.314
Environmental Disclosure	7.000	16.000	31.000	6.000	15.000	30.000	0.375
Independent Variables: Board diversity							
Gender Diversity	0.778	0.857	1.000	0.786	0.875	1.000	-0.543
Nationality Diversity	0.000	0.200	0.400	0.000	0.300	0.600	3.977****
Surface Diversity	0.507	0.576	0.644	0.788	0.866	0.969	1.800*
Identity Diversity	0.439	0.528	0.609	0.714	0.824	0.956	3.167****
Demographic Diversity	0.264	0.317	0.378	0.344	0.621	0.833	4.740****
Meso-level Diversity	0.261	0.313	0.363	0.335	0.616	0.825	3.555****
Control variables: Board-level characteristics							
Board Activity	4.000	6.000	9.000	4.000	6.000	9.000	-0.693
Succession	0.300	0.300	0.400	0.200	0.300	0.400	-0.752
Attrition	0.000	0.000	0.100	0.000	0.000	0.100	4.453****
Board Size	7.000	8.000	9.000	7.000	8.000	10.000	-9.551****
Board Structure	1.000	2.000	2.000	1.000	2.000	3.000	-4.304****
Board Stability	1.900	2.400	3.100	1.900	2.500	3.200	-0.901
CEO duality	0.000	0.000	0.000	0.000	0.000	0.000	-0.489
Nomination com. Independence	0.000	66.670	83.330	0.000	75.000	83.330	-5.259****

Table constructed by the author. This table presents summary statistics for all variables: the entire data set comprises 2,612 moderately diversified boards matched with 745 extremely diversified boards and scores over the period 2005 to 2018 – the entire sample. In addition, for these variables, t-statistics report the differences between moderate and extreme diversity firms.

The demographic dimension faultline reports a mean of 0.320 and a maximum value of 0.720. Prior studies showed that diversity faultlines measured by combining demographic characteristics (years of work experience, type of task-related background, degree major, sex, age, race, and country of origin) have a mean of 0.409 (Thatcher et al. 2003). At meso-level diversity, scores show that the average faultlines in boards have declined by including the director pay attribute in the calculation process. This decline in faultline scores has a mean of 0.320 at the deep level of diversity, where faultline score is generated based on the joint effect of differences in three identity board attributes, four information-

related characteristics and one non-demographic characteristic. The MDI reflects the moderating effect of information-related attributes and how the transition to deep and complex levels of diversity mitigates extreme faultline score. The SED score based on automated content analysis is considered, in the sense that sentences or information provided are not merely counted but also weighted to reflect their relevance, importance and significance (Tang and Luo 2011; Cotter and Najah 2012). It is noteworthy that although the propensity and the extensiveness of the disclosure are related, they are in various levels of a corporate decision.

Table 3.6 display the pair-wise correlations, where Pearson Product Moment correlations are displayed above the diagonal, and Spearman rank-order correlations are displayed below. Collectively, SED is significantly correlated with the predicted signs with independent variables. Specifically, the meso-level diversity variable is positively correlated with SED ($p < 0.01$). This chapter also notes that there is a positive correlation ($p < 0.01$) between the level of SED and its subcomponents.²⁵ The use of variance inflation factors is a typical method for assessing collinearity (VIFs) (Greene 2003). This is possible in R by utilising the 'vif' function from the 'car' package. This has an advantage overlooking solely at the correlations between two variables as shown by the Pearson correlation coefficient, because VIF analyses the correlation between one variable and the rest of the variables in the model at the same time (Farrar and Glauber 1967). Thus, this chapter do not rely on Pearson correlation only to analyse multicollinearity between independent variables. This chapter do not either

²⁵ In addition, the correlation coefficients for both independent and control variables that are included in the analyses are also used to diagnose multi-collinearity (un-tabulated). With variance inflation factor (VIF) statistics less than 10, the unreported tests suggest that multi-collinearity is not inherent in this study's regressions. All unreported results are available upon request.

neglect the high correlations between diversity scores at demographic and identity levels, nor suggest dropping diversity scores at any of these levels and ignore the moderating effect of moving to deep level diversity. Thus, this analysis keeps all predictors variables as long as VIF score is < 2 . Also- there is nothing necessarily invalid about using correlated predictors (so long as they are not perfectly correlated > 0.99) (Christ 1965). This chapter rely on large sample size of 3,357 firm year observations and thus the credibility of results increases, and the generalisability improves to separate effects. Table 3.6 shows that the correlations coefficients of the boards with moderate diversity score for nationality diversity and meso-level diversity are positive and significant. However, there is a negative and significant correlation to gender (male dominate boards), surface diversity and identity diversity. Results show that the coefficients and significance of surface, identity and demographic diversity are reversed in boards with extreme diversity scores. Next, this chapter considers whether CG affects the extensiveness of the level of SED, and finds that the positive and significant coefficients show that firms with larger board size, more board stability and high nomination committee independence are more likely to disclose more SED. In contrast, the coefficients for the succession rate are negative and significant. Moreover, the coefficients for CEO duality are negative but not significant. While these findings are consistent with agency theory, which suggests a high likelihood that the president/CEO is acting in his/her interest rather than in the interests of the shareholders by combining these functions, it is inconsistent with other claims that duality has some advantages (e.g., Finkelstein and D'Aveni 1994; Brickley et al. 1997), although the latter evidence suggests that the costs of separation are generally higher than its benefits (e.g.,

the benefits posited include being in a good position to make relevant and timely decisions).

Table 3.6 Full data set: Pearson (top) and Spearman (bottom) correlation coefficients

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 Social Disclosure		0.703	-0.254	0.199	0.000	-0.036	0.057	0.089	0.024	-0.079	-0.021	0.242	0.020	0.113	-0.058	0.211
2 Environmental Disclosure	0.669		-0.228	0.180	-0.043	-0.084	0.003	0.049	0.060	-0.129	0.009	0.128	-0.020	0.078	-0.071	0.161
3 Gender Diversity	-0.237	-0.156		-0.120	0.196	0.236	0.031	0.023	-0.116	0.081	-0.037	-0.197	0.047	-0.136	-0.029	-0.267
4 Nationality Diversity	0.233	0.183	-0.130		0.060	-0.225	-0.024	0.045	0.051	-0.162	0.018	0.374	0.078	0.169	-0.019	0.123
5 Surface Diversity	0.067	-0.026	0.132	0.080		0.867	0.555	0.523	0.004	-0.037	-0.037	0.180	0.151	0.067	0.008	0.079
6 Identity Diversity	0.018	-0.066	0.176	-0.160	0.907		0.576	0.521	-0.027	0.030	-0.051	0.068	0.143	0.022	-0.004	0.040
7 Demographic Diversity	0.103	0.016	-0.013	0.080	0.738	0.754		0.866	0.017	-0.004	-0.040	0.204	0.147	0.072	-0.016	0.130
8 Meso-level Diversity	0.131	0.058	-0.012	0.126	0.724	0.728	0.958		-0.001	-0.042	-0.039	0.246	0.157	0.078	-0.017	0.163
9 Board Activity	0.029	-0.017	-0.045	0.034	0.021	0.001	0.013	0.005		-0.024	0.024	0.016	-0.051	0.061	0.203	0.023
10 Succession	-0.096	-0.105	0.087	-0.123	-0.065	-0.019	-0.068	-0.089	-0.009		-0.057	0.008	-0.051	-0.130	0.024	-0.140
11 Attrition	-0.029	-0.021	-0.022	0.016	-0.039	-0.044	-0.007	-0.013	0.005	-0.050		-0.150	-0.017	0.004	-0.024	-0.007
12 Board Size	0.274	0.150	-0.187	0.390	0.203	0.104	0.194	0.225	-0.001	-0.021	-0.154		0.359	0.112	0.029	0.338
13 Board Structure	0.008	0.010	0.051	0.073	0.182	0.169	0.150	0.159	-0.022	-0.046	-0.023	0.345		0.052	-0.003	0.551
14 Board Stability	0.091	0.060	-0.040	0.097	0.057	0.024	0.016	0.017	0.012	-0.112	-0.008	0.042	-0.024		0.039	0.121
15 CEO duality	-0.065	-0.062	-0.029	-0.015	-0.019	-0.021	-0.031	-0.026	0.136	0.033	-0.022	0.016	-0.003	0.009		-0.024
16 Nomination Committee independent.	0.200	0.149	-0.234	0.146	0.142	0.094	0.157	0.173	0.006	-0.140	-0.016	0.346	0.642	0.028	-0.027	

Table constructed by the author. This table reports the correlation coefficients for regression variables. Bold text indicates significance based on two-tailed t-tests, at the .05 level or better.

3.5.6. The empirical model

The correlation between board diversity and SED is examined in two ways. First, univariate analysis is carried out, where the correlation coefficients between various diversity and CG mechanisms, and the quantity of social and environmental information in annual reports are estimated and matched by hypothesis to the expected direction. Second, a multivariate analysis is carried out, and the quantity of disclosure is affected by a wide range of diversity and control variables.²⁶

Earlier studies (Trumpp et al. 2015; Qiu et al. 2016) are followed and adopt 3SLS to perform the analyses. Data on SED disclosures are from company annual reports, and data on board diversity and CG are from the BoardEx database. This chapter controls for eight governance/board-level characteristics on the SED scores, and follows the empirical model tested by (Chan et al. 2014; Haque 2017) to study the correlations between board diversity and corporate SED.

The following model is employed to examine the study hypotheses:

²⁶ A Ramsey test was conducted on the data sets of the respective boards to detect autocorrelation, otherwise known as serial correlation, and to show the degree of omitted variables. The analysis is based on the presumption that, based on the null hypothesis, there are no serial associations in regression. Statistics suggest that zero values are highly positive autocorrelations (this is the case in which coefficient standard errors are too small). Values close to four indicate extreme negative autocorrelation, whereas two values near to two show no autocorrelation. Therefore, this study's results contribute to the non-rejection of the null hypothesis. No serial correlations were found in regression, and the F value of 2.02 with a probability of 0.10 indicates the significance of the score. Accordingly, it could be argued that the threat of omitted variables in the model is minimised (Saeed et al. 2016; Bennouri et al. 2018).

$$\begin{pmatrix} \text{SED}_i: \\ \text{Environmental disclosure} \\ \text{Social disclosure} \end{pmatrix}_{it} = \beta_0 + \beta_1 \begin{pmatrix} \text{Corporate governance:} \\ \text{Board gender diversity} \\ \text{Board nationality diversity} \\ \text{Board surface diversity} \\ \text{Board identity diversity,} \\ \text{Board demographic diversity,} \\ \text{Board meso-level diversity} \end{pmatrix}_{it} + \beta_2 \begin{pmatrix} \text{Control variables:} \\ \text{Board Activity} \\ \text{Succession ratio} \\ \text{Attrition ratio} \\ \text{Board size} \\ \text{Board structure} \\ \text{Board stability} \\ \text{CEO duality} \\ \text{Nomination committee independence} \end{pmatrix}_{it} + \sum \beta_1 \text{Year Effects} + \sum \beta_x \text{Industry Effects} + \varepsilon_{it}$$

Where:

Dependent variables:

Social disclosure = number of sentences that indicate social information in the narrative sections of annual reports.

Environmental disclosure = number of sentences that indicate environmental information in the narrative sections of annual reports.

Independent variables:

Gender diversity = board diversity based on the director's gender.

Nationality diversity = board diversity based on the director's nationality.

Board diversity = faultline based at four levels of surface diversity, identity diversity, demographic diversity, meso-level board diversity.

Control variables:²⁷

Board-level CG variables = board activity, succession ratio, attrition ratio, board size, board structure, board stability, CEO duality, nomination committee independence, ε_i = error term.

In guiding this study's choice of the econometric model (e.g., 3SLS, instrumental variables (IV) and GMM (generalized method of moments), this chapter builds on prior research and applies simultaneous equations in a disclosure setting (i.e., three-stage least squares (3SLS) regression analysis) to mitigate against any potential endogeneity concerns (Al-Tuwaijri et al. 2004; Hsu et al. 2017; Wu et al. 2021a). The 3SLS model, which takes into account changes in SED over the

²⁷ Board size is the number of directors on the board at the annual report date selected; Board meetings is the number of board meetings during the year; board nomination independence is the percentage of independent board members on the nomination committee as stipulated by the company; attrition rate is the number of directors that have left a role as a proportion of the average number of directors for the preceding reporting period at the annual report date selected.

14 years as a result of changes in board diversity and board-level CG variables. The model is responsible for any prejudice induced by corporations and sector-specific characteristics in the disclosure. This model excludes from the regressor variables the effects of time-invariant functions. Board diversity slopes and variables of CG, respectively, are β_1 and β_2 . α_i is business intercept i . The error term is also broadened from the between-firm error μ_{it} , to include ε_{it} , which encompasses the within-firm error.²⁸

The equation of differences shows differences in the level equation from year to year. Therefore, the difference equation represents the year-to-year variance in results, the year-to-year shift in explaining variables and the difference in error terms. Note that in the difference equation, the fixed effect error term disappears, since it is invariant by definition. By estimating these equations simultaneously, the system 3SLS approach controls for heterogeneous endogeneity (stemming from time-invariant variables) and includes the relationship between board diversity and SED (García-Meca et al. 2015).

In the first-stage regression analyses, we included the instrumental variables to predict faultlines strength. Two groups of instrumental variables have been identified as relevant and valid instruments by prior faultline studies (Cooper et al. 2014; Meister et al. 2020; Wu et al. 2021b; Zhang et al. 2021) gender diversity (board diversity based on the director's gender), Nationality diversity (board

²⁸ It is assumed that the error term has a constant variance as this chapter is running this study's regression model. Otherwise, this chapter might encounter heteroskedasticity, and this chapter may be overstating the goodness of fit. To test this concern, this chapter ran the Breusch-Pagan/Cook-Weisberg method to test for heteroskedasticity and to produce robust standard errors (Hafsi et al. 2013). Moreover, this chapter uses the Ramsey RESET test for omitted variables and model misspecification. This chapter also uses the VIF to examine whether the independent variables are perfectly collinear (Mallin et al. 2014) The term error is further broken down into two parts: the combined effect (lit) that differs between individuals and time periods and the individual effect (gi), which is characteristic of each firm (in this case the board). Such equations are calculated empirically, using a simultaneous equation estimator such as 3SLS estimator.

diversity based on the director's nationality).]The analysis imply that board diversity (faultline based at four levels of surface diversity, identity diversity, demographic diversity, meso-level board diversity) may result in a relatively weak internal alignment compared with a well-balanced board (moderate), thus having boards with moderate MDI score is important for developing more transparent and rigorous corporate governance structures. The estimated results are used to generate the predicted value, which was included in the second-stage regression analyses to take account of the endogeneity effect in the analyses (Wu et al. 2021a).

3.5.7. Empirical results, further analysis and robustness checks

3.5.7.1. Empirical results

Table 3.7 reports the results of the 3SLS regression model for examining the relationship between board diversity and SED.²⁹ Results are consistent with the current study's expectation based on stakeholder theory and the prior empirical research. To that end, this chapter introduces the first variables that present a positive impact on social and environmental disclosure variables. The results suggest that nationality (Katmon et al. 2017), meso-level diversity, board size (Abraham and Cox 2007; Cong and Freedman 2011; Mallin et al. 2013; Mallin et al. 2014; Liao et al. 2015), board stability and nomination committee independence of firms in panel A are positively and significantly related to SED (see Table 3.7). In panel B, the signs of coefficients are changed, or results

²⁹ With regard to simultaneity, there has been a view that the theory should guide the model structure in terms of the direction of the relationship (Van Lent 2007). The relationship between board diversity and company disclosure is found in corporate governance literature (Beiner et al. 2006). The direction of this correlation is from diversity and governance to disclosure, not vice versa (Beiner et al. 2006). The multiple equation models are used to solve a certain issue (e.g., multiple equations: 3SLS) when simultaneity is probable (e.g., board diversity can affect corporate disclosure requirements and corporate disclosure requirements may also alter their CG). CG variables which were of interest in previous diversity and CSR reporting studies, such as Hsu et al. (2017). This inclusion is important to revise this study's results from possible endogeneity attributable to omitted variables, as well as considering the influence of conventional corporate governance factors that appear in the prior board diversity and CSR literature.

become insignificant at the 1, 5 and 10 per cent levels (see Table 3.7); the absence of significant positive associations is consistent with earlier disclosure studies (Post et al. 2015; Taurigana and Chithambo 2015; Hoang et al. 2018).

Table 3.7 Aggregate level regression of board diversity on SED

Variables	Full data set	
	Social Disclosure	Environmental Disclosure
1)Gender Diversity	-62.497**** (3.972)	-16.223**** (2.071)
2)Nationality Diversity	10.393**** (2.186)	8.622**** (1.140)
3)Surface Diversity	0.039 (5.439)	-6.563** (2.836)
4)Identity Diversity	11.070** (5.772)	-3.980 (3.010)
5)Demographic Diversity	-43.413**** (6.847)	-41.557**** (12.684)
6)Meso-level Diversity	45.581**** (6.803)	46.018**** (3.547)
7)Board activity	0.044* (0.025)	-0.030** (0.013)
8)Succession Rate	-10.362*** (3.116)	-2.984* (1.625)
9)Attrition Rate	-4.444 (6.475)	-5.567* (3.376)
10)Board Size	4.573**** (0.222)	0.953**** (0.116)
11)Board Structure	-6.564**** (0.889)	-1.013* (0.463)
12)Board Stability	2.855**** (0.221)	0.980**** (0.115)
13)CEO Duality	14.222**** (1.506)	-6.575**** (0.785)
14)Nomination committee independence	0.145**** (0.016)	0.056**** (0.008)
Constant	85.791 (5.871)	30.622 (3.061)
Observations	3,357	3,357
Average RVI	1.060	
Largest FMI	0.785	
Mean VIF	1.96	
DF	Min=15.630	Avg=53.170
Year fixed effects	Yes	Yes
Industry fixed effects	Yes	Yes
Adj. R-squared	13.880%	8.430%
F values	56.880****	32.910****

Table constructed by the author. * $p \leq 0.10$ (confidence at the 90 per cent level) ** $p \leq 0.05$ (confidence at the 95 per cent level) *** $p \leq 0.01$ (confidence at the 99 per cent level) **** $p \leq 0.001$ after imputing missing values. Standard errors are reported in parentheses. Refer to Table 3 for the variable descriptions, measures, and sources.

Table 3.8 Sublevel regression of board diversity on SED

Variables	Panel A: Board with Moderate Faultline		Panel B: Board with Extreme Faultline	
	Social Disclosure	Environmental Disclosure	Social Disclosure	Environmental Disclosure
1)Gender Diversity	-53.671**** (12.868)	-21.765**** (6.319)	-49.078** (23.897)	-13.277 (10.167)
2)Nationality Diversity	19.721**** (5.854)	13.025**** (3.636)	-7.950 (13.613)	-3.607 (5.085)
3)Surface Diversity	-47.718** (21.302)	-19.631 (12.530)	74.452* (40.805)	24.492 (15.937)
4)Identity Diversity	39.961** (19.684)	13.773 (13.354)	-50.418 (44.600)	-13.465 (16.412)
5)Demographic Diversity	-57.025*** (21.818)	-53.965*** (12.684)	-17.974 (71.398)	-21.608 (36.108)
6)Meso-level Diversity	76.734**** (19.356)	75.219**** (13.824)	24.747 (70.072)	26.560 (34.456)
7)Board activity	5.369 (19.149)	-0.212 (10.497)	-5.384 (41.458)	-7.483 (17.705)
8)Succession Rate	-23.813*** (8.749)	-17.041**** (5.213)	-6.415 (36.468)	-9.066 (12.800)
9)Attrition Rate	-0.022 (0.086)	-0.092* (0.051)	0.173 (0.173)	0.041 (0.069)
10)Board Size	3.895**** (0.822)	1.051** (0.445)	6.839**** (1.440)	0.876 (0.615)
11)Board Structure	-6.436*** (1.980)	-0.908 (1.232)	-8.906* (4.950)	-4.867** (2.113)
12)Board Stability	2.277** (1.099)	0.829* (0.495)	2.104 (3.481)	-0.760 (1.339)
13)CEO Duality	-7.603 (4.793)	-2.918 (2.698)	-31.466** (12.735)	-10.828** (4.508)
14)Nomination committee independence	0.177**** (0.040)	0.071*** (0.024)	0.291** (0.096)	0.080* (0.035)
Constant	89.151 (14.204)	30.790 (6.832)	39.467 (30.509)	25.255* (13.862)
Observations	2,612	2,612	745	745
Average RVI	1.050		1.779	
Largest FMI	0.797		0.874	
Mean VIF	1.96			
DF	Min=15.120	Avg=57.020	Min=12.300	Avg=42.360
Year fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Adj. R-squared	23.700%	39.040%	20.910%	26.580%
F values	11.870****	23.390****	4.580****	5.900****

Table constructed by the author. * $p \leq 0.10$ (confidence at the 90 per cent level) ** $p \leq 0.05$ (confidence at the 95 per cent level) *** $p \leq 0.01$ (confidence at the 99 per cent level) **** $p \leq 0.001$ after imputing missing values. Standard errors are reported in parentheses. Model A represents boards with moderate faultline strength with values from 0.25 – 0.75. Model B represent boards with extreme faultline strength with values close to 0 and 1. Refer to Table 3 for the variable descriptions, measures, and sources.

This chapter shows variables that present a negative impact on social and environmental disclosure variables. The results suggest that gender (proportion of male directors) (Liao et al. 2015; Ben-amar et al. 2017a; Cabeza-García et al. 2018), surface, demographic diversity, and succession rate of firms in panel A are negatively and significantly related to SED disclosure. In panel B, the signs of coefficients are changed, or results become insignificant at the 1, 5 and 10 per cent levels. The absence of significant negative associations is consistent with earlier disclosures studies (Post et al. 2015; Tauringana and Chithambo 2015; Hoang et al. 2018), except board structure and CEO duality are negatively and significantly related to SED.³⁰ The board-level probably decides whether the company discloses or not, but to what extent the SED information should be publicly disclosed is in the hands of relatively lower-level managers.³¹

These results are also consistent with the earlier study, which argues that a board of directors can integrate information taken from their internal reports regarding CSR activities, including information about social and environmental performance (de Villiers et al. 2011), with other information found in external reports. The results can also be interpreted as relating to the UK's expectation for good CG and a high level of investor protection (Rejchrt and Higgs 2015). Directors are expected to play a fundamental role in mitigating the conflict between

³⁰ This study's results support the suggestion that the board of directors is conditionally linked with some of the board members' characteristics and supports the empiric evidence (Sharma et al. 2009), which notes that the board activity coefficient (including the annual number of board meetings) is insignificant.

³¹ The regression results (see Table 3.11) show that female directors still play an important role, but that CEO duality has no significant coefficient. Although this result appears counter-intuitive, it is inconsistent with some prior studies (Brammer and Pavelin 2006; García-Meca and Sánchez-Ballesta 2010). The possible reason is that the board directors would decide whether the firm should increase social and environmental disclosure, but the decision as to which items should be disclosed is likely to be processed at the lower level of technical managers. This study's model probably does not capture the factors associated with the decision at levels below the board.

management and stakeholder aims by increasing the level of transparency, which, as mentioned, helps to reduce information asymmetry and agency costs.

In summary, these results collectively show that CG mechanisms mostly dominate firm characteristics in explaining why UK firms disclose SED in their annual report narratives. Therefore, board characteristics have a higher impact on social disclosure than environmental disclosure provided to the British stock market. This study's conclusion here is in line with Gray et al.'s (1995) argument, which emphasises the importance of studying the incentives that motivate firms to provide environmental information in their narratives. This chapter might also interpret this result as showing that the CG in the UK has not developed yet to encourage the FTSE All-Share index to provide a level of sufficient environmental information. This result emphasises the limited role currently played by board diversity in the UK in stimulating managers to provide more meaningful information about their social and environmental responsibilities. In turn, this result also suggests that further steps should be taken by the UK regulators to improve the CG mechanisms in the country.

It seems, according to this study's findings, that CG motivates the managers of UK firms to comply with social disclosure regulations more than the environmental disclosure requirements. One of the many empirical research that has examined the role of CG (Jizi 2017) examines the relationships between board composition and CSR disclosure. This research concludes that firms with high governance in terms of board gender diversity and board independence have higher CSR disclosure. As some of the prior research (e.g., Post et al. 2011) suggests, environmental CSR can be indicated by board composition. Thus, this chapter classifies firms into moderate and extreme board diversity, depending on faultline strength values from 0 to 1 (Thatcher et al. 2003; Thatcher and Patel

2012). The 3SLS estimations shown in Table 3.7 suggest that only UK firms with moderate board diversity score are likely to provide significantly high levels of SED in their annual report narratives. Meanwhile, only the board structure and CEO duality significantly influence extreme board diversity firms' SED disclosure.

The main conclusions drawn, based on Table 3.7, indicate that governance (moderate board diversity) factors influence the UK firms' decisions to reveal or conceal social and environmental information. The results, based on factors that influence SED in the UK, tend to be primarily powered by boards with moderate diversity ratings (0.25 – 0.75). Comparing standardised boards with moderate and extreme diversity SED coefficients, this study's findings are mainly driven by companies with moderate faultlines (0.25 – 0.75),³² and these findings indicate that companies have strong incentives to share more information to satisfy their investors better; this minimises the cost of agency by aligning any conflicts of interest that might occur between different parties and removing the information asymmetry problem. These findings are consistent with the theoretical research which argues that the disclosure of a large amount of information is likely to reduce the information asymmetries between uninformed or less-informed investors and educated investors (e.g., Diamond and Verrecchia 1991). This study's result is also consistent with the recent empirical evidence provided in SED (Jizi 2017; Katmon et al. 2017; Nekhili et al. 2017; Cabeza-García et al. 2018; Hoang et al. 2018).

³² Table 3.7 shows the results for the UK firms' social and environmental disclosure practices. They show that large boards of directors, nationality diversity and meso-level diversity in firms with moderate board diversity (e.g., panel A) lead to the provision of more environmental disclosure (the t-statistics 2.36, 3.58 and 5.44 at the 1 per cent level, respectively). The amount of social information disclosed is likely to be increased significantly by board diversity, the board size, nomination committee independence and board stability (t-statistics 4.74, 4.46 at the 1 per cent level, and 2.07, at the 5 per cent level, respectively). Another board characteristic, that board activity measures by the number of board meetings, leads firms to comply less strongly with the environmental disclosure (t-statistic -1.82 at the 10 per cent level).

When this chapter distinguishes between firms with extreme and moderate diversity scores, it finds that firms with extreme diversity score do not provide significantly useful social and environmental information either. This study's results have both theoretical and practical implications. First, they show that the quality of CG is an important factor to consider when studying the impact of board diversity on SED. The results further confirm the importance of improving CG factors in the UK to stimulate firms to provide more meaningful social and environmental information. Table 3.6 shows the factors that motivate UK firms to provide higher disclosure level in general, and how those factors work among firms with moderate diversity score. Generally, this chapter finds that the social and environmental disclosure drivers in the UK are likely to be consistent with those associated with board diversity at meso-level rather than surface diversity, as shown in Table 3.6. These results confirm this study's argument that it is quite difficult to draw conclusions in terms of the incentives for SED based on board diversity since the two levels of board diversity (surface and identity diversity) have different implications (insignificant association) on disclosure. These results support the study's hypothesis and are consistent with stakeholder theory, empirically suggesting that board diversity is an important factor in understanding SEDs' probability. The theoretical implications of this finding contribute to enriching the continuing discussion about the effect of a well-balanced board on social and environmental information quantity conveyed in the annual report narratives.

These outcomes lend themselves to the possible justification that the significance of board diversity for the FTSE All-Share index on SED is increasing by moving to deep levels of diversity. Arguably, one of two possibilities could back the weak role of board diversity based on identity attributes on corporate

disclosure. The first possibility is ignoring other diversity types. The second possibility of this insignificant association is that identity attributes are not strong enough to improve firms' social and environmental information. The descriptive analysis section entails a reasonable basis for further in-depth evaluation of these two possibilities.

The following Table 3.8 lists the three hypotheses developed along with the results of the analysis conducted in the current study. Column 1 reflects the hypothesis number; column 2 lists the diversity variables; column 3 shows the expected association, as highlighted in each hypothesis; column 4 lists the actual direction of the relationship found; column 5 shows the result of the analysis (rejecting/accepting the hypothesis).

Table 3.9 Summary of results

Hypothesis number	SED	Expected sign	Reported result Panel A	Results of the Analysis (Rejecting / not rejecting the hypothesis)
1	Gender diversity (proportion of male directors)	-	-4.162***	Not rejected
2	Nationality diversity	+	1.118*	Not rejected
3	The multi-level construct of diversity in board significantly increases SED	-	8.588***	Rejected

Table constructed by the author. The above table sets out results of the analysis, where column 1 lists hypothesis number. Column 2 displays an independent component of the hypothesis; (+) represents a positive association and (-) denotes negative. Column 3 defines a significant level. Column 4 presents rejecting or accepting the hypothesis.

Regression results of panel A provide evidence that gender diversity measured as the percentage of male directors in the boardroom is correlated with social and environmental disclosure. The coefficient of male dominance is -53.67 at 1 per cent significance level, indicating a negative impact of male directors on corporate disclosure regarding SED. This finding is consistent with other articles on how male directors hinder the quantity of social and environmental-related information

in annual reports (Ben-amar et al. 2017a; Cabeza-García et al. 2018; Hoang et al. 2018; Nadeem 2020).

Gender diversity is a standard SED-associated variable, as referred to in Table 3.7, but the relationship is more critical for SED with a 1 per cent significance level and a moderate Faultline. SED analysis suggests that a board with high nationality diversity provides more disclosure; this is typically expected as the firm's business is more diversified and thus calls for more information to be released. At the surface level in panel A, director age attribute failed to mitigate the negative joint effect on SED, however, director nationality attribute succeeds to construct a positive influence on SED.

It is worth noting that information-related attributes constrained the effect of demographic diversity as environmental disclosure requires a unique education and experience relevant to corporate environmental concerns and, based on this study's results, it shows that director information-related attributes are irrelevant to SED. Clearly, with such different results between using disclosure quantity in moderate and extreme diversified boards, it is empirically evident that using MDI as a proxy for board diversity is a proper measure and explains the mixed results. In closing, by comparing the SED regressions, it is evident that determinants of SED are more apparent in panel A (well-balanced boards). Accordingly, two conclusions are reached here: the first presumes that the MDI measure developed previously is a valid diversity measurement. Secondly, the current study's results as to the relation between board diversity mechanisms and disclosure are robust.

Regression results are consistent with those of prior studies. However, as a robustness test, the interpretation of results (as discussed above) is focused on

the extent to which board diversity and control variables are similar/different regarding the quantity of social and environmental information disclosed. Comparing the quantity results reported in this test with those of previous studies is beyond the scope of the current study. The decision not to compare regression results for quantity is justified in several ways. Firstly, concerning disclosure quantity in general, from surveying the related literature, it is clear that none of the CG mechanisms, nor the control variables, gained a consensus as to their association with disclosure quantity. Even where the majority of studies suggest a specific association between a certain variable, the significance level markedly differs. Secondly, the results depend on the disclosure mechanisms used even with the use of a specific definition of the quantity of disclosure. Thirdly, the different combinations of board diversity mechanisms and control variables used in each study are expected to yield different results. Fourthly, the sample characteristics (size and period of analysis) can also affect the reported findings.

3.5.8. Further analysis

Motivated by the present study's theoretical foundation, in addition to considering the difficulty in distinguishing social from environmental disclosures in some of the previous research, this chapter investigates whether well-balanced boards would promote SED.³³ This chapter thus uses the following robustness checks to validate this study's findings. Results were validated by performing collinearity

³³ Textual analysis reliability is an issue when analysing manual content or when multiple encoders are involved. Prior literature argues that content analysis is not considered reliable if only once or only one individual performed the analysis (Neuendorf 2017). However, computerised content analysis is deterministic and therefore, absolutely reliable. Reliability should not be a concern because the current study employs a computerised content analysis approach and mainly involves one coder. Despite the reliability argument, the reliability of the computerised content analysis is based on the reliability of the manual coding (keyword listing) versus the computerised process. Two main types of reliability tests exist: stability and reproducibility (Ford 2004; Bauer 2007). Stability is the degree to which a process is defined as stable and unchanged over time. The stability of the coding procedures is likely to be guaranteed as long as it is computerised. Reproducibility is the second reliability measure. Studies argue that the index results awarded to companies could be seen as reliable if the same results were reproduced by other studies (Campbell et al. 2005).

diagnostics³⁴, the Breusch-Pagan/Cook-Weisberg test for heteroskedasticity and the Shapiro-Wilk W test for normal data (see appendix 3.4).

Further to that, the issue of endogeneity was checked since it is argued to be a common problem in CG research (e.g., Larcker et al. 2007). Using 3SLS models is seen as one method of dealing with the problem of endogeneity, as it eliminates the influence of time-invariant unobservable variables (e.g., Brown et al. 2011).³⁵ The adoption of 3SLS control inconsistencies in estimates which occur where there is an unobserved heterogeneity between firms (see appendix 3.5).

3.6. Conclusion and future research recommendations

The current study discusses the impact on non-financial corporate disclosure activities in Britain over 14 years through board diversity and CG. The findings support board diversity's important role in encouraging UK firms to demonstrate higher levels of SED in their annual reports' narrative divisions. Furthermore, the findings indicate that board characteristics drive UK companies to include more social information than environmental information, perhaps due to incentives from the company board to provide more CSR information in their narratives (Patelli and Pedrini 2013; Liao et al. 2015; de Villiers and Marques 2016; Jizi 2017).

Distinguishing moderate and extreme diversified firms' boards show that this study's findings regarding those factors that affect SED appear to be driven more by firms with moderate/well-diversified boards in the UK. The results have several repercussions for the UK regulators and investors. They support the trend of

³⁴ SED mechanisms, in general, have mean VIF values of 1.96 (see Table 3.6). In short, when the correlations matrix and VIF are used to check multi-collinearity, it is clear that both methods suggest that all independent variables are free from the multi-collinearity problem. Empirical literature depends on the first (correlations analysis) method and seldom uses VIF.

³⁵ Using Stata as this study's statistical analysis package, this chapter primarily ran the pooled OLS regressions in examining the association between board diversity and SED. Then, this chapter ran two-stage least square (2SLS) and three-stage least square (3SLS) regressions to check for the endogeneity bias in this study's data set (see Appendix 3.6). Results suggest stability in regression outputs across various regression models.

regulation in the UK in SED that stresses the role of directors in facilitating the process of disclosing environmental information and encouraging it rather than social disclosure.

Nevertheless, the results show that more reforms are needed in the UK context, streamlining debate about the impact on disclosure practice, generally, and within the UK context, of improved board diversity in multiple levels and from the director and board-level dimension. Corporate value can also be found by investors who provide empirical proof of various CG information SED attributes (e.g., board size or senior executives).

Investors can thus develop their perception of SED information on these attributes, which is exposed to social and environmental contexts. Empirical testing was carried out on the relationship between board diversity and SED transparency.

Consequently, a board with divergent members represents a wide spectrum of interests and serves as a mediator to address real and inseparable conflicts between financial (Gamerschlag et al. 2011; Shaukat et al. 2016), social (Haniffa and Cooke 2005; Gregory et al. 2014; Mallin et al. 2014; de Villiers and Marques 2016) and environmental demands (Walsh et al. 2005; Liao et al. 2015; Tauringana and Chithambo 2015; Ben-amar et al. 2017a).

This statement reflects the stakeholders' theoretical perspective, but it seems complicated to do so. This chapter shows that both nationality-based diversity and meso-level board diversity in themselves are strongly linked to social and environmental revelation. The size and stability of the board indicate how a company is proactive in social and environmental aspects, and the independence of the nomination committee concerns the level of disclosure. In general, the

results are compatible with the concept of independent, diversified boards being the best practice for environmental (Walls et al. 2012) and social outcomes (Shaukat et al. 2016). This chapter is conducted in the UK, where companies react to cooperative sustainable development initiatives financed at their discretion by the industry or government (Lash and Wellington 2007). Some of the UK companies have discussed and publicly reported their attempts to address the effects of human-induced climate change on their company survival in the absence of compulsory independent reporting requirements in this study's research. This chapter also shows that the work of CG mechanisms in enterprises with extreme faultline strength is different from that in firms with moderately diverse scores, which seek to avoid transparent environmental practices or failure to meet common standards and to comply with the law, resulting in a vague disclosure outcome. Similarly, this study's sample is restricted to the FTSE All-Share index, and disclosure requirements are different for small-sized enterprises or those operating in other countries.

This study's analyses are limited to the following: (i) inclusion of country features in future work should therefore investigate how these variables empirically explain variation in these disclosure practices across different countries in order to examine the impact of board diversity and corporate governance on the social and environmental divulgation practices; (ii) given the quantity rather than the quality of SED in further articles, it is also able to determine if there are discrepancies between quantity-driven and quality-based research results when generally assessing disclosure; (iii) search of several other corporate disclosure channels (Li 2010), such as online resources, conference calls and financial analytics; this is an opportunity for future directions, helping to address questions including how board diversity influences the disclosure of SED across various

disclosure channels and how some governance features are more closely linked to certain channels than others.

This chapter is based on archival data related to board diversity, and SED practices, therefore, other means such as surveys and case studies are highly recommended. Also, this chapter has not focused on the effect of SED practices on firm value creation and financial performance, which is an area of future study. Moreover, other theoretical foundations (e.g., stewardship theory) can substitute stakeholder and legitimacy framework to deal with social, moral and behavioural aspects of board members (Bebchuk and Fried 2005; Parmar et al. 2010) which is considered as a less studied area that needs further research. Regarding this study's unreported results, available upon request, this chapter suggests that well-balanced boards tend to disclose more social and environmental information than their counterparts. This study's conclusion, based on all firms, is likely to be driven more by firms that own moderately diversified boards than firms with extreme ones.

Chapter 4: The Impact of Board Diversity on Corporate Performance

4.1. Introduction

Many businesses have opted to include aspects of board diversity in their annual report. It is not always clear if there were diversity-related objectives at the board and senior management levels and, if so, how these targets are achieved and their implication on organisational performance (Aggarwal et al. 2019).

In terms of board diversity links to corporate performance, there are multiple performance mechanisms, VB measures (e.g., EVA and RI) along with market-based performance measures (e.g., Tobin's Q), besides accounting profitability measures (e.g., ROA and ROE). The EVA is the difference between net operating profit after tax (NOPAT) and its weighted average cost of capital. The RI is used as a corporate performance metric, equal to income generated after all the associated capital costs have been paid out (Dekker et al. 2012; Sloof and van Praag 2015; Firk et al. 2016).³⁶ The ROA (performance metric of a company's productivity compared to their overall assets, equal to net income divided by total assets) shows how management uses the company's assets (Alexandridis et al. 2017). The ROE (performance indicator of how effective management is to use the assets of a company to generate profits) is equal to net income divided by

³⁶ Empirical research argued for centuries that to create wealth, a company has to earn more than its debt and capital costs (Biddle et al. 1997a). The concept of wealth creation was applied under various names in the 20th century, such as residual incomes (RI). RI is used as manager key performance indicators (KPIs) at department level. Further to that, Bacidore (1999), recommended broadening the use of the RI to assess corporate performance at organisational level (e.g., corporate financial reporting purposes). General Motors used this performance measure in the 1920s and General Electric in the 1950s to measure firm performance (Biddle et al. 1997a; Palliam 2006; Forker and Powell 2008; Kothari et al. 2009; Larcker and Rusticus 2010; McNichols et al. 2014). A decade later, Stern Stewart & Company promoted the use of residual income (RI) and economic value-added (EVA) as a measure of corporate performance instead of earnings per share or cash flow from operations (Stewart 2009). There is a claim that earnings per share and earnings growth are deceptive indicators of corporate success, and EVA is the best practical performance indicator (Ismail 2006; Lee and Kim 2009). As value-based measures (e.g., EVA) quantify how executives impact capital costs through asset base management (Biddle et al. 1997; Davis 2016).

average shareholder equity (Hafsi and Turgut 2013; Nekhili and Gatfaoui 2013; McGuinness et al. 2017).

Contemporary trends in diversity have led to a proliferation of articles that demonstrate how board diversity formulates corporate performance (Homroy and Slechten 2017; Kumar and Zattoni 2017b; Yoshikawa and Hu 2017).

To the best of this study's knowledge, VB management literature entails a limited understanding of how board diversity based on multi-level attributes of high-performing boards enhances corporate performance from different approaches. For example, aspects such as corporate VB performance are proxied by EVA and RI along with market-based performance measures (e.g., Tobin's Q) and profitability measures (e.g., ROA and ROE). This chapter merges the multi-level faultline methodology into corporate performance evaluation to capture the effect of board diversity on corporate value and market-based performance. This chapter captures board diversity at four primary levels: first, surface-level diversity, where faultline strength is captured by measuring the level of alignment for director age and gender attributes together. Second, identity-level diversity where faultline strength is moderated by including director nationality into faultline strength to form identity diversity level proxied by director age, gender, and nationality simultaneously. Third, demographic-level diversity where faultline is assessed by combining director identity characteristics and information-related attributes (e.g., differences in the number of educational qualifications, director role, seniority, and director network size). Fourth, the meso-level where diversity is measured according to the distribution pattern for the eight (non-)demographic attributes. Therefore, in this study, this chapter analyses the impact of board diversity based on director demographic and non-demographic director attributes

at multiple levels along with board-level characteristics on corporate performance.

Thus, this study explains how board diversity based on multi-level attributes of high-performing boards enhances corporate performance and addresses the gap in the extant board diversity literature by proposing an MDI to capture the causality relationship between meso-level (multi-layer) diversity and corporate value and market-based performance.

To put this study in context, this chapter investigates the impact of traditional concepts of board diversity (e.g., gender and nationality diversity *per se*) and the advanced board faultline approach on corporate performance which is considered as a less studied area in governance literature (Mäs et al. 2013; Schmid et al. 2015; Spoelma and Ellis 2017).³⁷ This chapter considers board diversity and business-related domains such as corporate performance. The following sections discuss these aspects in detail.

This study's analysis utilises the faultline concept whereby a hypothetical dividing line splits the boardroom into subgroups, using a panel of FTSE All-Share index, non-financial companies from 2005 to 2018, since the release of the UK Companies Act 2006. This chapter discusses director identity and information-related characteristics of high-performing boards, together with non-demographic attributes, and argues that these attributes should enhance corporate financial performance. The attention to corporate boards' qualities to improving corporate performance has grown significantly in recent years, and

³⁷ The term "traditional diversity" is a synonym which is a relatively new name for the previously well-known basic *per se* diversity concept. And traditional diversity measures are the tools that are commonly referred to as measuring the influence of one single diversity attribute at a time on group outcome (Flache and Mäs, 2008; García-Meca et al., 2015) such as binary variable coding and propensity score matched procedure measures.

therefore, stands central in the literature (Daily et al. 2003; Bouwens and Lent 2007; Van Lent 2007), with a particular focus on the boards' relationships to company performance (Bo et al. 2016; Kumar and Zattoni 2016a; Barroso-Castro et al. 2017; Fauver et al. 2017; Bennouri et al. 2018).

This chapter builds on the earlier work of Payne, Benson and Finegold (2009), considering the impact of diversity based on eight (non-)demographic attributes on corporate performance. New findings are expected as it employs faultline and multi-level approaches to study not only five attributes of the high-performing boards studied separately in their masterpiece work, but rather studies the joint effect of identity, information-related and non-demographic director attributes (e.g., director pay), along with the boards' diverse aspects based on eight statutory board-level characteristics.

Faultline strength is determined here by the number of director attributes that align and the possible ways to subdivide the group based on these attributes (Thatcher et al. 2003; Mäs et al. 2013; Meyer et al. 2015a).

The current understanding of diversity is expanded to gauge diversity distribution of boards at unit/micro aspect. The micro aspect, diversity, is captured at four levels: surface, identity, demographic, and meso-level diversity. This chapter has also not ignored the structural/macro aspect of board-level or statutory board characteristics as it is insufficient to rely solely on demographic diversity for well-performing boards (Nekhili and Gatfaoui 2013; Aggarwal et al. 2019).

These distinctive aspects collectively motivate this study to emphasise the need to expand prior extended board diversity measures *per se*, such as gender diversity and the effect of board diversity on corporate performance from multiple approaches (e.g., profitability, value, and market base). This chapter is also

responding to a recent report, Board Diversity Reporting, published in 2018 by the FRC, which stated the importance of investigating the balance of skills in boardrooms and how the board works together as a unit. Therefore, this chapter aims to bring together all these concerns while evaluating corporate performance.

Thus, this study addresses the following main question: How does board diversity influence the UK firms' financial, market and value-based performance?

This study's main finding suggests that directors' attributes are correlated with higher levels of corporate performance, which can be summarised as follows.

First, boards with a moderate diversity score (e.g., panel A) show a significant positive effect at the 1 per cent, 5 per cent and 10 per cent levels (coefficients are 1.895 and 2.594, respectively) on the VB performance (EVA and RI), in contrast to firms with extremely diversified boards which show an insignificant association to EVA and RI, along with a significant negative effect on Tobin's Q (e.g., panel B).³⁸

Second, this study's results show that the dominance of male representation in the boardroom hinders value- and market-based performance mechanisms (e.g., EVA, Tobin's Q and RI) in a significant way. Further to that, there is a positive effect of nationality diversity on EVA, RI, and ROA.

These results extend rather than substitute the findings in diversity and corporate valuation literature and are consistent with stewardship, resource dependence

³⁸ Faultline score varies between 0 and 1, with a mean value of 0.5 (moderate). Diversity scores of 1 imply very strong faultline (extreme) due to the very diverse members' characteristics, whereas a rating close to 0 is extremely weak faultline between subgroups and directors' attributes are almost identical (Crucke and Knockaert 2016). This chapter considered the mixed outcomes that might arise from these two board diversity classifications. Thus, this chapter separated boards with extreme faultline vs moderately diversified boards (well-balanced with diversity score that varies between 0.25 – 0.75).

and agency theories, suggesting that a well-diversified board positively improves corporate performance. The findings should be useful for corporate leaders, stakeholders, and consultancy firms in their valuation of board diversity and the function of subgroup dynamics in enhancing board performance and corporate effectiveness. The findings also assist regulators in assessing board diversity extent in listed corporations to secure shareholders' value creation process.

The research is structured as follows: the next section sets out the research contribution; section three provides the theoretical background; section four synthesises the literature review and hypothesis development; section five explains the research methods; section six summarises the empirical analysis and primary research outcomes.

4.2. Research motivation

What is known about board diversity is based mainly upon a few studies that analyse CG within the frame of board Faultline, as many articles consider it to be an important area that still needs more investigation (Armitage et al. 2017; Black et al. 2017; Buttner and Lowe 2017; Huang et al. 2017). Although the G-index is a significant element in governance literature, a promising development in this area of research is to establish this study's MDI to assess the effect of diversity on EVA as a proxy for value creation.

Despite much faultline research (Bezrukova et al. 2016; Spoelma and Ellis 2017; Antino et al. 2019; Meister et al. 2019), this chapter still needs to study the impact of board diversity on corporate value and market-based performance, and which have attracted attention over the last decade. In a similar vein, the faultline concept and multi-level approach have evolved, describing board of directors' subgroups dynamics and VB practices which still need more analysis. As corporate performance studies have several implications for corporations and

stakeholders (Buse et al. 2016; Armitage et al. 2017; Buttner and Lowe 2017), thus merging diversity to these aspects leads to the expectation of practical relevance to various stakeholders.

Studies on faultlines categorise board faultlines into: (i) social (identity) characteristics (age, gender and nationality); (ii) informational characteristics (experience, education and tenure); and (iii) non-demographic characteristics (personality, location, ownership, salary) (Harrison and Klein 2007; Ben-Amar et al. 2013; Chapple and Humphrey 2014; García-Meca et al. 2015; Fang et al. 2018). Based on that, there is still a need to develop a new cluster-based faultline measure, which can be used to demonstrate the influence of directors' new demographic and non-demographic attributes of highly effective boards on performance (Ben-Amar et al. 2013; Ward and Forker 2017).

In the last decade, there was over-reliance on the demographic diversity (Mahadeo et al. 2012; Ali et al. 2014b; Boiral 2016; Saeed and Sameer 2017; Aggarwal et al. 2019) in the board aspect rather than statutory, cognitive or non-demographic dimensions (Hafsi and Turgut 2013). Therefore, this study analyses firm performance concerning a proposed MDI for diversity in boards. The analysis also considers board-level diversity of boards (e.g., board size, stability, structure, succession, activity, attrition, nomination independence and CEO duality). By analysing VB performance, taking into consideration variances between different boardrooms and diverse director attributes levels, this chapter aims to highlight new aspects in diversity research. To achieve the objectivity of this study, this chapter considers both diversity in boards based on DIB and the boardroom structure configurations (DOB) following earlier diversity study recommendations (Hafsi and Turgut 2013). On the one hand, the highlighted MDI consider

statutory/non-demographic diversity to capture board composition and dynamics which is critical to building an effective boardroom. On the other hand, demographic diversity results in high-quality management through the directors' various skills related to demographic attributes (Gull et al. 2018).

In another vein, there is an increasing interest in adopting VB measures in academia and policymakers (Ferguson and Leistikow 1998; Young and O'Byrne 2001; Malmi and Ikäheimo 2003; Ismail 2006; Forker and Powell 2008; Lee and Kim 2009; Stewart 2009; Chiwamit et al. 2017). Thus, this chapter considers VB measures, for example, EVA as the difference between the firm's NOPAT and its WACC. It is crucial to bring this performance measure to diversity research for the following reasons: first, VB extends and complements other performance measures as it altogether accounts for the firm's overall capital costs. Second, VB is used as a proxy for stock performance where the higher the VB, the higher the security prices, which is beneficial to stockholders and corporations (Machuga et al. 2002; Grant 2003; Malmi and Ikäheimo 2003). By incorporating VB into the company evaluation process, securities analysts and portfolio managers enhance the overall pricing accuracy of their research recommendations. Also, with VB, corporate managers have an innovative performance tool for assessing the balance between their cost of debt and equity to get the optimal capital structure. Also, this chapter uses market-based performance measures (e.g., Tobin's Q) calculated based on the most usual proxy: the book value of total assets minus the book value of common equity, plus the market value of common equity divided by the book value of total assets (Brown et al. 2011).

This chapter contributes to the extant body of research on board diversity and corporate performance valuation. It fills the gap in CG literature by moving beyond

traditional diversity measures to the use of faultline methodology to better explain how board diversity stimulates corporate value and market-based performance. This approach is different from what has been done before and contributes to amplify board diversity, by proposing a multi-dimensional diversity measure (MDI) as a response to the call made by Thatcher and Patel (2012), who highlight the importance of investigating the distribution of multiple diversity attributes simultaneously. The proposed MDI responds to such a call and is designed to capture the joint effect of numeric and nominal director attributes at various levels from the surface (baseline) to meso-level diversity.

Finally, this chapter brings all this together into a single analysis to study the influence of diversity based on eight (non-)demographic director attributes on firm performance using five performance measures (e.g., EVA, RI, Tobin's Q, ROA, and ROE). Moreover, this chapter considers eight board-level characteristics. These associations are comprehensive and econometrically well-specified through the solid analysis of the causal relationship between board diversity and board-level characteristics to corporate performance, which is taken into account by employing a simultaneous equation framework. Further to that, the current study has theoretical and practical implications as follows. First, this chapter introduces a stewardship theory to faultlines literature and offers a methodological approach to measuring faultlines at different levels, expanding diversity research (Bezrukova et al. 2016) by drawing on the multi-level approach. Second, this study has essential implications for academics, senior policymakers, and corporate boards. Furthermore, to better utilise the findings of this chapter, corporate leaders should note how board diversity is important to enhance corporate performance.

Thus, this chapter contributes to diversity literature by answering the following sub-questions:

- 1- How to capture board diversity through the proposed MDI along with other well-studied factors such as board-level characteristics to improve corporate performance?
- 2- What is the importance of differentiating the effect of multi-level board diversity to provide a better explanation of the mixed findings in corporate performance studies?

Further to that, this chapter aims to investigate the UK board-level characteristics and enhance the accountability of board members by linking boardroom diversity to corporate VB performance measures.³⁹ Moreover, it act as best practice's governance tool countering the moral-ethical relativism in the governance context (Clark and Brown 2015; Van Peteghem et al. 2017). Finally, more diversity develops a corporate competitive advantage and enrich corporate image that leads to a positive effect on customers' behaviour and thus on a firm's performance (Coffey and Wang 1998; Bhagat and Black 2002; Dalton et al. 2007; Bear et al. 2010). This study applies multiple contributions to management accounting and diversity research by bridging the faultlines

³⁹ One of the main objectives of this chapter is to fill the gap in diversity research by empirically analysing the transition effect between multi-layer diversity on moderating diversity and how board diversity at meso level (meso-level diversity is proxied by faultline strength, a hypothetical dividing line that splits board of directors into subgroups based on based on director identity characteristics (e.g., director age, gender, nationality), information (e.g., differences in number of educational qualifications, director role, seniority, and director network size), and non-demographic attribute (e.g., director pay) impact corporate performance. The current literature emphasises the need to expand prior extended board diversity micro-level measures such as gender diversity and its effect on performance through constructing a multi-dimensional measure, Therefore, this study fills this gap by developing a more complex multi-dimensional measure for board diversity and how it stimulates corporate value creation. This chapter is also responding to a recent report, Board Diversity Reporting, published in 2018 by the Financial Reporting Council (FRC), which stated that the importance of investigating the balance of skills in boardrooms and how the board works together as a unit. Also, this study aims to bring all these concerns while evaluating corporate value creation.

concept with VB management. The aim is to fill the found gap in the interrelationships between board diversity and performance (Hayes et al. 2012; McLeod et al. 2016; Zhu et al. 2016).

4.3. Theoretical background

Many theories were used to explain how boards affect company performance, for example, the agency (Jensen and Meckling 1976), social network (Granovetter 1985), stewardship (Davis et al. 1997; Buttner and Lowe 2017), institutional (DiMaggio and Powell 1983) and resource dependence theories (Pfeffer and Salancik 1978). However, the relationship between director characteristics (Granovetter 1985), board-level-related characteristics (Forbes and Milliken 1999) and board diversity has been investigated relatively little from the perspective of the multi-level (Bezrukova et al. 2016) and faultline approaches (Thatcher and Patel 2012).

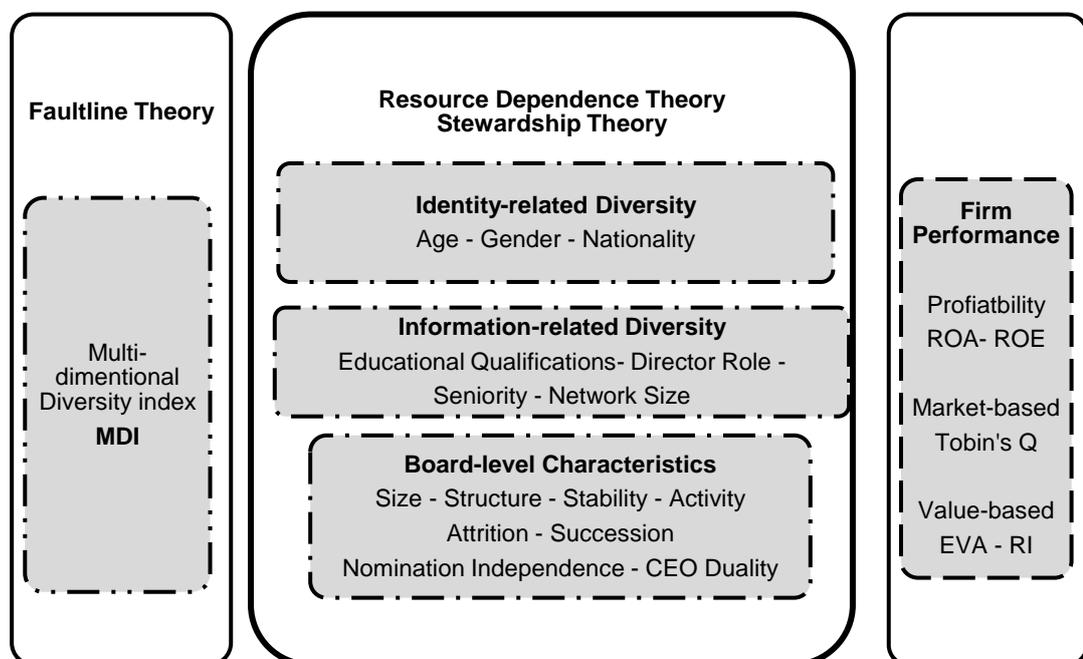


Figure 4.1 Summary of theoretical framework

Therefore, this chapter mainly relies on three theories – stewardship, resource dependence and faultline theories – as shown in figure 4.1. This chapter uses stewardship theory, which places emphasis on the delegation and authorisation for the board of directors, instead of screening and monitoring their attitude toward manipulating earnings to achieve personal gains (Fama and Jensen 1983), and, further to that, resource dependence theory, which explains the linking role and how directors bring various resources to the organisation (Pfeffer and Salancik 1978). Finally, the faultline theory is selected to explain how the directors' diverse attributes are aligned (Lau and Murnighan 1998) to amplify directors' strategic roles and board performance. This theoretical review prioritises these theories over and above other CG theories to construct the MDI.

Board diversity literature over-relies on firms' financial and market performance proxies. As a result, areas such as diversity and board-level characteristics are mostly untested for their ability to improve corporate VB performance more effectively. This analysis seeks to re-examine some of these board characteristics using an integrative theoretical framework from faultline relevant literature for direct causal relationships to corporate financial performance.

In the literature, resource dependency theory and stewardship theory were two dominant viewpoints for CG (Daily et al. 2003; Hillman and Dalziel 2003; Armitage et al. 2017). The principle of resource dependence suggests that the effectiveness of the board is determined by external resources which individual members use for business (Pfeffer and Salancik 1978). Along with others, including stewardship and resource dependence theories, both theoretical views often suggest competitive or seemingly paradoxical board roles (Sundaramurthy and Lewis 2003). Subsequently, there have been several arguments on the effect

of CEOs' duality (Rechner and Dalton 1991), the size of the board (Guest 2009; Bai 2013), the board composition (Sundaramurthy and Lewis 2003) and other board characteristics on corporate performance (Rechner and Dalton 1991; Wagner Iii et al. 2002; Zahra and Pearce 2016). In general, CG principles and codes account for such issues as management structures, arrangements of ownership, numbers of directors, pay plans and other activities. It is predicted that compliance with these codes would enhance corporation legitimacy (Roberts et al. 2005; Armitage et al. 2017).

The underlying assumption that differentiates stewardship theory from other theories (Fama and Jensen 1983), is that board members work for the best interests of stakeholders (Daily et al. 2003; Roberts et al. 2005; Kumar and Zattoni 2017a). Stewardship theory is constructed on the alignment of interest between stewards and corporate owners from the sociological perspective (Rashid 2015). This theory contradicts agency theory and eliminates the existence of board opportunistic behaviour (Katmon and Farooque 2017). Although agency theory assumes that agents and principles have contradictory benefits (Funchal and Monte-Mor 2016), stewardship theory gives trust to agents and the boardroom. Therefore, a monitoring role is neglected as managers are trusted to run the business, and there is no need to waste corporate resources on screening attitudes of executives who share the same interests with stakeholders (Mallin et al. 2013).

Though stewardship theory states that corporate executives aim to reach corporate targets, moreover, this secures revenue and dividends to stakeholders as everyone is playing on the same team. Therefore, this theory considers the optimal governance strategy as the one that empowers the corporate board and trusts them to generate profits and create value (John et al. 2016; Kumar and

Zattoni 2016c). The board of directors achieves self-esteem by aligning their goals to overlap with corporate aims. Taking into consideration that the decision-making process is based on financial and non-financial factors, the non-financial motives can be described as economic value creation, reputation, and ethics. According to the theory, directors are described as good stewards.

Furthermore, it is accepted that directors and management aim to build goodwill by working toward implementing the best financial strategy that enhances corporate financial performance and increases shareholder revenues (Albrecht 1998; Chapple and Humphrey 2014; Fauver et al. 2017). Stewardship theory proposes that optimal corporate performance depends on a boardroom that holds fully authorised executive members as they are those who are fully aware of business operations in comparison to outsider directors. On the one hand, empowering corporate managers to increase corporate efficiency and revenues; on the other, it is recommended to have executive directors with full control of corporate resources due to their practical experience. This professional background entails a boardroom with a high-quality level of business information (Gupta and Raman 2014; Sun et al. 2015; Boiral 2016; Buse et al. 2016; Chen et al. 2017b; Trittin and Schoeneborn 2017).

According to stewardship theory, several studies document that high-quality board members and managers lead to high-quality CG by an enhanced view of corporate strategic objectives, besides a better decision-making process (Gupta and Raman 2014; Sun et al. 2015; Boiral 2016; Buse et al. 2016; Chen et al. 2017b; Trittin and Schoeneborn 2017).

In this respect, this chapter borrows from well-constructed theory in the faultline and diversity literature to bridge (non-)demographic director attributes of the

boardroom (Lau and Murnighan 1998; Stevenson and Radin 2009; Ben-Amar et al. 2013) with statutory characteristics (diversity of boards), which is necessary to set up a comprehensive definition of board diversity (Adams et al. 2015). Therefore, there are strong ties that connect attributes such as age, gender, and nationality to non-demographic board characteristics (Ben-Amar et al. 2013; Rao Sahib 2015). The typology of the theories (see appendix 2.1) provides the foundation for roles of governing boards (Hung 1998) and explains the deep ties between the six roles of the boardroom. Agency theory has covered the correlations between the board of directors' control role and non-demographic attributes such as board independence (Fama and Jensen 1983).

In a similar vein, faultline theory backs up the establishment of a multi-layer diversity comprehensive proxy through bridging both director-level attributes (e.g., gender, race, nationality, age, education, task-related background and marital status) and board-level characteristics (e.g., attitudes, conscientiousness) (Larcker et al. 2013; Renneboog and Zhao 2014; El-Khatib et al. 2015; Wong et al. 2015).

4.4. Literature review and hypothesis development

The literature review highlights several performance mechanisms stemming from the generally accepted accounting principles (GAAP). These measures are used to assess corporate performance and the efficient utilisation of the firms' financial resources. These performance measures are classified into market-based measures (e.g., Tobin's Q), VB measures (e.g., EVA and RI) and the traditional financial ratios used extensively in most prior studies (Neely 2007; McKinsey 2015; Firk et al. 2016; Sarhan et al. 2018) that measure corporate activity, liquidity, interest coverage, debt and corporate profitability (e.g., ROA and ROE). In the last couple of years, markets' participants and stakeholders

have been seeking VB measures (Chiwamit et al. 2017; Knauer et al. 2018). The estimation of corporate VB performance is achieved with the utilisation of EVA and RI in compliance with earlier studies (Grant 2003; Grant and Trahan 2009; Lee and Kim 2009; Dekker et al. 2012; Sloof and van Praag 2015; Chiwamit et al. 2017). The main distinguishing characteristic between traditional performance measures and VB measures is the transformation process of accounting profits into economic revenues. EVA and RI are considered as essential tools for top management and senior executives' performance assessment mechanisms to gauge value creation (Bacidore et al. 1997; Ferguson and Leistikow 1998; Stewart 2009; Aggarwal et al. 2015; Knauer et al. 2018).

To date, articles investigating the impact of diversity on group performance have produced equivocal results (Joshi and Roh 2009). Much uncertainty still exists about the influence of diversity *per se*, attribute and accumulative faultline on board performance (Bell et al. 2011; Guillaume et al. 2012; Van Dijk et al. 2012). However, this chapter agrees with prior faultline studies on the complexity of multi-dimensional diversity literature and the theoretical foundation because diversity literature is very diverse (Harrison and Klein 2007).

A core element of performance mechanisms and evaluation systems in many companies is accounting profitability measures. Whether or not managers should be held responsible for the cost of capital used to generate revenue, financial return is an important consideration for the choice of financial performance measures. A well-known problem when firms use earnings measures is the incentive provided for managers to invest in projects that improve the income of their units, although this comes at the cost of inefficient deployment of corporate assets. For example, when a unit manager selects an

investment with a return rate of 8 per cent and the unit capital cost is 10 per cent, the unit generates more profit, but reduces the company's financial profit. The use of profit measures can, therefore, lead to management deviation from firm objectives (Machuga et al. 2002). Likewise, profitability measures (e.g., ROA and ROE) result in inconsistencies if an investment's returns are higher than the capital cost of the unit, but lower than the manager's current average ROA and ROE, thus discouraging investment. The VB literature provides various approaches to encourage managers to include the capital cost in the decision-making process (Machuga et al. 2002; Lee and Kim 2009; Davis 2016). For example, companies set performance objectives based on capital costs and compare income, and apply non-financial performance measures that reflect value drivers to stimulate value creation. The use of VB measures that specifically include estimating the costs of invested capital, such as RI, EVA, and Cash Flow Return on Investment (CFROI), is a critical approach. Empirical research suggests that firm performance can be substantially affected by board diversity, for instance, Wallace and Sheldon (2015) showed that firms whose CEO was held to be accountable to VB (e.g., RI and EVA) had less investment, more expenditure on existing assets and more available share capital returned to shareholders in dividends and repurchases. Likewise, Grant and Trahan (2009) report on the economic performance of VB adopters to outperform non-adopters.

While some empirical research and VB proponents point out that managers use EVA and RI in evaluating VB performance on all levels of corporations (Grant and Trahan 2009; Lee and Kim 2009; Stewart 2009), however, recent studies show a minority of companies use capital cost VB measures (Lee and Kim 2009; Holloway et al. 2016; Chiwamit et al. 2017). VB performance measures could be

applied at lower management levels, where strategic decision-making and control are restricted. This suggests that the application of VB mechanisms to measure and evaluate management performance depends on the company context.

Strategic and economic arguments are drawn on that show how vital VB performance measures are for companies. Value creation shows the company's strategic vision of intensifying the use of assets (e.g., induce strategic compatible behaviour). Therefore, the board of directors aims to enhance VB performance, and particularly control capital cost. Therefore, boards assess managers; although they do not have a significant divestment authority to an asset base (Van Lent 2007), they still have valuable opportunities to manage their existing asset base, for example, managing their operating capital unit (such as inventory turnover and accounts receivable/payable) and the intensity with which an active asset base is present.

Literature also urges study of the impact of board diversity on sustainability, corporate image, financial and non-financial performance, organisational citizenship and virtues, research development and innovation (Kaczmarek et al. 2012; Adams et al. 2015; Post et al. 2015). Diversity research attempts to set a reliable proxy for corporate value and predict future performance based on governance sub-indices such as disclosure index, board structure index, ownership structure index, board procedure index and minority shareholder rights index. However, a shared factor in all diversity indices is the imperfection to proxy corporate-level governance through observable measures at multiple levels (Tuggle et al. 2010; Nekhili and Gatfaoui 2013; Veltrop et al. 2015b; Bezrukova et al. 2016; Black et al. 2017).

Governance literature shows boardroom diversity as a growing field that requires further investigation for the effect of governance structures (e.g., the board of directors) on corporate value and market-based performance is essential to ensure a functional boardroom and stimulating corporate value performance (Hutzschenreuter and Horstkotte 2013b; Pathan and Faff 2013; Kumar and Zattoni 2016a). There is a need to create a diverse boardroom, integrating many aspects of diversity, in order to meet current management needs (Sealy 2018). However, there is research that introduces human capital diversification in the boardroom, but it is established on the analysis of board characteristics diversity one at a time, such as board size, age or gender (Mahadeo et al. 2012; Ali et al. 2014b; Adams et al. 2015; Ararat et al. 2015; Park and Kim 2015; Giannetti and Zhao 2016; Saeed and Sameer 2017). For example, prior diversity studies investigate either director identity (e.g., gender) or information-related characteristics (e.g., experience) of high-performing boards (Payne et al. 2009; Nekhili and Gatfaoui 2013). Also, there is insufficiency in the over-reliance on gender and age diversity attributes alone to capture diversity. Other board characteristics (e.g., board size) should be considered to establish a well-functioning board (Nekhili and Gatfaoui 2013).

The significance of balancing efficient governance mechanisms and managerial ethical perspectives is needed (Tuggle et al. 2010; Wu 2013). Therefore, there is a global call to pay more attention to the corporate boardroom to avoid corruption (PwC 2012) and international governance scandals (Hung 1998; Melé and Sánchez-Runde 2013; Clark and Brown 2015; Cho et al. 2017; Col 2017; Dixon-fowler et al. 2017; Homroy and Slechten 2017; Yoshikawa and Hu 2017).⁴⁰

⁴⁰ In the US, 30 per cent of the industrial sector are obliged to enforce a massive restructure to boardrooms to adhere to the required governance parameters according to NYSE and NASDAQ listing standards (Katmon and Farooque 2017). All these attempts to increase the quality of board

Recently, studies on effective management attracted attention because of how vital the boardroom is to CG (Zeitoun and Pamini 2015; Kumar and Zattoni 2017c). The weak, fragile external monitoring function of board governance is critical and leads to corruption and constraints of decision-making in the last decade (Ararat et al. 2015; Chen et al. 2017c). Finally, diversity needs more societal and global attention besides the political aspect to go beyond a gender quota for a board of directors (Mathisen et al. 2013; Lucas-pérez et al. 2015) (Mahadeo et al. 2012; Ali et al. 2014b; Saeed and Sameer 2017), as in the case of Norway in 2003, which later followed Germany and France (Reguera-Alvarado et al. 2017).

Moreover, prior studies (Park and Kim 2015; Piekkari et al. 2015; Armitage et al. 2017; Karakas et al. 2017; McGuinness et al. 2017) emphasise the importance of a boardroom with diverse skills and knowledge to increase corporate decision-making quality. Analysing a single board attribute alone cannot accurately reflect board performance, but the cohesion of board characteristics can (Chen et al. 2013; Ararat et al. 2015; Meyer et al. 2015a; Rejchrt and Higgs 2015; Boyd et al. 2017).

In line with the mixed results on the effect of board diversity on the performance of companies, appendix 4.1 highlights key research on board diversity and the effect of member attributes on corporate performance. The mixed outcomes as shown in appendix 4.1 lead diversity research to move into the faultline concept: *“Faultlines are hypothetical dividing lines that split a group into two or more subgroups based on the alignment of one or more individual attributes and have*

of directors are made to ensure value creation. Moreover, this cause to the development of a multi-dimensional measure of governance from global context such as global gender diversity index (Aggarwal, Schloetzer, and Williamson, 2015; Trittin and Schoeneborn, 2017).

been found to influence group processes, performance outcomes and affective outcomes” (Thatcher and Patel 2012). There is a need for further explanation of the influence of board diversity on the market and VB performance indicators, moreover, analysing these interactions to expand faultline literature by embracing a multi-level approach to capture diversity at multiple diversity levels.

The literature shows that the faultline approach explains diversity over and above the impact of traditional board diversity measures on performance (Bai 2013; Das Neves and Melé 2013; Cui et al. 2015; Dow et al. 2016; Cho et al. 2017). Moreover, this review is consistent with that call for the extension of faultline design and refining of faultline measurement and proposes the application of faultlines to corporate performance. Also, the review of prior articles demonstrates the influence of diversity type on faultline measure (Balta et al. 2010; Meyer and Glenz 2013; Crucke and Knockaert 2016; Meister et al. 2019), moreover, how different board attributes are aligned in homogeneous subgroups (Carton and Cummings 2012), as board diversity provides corporations with all the necessary elements in decision-making, such as knowledge and experience. An earlier study suggested some future directions to study new board diversity attributes that might lead to unexpected outcomes (Adams et al. 2015; Volonté 2015), for example, to focus on information and social identity as a critical type of diversity and how it stimulates problem-solving skills and the smooth transferring of knowledge and experience among directors through a global network. Also, board diversity is considered a critical factor in the governance context (Meyer and Glenz 2013; Meyer et al. 2014). Moreover, this approach agrees with the philosophy that faultline requires diversity as a precondition (Meyer and Glenz 2013; Meyer et al. 2014).

In another vein, multiple articles capture corporate performance by using market-based performance measures such as Tobin's Q or accounting performance measures as ROA (Kaczmarek et al. 2012; Pathan and Faff 2013; Chapple and Humphrey 2014; García-Meca et al. 2015; Isidro and Sobral 2015; Fang et al. 2018; Sarhan et al. 2018).

To the best of this study's knowledge, no earlier study has linked the advanced faultline approach to a combination of these measurements, along with embracing VB measures that explicitly include an estimate of the cost of invested capital. Empirical research suggests that firms of which the CEO was held accountable for a VB measure, such as RI (Forker and Powell 2008; Firk et al. 2016), EVA (Chiwamit et al. 2017; Knauer et al. 2018) and CFROI, invested less, divested more, used existing assets more intensively, and returned more unused capital to shareholders in the form of dividends and share repurchases (Dekker et al. 2012; Fauver et al. 2017).

The diversity literature for performance measurement shows that performance measures should be closely connected to the strategy and value drivers of a company (Larcker et al. 2007; Larcker and Rusticus 2007; Larcker et al. 2013).⁴¹ If performance metrics are not relevant value drivers, management would more likely disregard the effect of their decisions, and this increases the conflict between the board of directors and business objectives, concerning whether managers are responsible for capital costs or not. The strategic importance of the intensive asset use is one of the key value drivers identified in the VB approach.

⁴¹ A metric that measures a company's fundamental ability to create shareholder value is the EVA. The value of EVA is positive if a company earns more than the required returns on its capital invested. The EVA is carefully described by Stewart (1991) and Grant (2003). EVA, in their view, is a well-known measure of economic gain or residual income. Positive EVA suggests that a company generates fundamental value by earning more than its capital cost (Bacidore et al. 1997; Ferguson and Leistikow 1998; Bacidore et al. 1999).

More consequent management decision-making on investments in new assets and intensity of use of existing assets is supposed to arise, in particular through a capital charge over the investment base (Wallace and Sheldon 2015).

Accordingly, this chapter suggests that the benefits of using VB measures increase when it is more critical for the firm to handle the asset base intensively. Following this point of view, the company's asset base is positive for (Bacidore et al. 1999) in their adoption of VB measures in the CEO contracts. Another empirical research found that increasing the intensity of use was the primordial reason for adopting the VB measures (2009).⁴²

Widespread interest in evaluating the reliability of financial statements indicates that alternatives to presently required performance indicators are tested in terms of value relevance. This chapter signifies the reliance on EVA or RI as financial measure substitutes, and integrates key indicators for company efficiency. As VB measures involve the cost of capital of companies, they are considered more consistent than earnings indicators. This chapter looks at how the significance of VB evaluation actions depends on the needs of companies and management to manage the cost of capital and find that this increases with a need for intensive use of assets, delegated authority, and reduced unit interdependence.

This chapter considers diversity at multiple levels using faultline methodology and proposes a multi-dimension comprehensive proxy to capture the impact of diversity and board-level characteristics on corporate performance. Furthermore,

⁴² Given the primary role of the efficient use of corporate resources, hold managers accountable for cost of capital, and particularly stimulating intensive asset use, this chapter suggest that the inclusion of such capital costs in financial performance measures (e.g., using VB tools) enhances and motivates companies to use assets efficiently. Therefore, this study analyses the joint effect of the directors' attributes at multiple levels, accounting profitability measures (e.g., ROA and ROE), market-based performance measures (e.g., Tobin's Q). Furthermore, it entails a significant contribution to the existing literature by demonstrating how board diversity influences value-based measures (e.g., EVA and RI).

this chapter uses VB measures such as EVA as a proxy for VB corporate performance along with market-based performance measures (e.g., Tobin's Q and RI) and accounting profitability measure (e.g., ROA and ROE).

This chapter considers the effect of board-level or statutory board characteristics. Adapting the faultline technique while studying boardroom diversity explains the directors' attitudes and its implication on corporate performance. Capturing board diversity is crucial to predict the correlations between the multi-dimensional aspects of the boardroom and corporate VB performance. As defined earlier, board faultline is the presumptive isolating lines that split a boardroom into moderately homogeneous subgroups dependent on individual directors' characteristics. This section has attempted to provide a summary of the literature relating to the influence of board societal (based on age or gender) and occupational heterogeneity (based on tenure or education) on firm financial performance.

This chapter is one of the few studies which stress the importance of considering demographic faultline types (e.g., identity and information faultlines) (Harrison and Klein 2007; Hutzschenreuter and Horstkotte 2013b; Adams et al. 2015) at multiple levels and how it affects firm performance. Also, it is the first of its kind to empirically analyse board non-demographic characteristics simultaneously to develop an acceptable layout to the formation process of corporate boardroom.

Board diversity in this study is assessed according to four levels, as follows: surface-level (baseline), identity-level, demographic-level, and meso-level diversity. This chapter measures diversity score at the surface level based on director age and gender attributes simultaneously. At the identity level, faultline is measured based on three characteristics of board members (e.g., differences

in age, gender, and nationality) (Rivas 2012; van Veen et al. 2014; Spoelma and Ellis 2017; Hooghiemstra et al. 2019; Rialp et al. 2019). At the demographic level, faultline considers identity and information-related attributes (e.g., number of educational qualifications, director role, seniority, and director network size).

In the micro-diversity aspect, faultline considers demographic and non-demographic attributes (e.g., director pay). However, the macro-diversity aspect considers the effect of board-level attributes which are related to the structural/macro aspect, in which board levels or statutory characteristics are analysed on the subject of creating corporate value (e.g., board structure, attrition rate, succession, board stability, board appointment independence, board meetings, CEO dualities, board size).

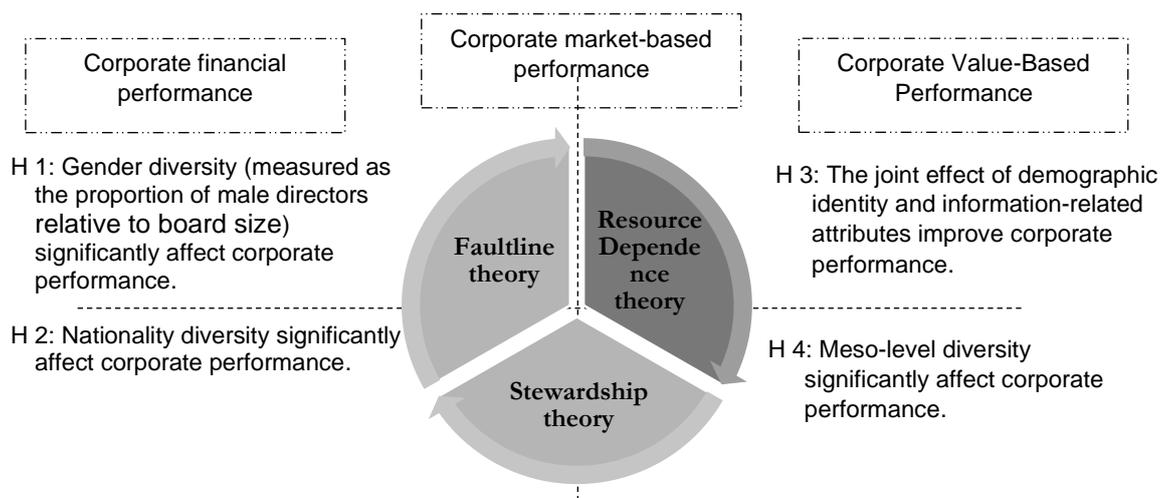


Figure 4.2 Hypothesis development model

Boards with very weak or strong faultline scores have low levels of group performance. Firms' boards of directors with moderate faultline scores (25 per cent to 75 per cent) have high levels of performance. Boards with strong faultlines experience negative effects as a result of the strong forces pitting the two sides against each other. A boardroom that experiences moderate faultlines experiences turbulence more frequently, but as the team members move

between subgroups, they can ensure smooth communication and functioning (Thatcher et al. 2003; Carton and Cummings 2012).

In this part of the study, this chapter discusses four main hypotheses relating to the impact of corporate board diversity on corporate VB performance, as presented in figure 4.2.

The review of board diversity literature classifies board heterogeneity into two categories: social (e.g., gender, nationality, and age) and occupational (e.g., director experience measured by the number of years and education level) (Adams et al. 2015; Hillman 2015; Masulis and Reza 2015; Vidaver-cohen and Brønn 2015; Cho et al. 2017).

4.4.1. Board diversity *per se* and firm performance

The inconsistencies in diversity and corporate performance literature (Carter et al. 2003; Carter et al. 2010; Salloum et al. 2019), regarding the effect of board diversity on corporate performance, show mixed empirical evidence. On the one hand, Cho et al. (2017) discuss the relationship between diversity based on gender attributes in the boardroom and firm value. In their study, diversity *per se* is measured by the presence of one or more women on the board. The results show that there is a positive relationship between female members, community service and firm performance. Further to that, other studies (Mahadeo et al. 2012; Ntim and Soobaroyen 2013; Uhde et al. 2017) report a positive effect of board heterogeneity on firm performance in a developing country context (e.g., Mauritius, Malaysia, Sri Lanka, and South Africa). Other research finds positive and significant effects for gender and ethnic diversity on firm value using data from 245 South African companies between 2008 and 2013 (Gyapong et al. 2016).

On the other hand, diversity literature shows a negative impact of gender diversity on corporate performance. Female representation on the board of directors can also have negative financial implications for the company (Ntim and Soobaroyen 2013). Ferreira and Adams (2009), studying the influence of women board directors and corporate performance, conclude that gender diversity has an adverse performance effect, which further indicates that gender-based quotas have a negative impact on results in well-governed firms. Another study that identifies the impact of gender diversity on governance and performance shows that there is an inverse relationship between the presence of female directors in corporate boardrooms and performance.

Prior studies investigate diversity based on ethnic attribute *per se* to study its influence on corporate strategy (Maloney and Zellmer-Bruhn 2006; Das Neves and Melé 2013; Ntim and Soobaroyen 2013). Results show the negative influence of ethnic diversity on corporate performance and governance (Kumar and Zattoni 2015; Masulis and Reza 2015; Kumar and Zattoni 2016b). Later, another research justified the negative impact as the willingness of directors with different nationalities to make more aggressive acquisition decisions (Dow et al. 2016).

Furthermore, Salloum et al. (2019) show that western ethnic minority members harm firm performance as they can be nominated for various reasons related to the legitimacy of regional and international board credibility, and personal business interests, as well as ties to the external corporate community. A study of the FTSE All-Share index shows that boards of different nationalities have a significant and robust relationship of shareholder heterogeneity, company foreign operations and operating performance (Rivas 2012; van Veen et al. 2014; Estélyi and Nisar 2016; Hooghiemstra et al. 2019; Rialp et al. 2019).

Gregory, Tharyan and Whittaker (2014) show no connection between board diversity and corporate financial performance using a sample of US companies over the five years from 1998 to 2002. Therefore, the mixed effect on corporate performance by diversified boards, supports the claim that gender and nationality diversity of the board *per se* have different performance impacts in different contexts at different times. Thus, based on the stewardship theory and the arguments developed here, the first set of hypotheses is as follows:

H1. Gender diversity (measured as the proportion of male directors on the board) significantly affect corporate performance.

H2. Nationality diversity significantly affect corporate performance.

4.4.2. Multi-dimensional board diversity and firm performance

Diversity literature has relied heavily on market-based measures, such as Tobin's Q, or accounting performance measures, such as ROA (Kaczmarek et al. 2012; Pathan and Faff 2013; Chapple and Humphrey 2014; García-Meca et al. 2015; Isidro and Sobral 2015; Fang et al. 2018; Sarhan et al. 2018). Moreover, the results achieved on the implications of boardroom heterogeneity on financial indicators such as ROA still need more investigation (Maloney and Zellmer-Bruhn 2006; Libecap 2014; Sila et al. 2016). This chapter argues that board diversity is more than just a figures game (female representation) – the more diversified the board, the higher the economic value and financial returns. Although a considerable amount of theoretical and empirical research estimates the relationship between diversity and firm financial performance, the outcomes are inconclusive and mixed (Campbell et al. 2005; de Anca and Gabaldon 2014; Byron and Post 2016). These studies highlighted several claims to justify why more board diversity influences firms' financial performance. For example, diversity based on gender *per se* leads to limited

recognition of stakeholder expectations which makes market penetration more difficult. Prior research has confirmed that employing various types of board diversity in corporations raises the level of creativity and innovation (Chapple and Humphrey 2014). Thus, the management of diversity is supported to enhance the decision-making process and motivate board and corporate problem-solving capabilities. Further to that, boards diversified based on the proportion of male directors only, constrain firms' financial performance (Isidro and Sobral 2015).

However, few articles rely on VB measures that explicitly include an estimate of the cost of invested capital, such as RI (Firk et al. 2016) and EVA (Chiwamit et al. 2017; Knauer et al. 2018). Empirical research suggests that firms of which the CEO was held accountable for a VB measure (RI or EVA) invested less, divested more, used existing assets more intensively and returned more unused capital to shareholders in the form of dividends and share repurchases (Chiwamit et al. 2017; Knauer et al. 2018).

Another aspect presented in this study's multi-dimensional analysis is the demographic dimension. Faultline considers identity- (e.g., age, gender, and nationality) and information-related attributes (e.g., number of educational qualifications, director role, seniority, and director network size).

As women play a role different from that of men in society, it could have an impact on the attitudes of women executives and inspire them to play another role in the boardroom (Hofstede et al. 2010; Liao et al. 2015). Therefore, this study integrates director gender in order to increase the value of structuring multiple levels of diversity index by considering the collective effect of differences in identity-related attributes (e.g., director gender).

In order to gain a competitive advantage, companies need a variety of boards to meet global demands as they increase their diversification for sources of funds (Kaczmarek et al. 2012). Therefore, this study integrates director nationality in order to increase the value of structuring multiple levels of diversity index by considering the collective effect of differences in identity-related attributes (e.g., director nationality).

In addition, the educational background of multiple boards of directors is used by companies to help businesses make strategic decisions and gain a competitive advantage (Katmon et al. 2017). On this basis, this study's research considers the number of educational degrees a director has obtained in order to increase the value of structuring multiple levels of diversity index by considering the joint effect of differences in information-related attributes (e.g., director education). Also, empowering boards with experienced directors increase corporate efficiency and revenue. This professional background entails a boardroom with a high level of business information (Gupta and Raman 2014; Sun et al. 2015; Boiral 2016; Buse et al. 2016; Chen et al. 2017b; Trittin and Schoeneborn 2017). Thus, this study includes managerial experience to increase the value of structuring multiple levels of diversity index by considering the joint effect of diversity on performance.

To this end, this chapter interacts with previous research which demands the conceptualisation of the traditional approach to diversity (Wageman et al. 2012). The parameters are specifically used to explain how faultline type shapes board diversity and its effects (Meister et al. 2019).

One main feature of a potential faultline is that they often consist of concepts of similar characteristics, but the faultline type is different in nature. Formerly,

faultlines were conceptualised mainly based on demographic attributes (e.g., gender, age, ethnicity and nationality) (Aggarwal et al. 2019; Antino et al. 2019), however, faultlines are based on a range of other attributes, such as task-related background, educational background, tenure, personality, language skill, differences of objectives, status disparity and organisational background (Bezrukova et al. 2009; Carton and Cummings 2012; Hutzschenreuter and Horstkotte 2013a). The value in understanding the underlying attributes or identities that form a subgroup is that various types of possible faultlines operate through different mechanisms and vary in their effects.

This study develops prior research (Carton and Cummings 2012; Richard et al. 2019) by drawing on the taxonomy for subgroup types in three major categories, for example, identity-based subgroups based on members' identity faultline (e.g., age, gender and nationality) and knowledge-based subgroups based on information-processing faultline (e.g., number of educational qualifications, director role, seniority and director network size).

Prior research shows that the relationship between board diversity and corporate performance is mixed (see appendix 4.2). This chapters shed some light on this subject by emphasising the moderating role of the director information-related attributes (number of educational qualifications, director role, seniority, and director network size) on performance. When executives have various information-related characteristics and share common socialisation experience with other members, board diversity is significantly altered. This study's research shows that the performance of board diversity at different levels of diversity is crucial.

As diversity research accumulates, this chapter recognises more and more the importance of understanding how board diversity impacts organisations (Finkelstein et al. 2009). A key diversity for board function and performance is the presentation of a knowledge-based faultline that is defined as the alignment of the experiential attributes of team members which split the team into coherent subgroups of knowledge and expertise (Bezrukova et al. 2009). Such subgroup formation is relevant for boards because it represents the information clusters formed by information-related characteristics of team members (Carton and Cummings 2012), and how top executives make strategic decisions to influence corporate outcomes (Hutzschenreuter and Horstkotte 2013a). While the importance of a knowledge-based faultline (e.g., information-related attributes) is already acknowledged, literature does not clearly establish their performance implications. Some studies argue, on the one hand, that information-related characteristics increase the team's capacity for information processing and encourage innovation (Xie et al. 2015), learning (Gibson and Vermeulen 2003) and high levels of performance (Hutzschenreuter and Horstkotte 2013a). A variety of career experience enhances the directors' ability to reduce unproductive knowledge fragmentation in the board (Hambrick and Mason 1984). As Cooper et al. (2014) argued, individuals with a variety of experience from different domains can act as bridge-builders between subgroups as they demonstrate weaker subgroup identification. In contrast, another research stream suggests that the impact of an information-related faultline is predominantly negative (Bezrukova et al. 2012), as the resulting factions between team members generate knowledge fragmentation that impairs team functioning and results in low performance (Li and Hambrick 2005).

Directors with experience from different functional areas and countries, therefore, have the necessary leverage to gain a strong network position within boardrooms with task-related and international experience based on knowledge. This superior management facilitating capacity makes better use of board members' access to information and the sharing of knowledge (Hallin et al. 2011; Carmeli et al. 2012), leading to high levels of firm performance (Rodan and Galunic 2004; Buse et al. 2016). As Cohen and Levintha (1990) emphasise, as the diverse team networks are integrated, the understanding of the skills and expertise of others is increased and that results in positive organisational outcomes.

The joint effect of differences in director information-related attributes (e.g., director network size) is therefore considered in this study. Given the previous theoretical and empirical literature, the third hypothesis is as follows:

H3. The joint effect of demographic identity and information-related attributes improve corporate performance.

The review of the literature shows that board diversity based on director independence positively improves corporate performance and firm image (Gupta and Raman 2014; Strand 2014; Alexandridis et al. 2017).

This study predicts that meso-level diversity (e.g., the joint effects of age, gender, nationality, number of educational qualifications, director role, seniority, director network size and director salary) is significantly and positively associated with corporate value creation due to the willingness of a well-diversified boardroom to make value-creating decisions. Little is known about the interrelationships between board heterogeneity and the firm performance

(e.g., ROA) (van Knippenberg et al. 2011; Trezzini 2013; Veltrop et al. 2015b; Van Peteghem et al. 2017).

Previous literature indicates that a manager's salary is correlated with their efforts to ensure that directors and executives behave in the interests of shareholders (Adams and Ferreira 2009; Liu et al. 2014; Bugeja et al. 2016; Stathopoulos and Voulgaris 2016; Sarhan et al. 2018). So, better-governed companies (with more moderate diverse boards) are less likely to overpay directors and senior executives.

Empirical research shows that opportunistic corporate executives seek to earn performance packages in firms with low CG structures (Carter et al. 2003; Adams and Ferreira 2009; Liu et al. 2014; Terjesen et al. 2015).

This chapter borrows from a well-constructed theory of faultline and diversity literature to bridge the demographic characteristics of boardrooms (Carter et al. 2003; Carter et al. 2010; Mahadeo et al. 2012; Ntim and Soobaroyen 2013; Gyapong et al. 2016; Salloum et al. 2019) with non-demographic characteristics (Lau and Murnighan 1998; Stevenson and Radin 2009; Ben-Amar et al. 2013). The statutory diversity of non-demographic attributes is necessary in order to establish a comprehensive definition of the diversity of boards. There are therefore strong ties linking attributes such as age, gender and ethnic background to director pay as a proxy for non-demographic board characteristics (Ben-Amar et al. 2013).

Given the previous theoretical and empirical literature, the fourth hypothesis is as follows:

H4. Meso-level diversity, based on the joint effect of demographic and director pay attributes, has a positive effect on value-based performance measures.

4.5. Methodology

4.5.1. Sampling technique and data collection

Data from DataStream is used to construct a panel data set, collecting corporate data from the official annual reports (e.g., balance sheet, income statement, cash flow statement). This chapter also uses BoardEx, which profiles almost every publicly listed company across the world on the publicly available information. In the process of building the profiles for these companies, it compiles the full list of their directors and senior executives, and builds complete profiles on each of these individuals.⁴³ These profiles include as much information on their full history regarding employment, other activities (e.g., clubs, memberships, non-profit activities), education and achievements. The most exceptional value in what BoardEx delivers is the ability to see how individuals are connected through organisations and how organisations are connected through individuals (e.g., network size). The BoardEx database quantifies these connections of the individuals and the organisations. The more extensive the network, the more influential the individual is based on how well they are connected to other business leaders across the world (relationship capital). Moreover, it is a valuable asset to every organisation which can leverage it to their advantage. In the next section, concerns about data availability, reliability and validity are addressed for this study.

⁴³ The quality of quantitative research is derived from careful hand selection technique and analysing archival data (e.g., Thomson Reuters and BoardEx databases which are considered as a widespread and reliable data platform on corporate governance information) (Qiu, Shaukat, and Tharyan, 2016; Trumpp, Endrikat, Zopf, and Guenther, 2015). These platforms consolidate published annual reports such as balance sheet, income statement, cash flow statement and firms' corporate governance data.

A balanced data set requires each firm (cross-section unit) to have the same periods available (van Knippenberg et al. 2011; Trezzini 2013; Veltrop et al. 2015b; Van Peteghem et al. 2017). Often, some observations are missing in the population of interest. For example, in this study, some firms begin at time $t = 1$, at time $t = 2$ some of the listed firms are dropped and new firms added as firms to be included in the sample have to be listed in the FTSE All-Share index for at least two consecutive years, have the full set of board characteristics and have relevant financial data available, which is standard in most prior studies (Wooldridge 2011). Once included, this chapter continues to follow a firm unless it is acquired or turns private. From this sample, this chapter drops firms for which no director-disclosed data is available. Also, the sample covers active and inactive firms, so with these constraints, this chapter has an unbalanced panel of 3,357 firm-year observations which is consistent with previous diversity articles (Tuggle et al. 2010; Kaczmarek et al. 2012; Bianco et al. 2015; Sun et al. 2015; Black et al. 2017; Haque 2017; Homroy and Slechten 2017; Martins et al. 2017).⁴⁴

This chapter concentrates on a single market to investigate corporate value and market-based performance using homogenous data. This study's sample consists of 3,357 FTSE All-Share index non-financial firms from 2005 to 2018 because not only is it widely used and represents 80 per cent of the total market capitalisation of the British listed companies, but also, the commercial and ethical concerns to solve the UK.

⁴⁴ With these constraints, this chapter obtain an unbalanced panel. As the FTSE All-Share index has evolved so too have the sectors which dominate it. This chapter looks at the available data, going back to 2005 and the reason for ending the study in 2018 is based on data availability. Therefore, the sample selection process is based on firm-level data over a period of 14 years (2005-2018) which allow this study to fully exploit the variations in corporate performance and diversity data. This wide window sample provides stability and reliability of outcomes in the context of diversity research (Cornett, Guo, Khaksari, and Tehranian 2010). The sample reflects a good combination of highly profitable and risky firms and some loss-making firms.

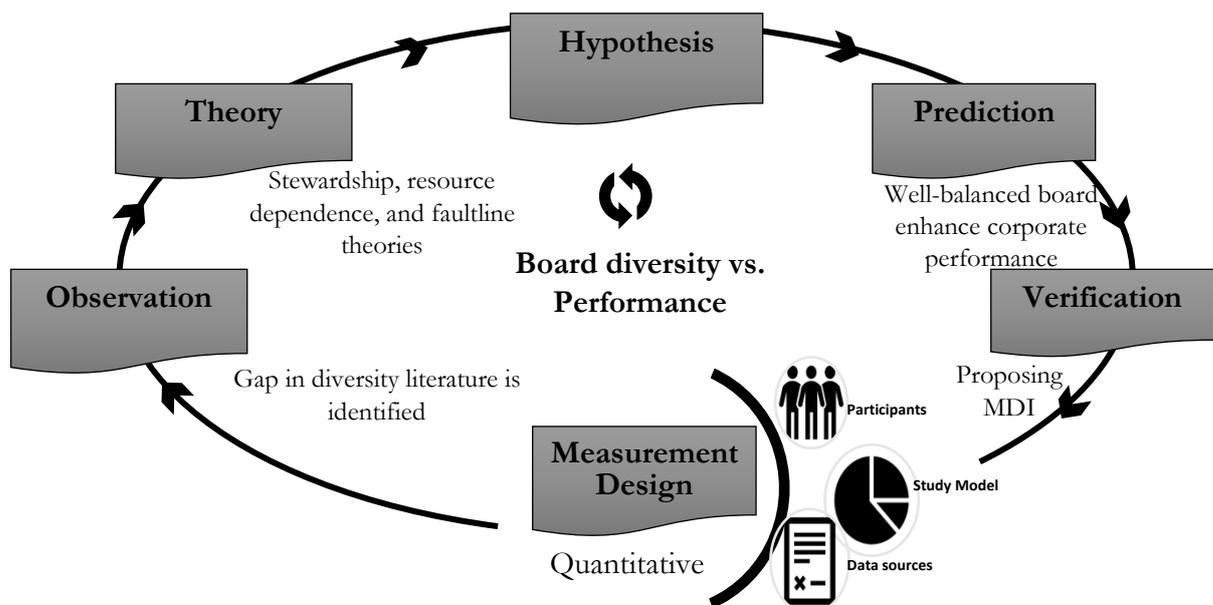


Figure 4.3 Methodological review

This chapter starts in 2005 since the release of the UK Companies Act 2006 and when the IFRS became mandatory for all UK firms, as shown in Table 4.1. This study stops in the year 2018 following the publication of the FRC’s Board Diversity Reporting report, as the latest this chapter can collect this study’s data from annual reports. This chapter is motivated to study diversity for both British readers and the global audience.

Table 4.1 Sample selection process

FTSE All-share Index 2005 - 2018	8,904 firm-year observations
Less financial UK firms	4,270
Total	4,634
Less firms with missing director characteristics	1,277
Full data set	3,357
Panel A: firms with moderate faultline scores (0.25-0.75)	2,612
Panel B: firms with extreme faultline scores close to 0 & 1	745

Table constructed by the author. The above table sets out the sample breakdown analysis for FTSE All-share index 2005 – 2018.

Firms with moderately and extremely diversified boards at surface-level are empirically analysed separately, to distinguish their implications on corporate performance.⁴⁵

The preliminary analysis of the sample shows that director age has a mean of 62.62 and board size has a median of nine members. This result is consistent with earlier study findings that the board size of FTSE 100 firms has decreased over time from over ten members to 9.00 members on average (Kaczmarek et al. 2012; Bianco et al. 2015; Schmid et al. 2015; Black et al. 2017; Haque 2017; Martins et al. 2017). Yet boards seem to have held the same trend until 2018. The smallest board is composed of three, and the biggest contains 19 members which imply a good variety of board sizes in the sample.

Table 4.2 Descriptive statistics for numeric attributes in sub-index level

	Obs	Minimum	Maximum	Mean	Std. Deviation
Numeric variables					
1 Age	26743	35	95	62.620	8.225
2 Education		0	9	1.870	1.156
3 Network Size		7	10896	1368	1613.595
4 Pay		0	8248	305.668	358.077

Table constructed by the author. The above table sets out the director attributes dispersion for FTSE All-Share index 2005 – 2018.

Results show that director education has a maximum value of 9, and the minimum director age is 35 years, with a mean value of 62.620 years as in Table 4.2.

The following Table 4.3 shows that the percentage of quoted female directors is 14.140 per cent. Notably, there is a wide variation of gender nomination in the sample, whereas, surprisingly, the number of quoted male directors is 22,961 out of 26,743 directors, and 82.930 per cent of directors are British.

⁴⁵ Lau and Murnighan (1998) also view conflict as a potential outcome of strong faultlines. The relationship between diversity and performance has also been looked at extensively with mixed results, therefore, this chapter believe it is important to investigate the effects of diversity faultlines on performance (Thatcher et al. 2003).

Table 4.3 Descriptive statistics for string attributes in sub-index level

		n	Freq.,	
1	Gender	Male	22,961	85.860
		Female	3,782	14.140
2	Nationality	British	22,178	82.930
		American	1,392	5.210
		Irish	428	1.600
		French	371	1.390
		Dutch	239	0.890
		Australian	220	0.820
		Canadian	203	0.760
3	Director seniority	Others	1,712	6.380
		Executive Director	9,028	33.760
		Senior Manager	1,235	4.620
		Supervisory Director	16,480	61.620
		Independent NED	10,133	37.890
		Senior Independent NED	2,945	11.010
4	Director role	CEO	2,072	7.750
		Chairman (Independ. NED)	1,415	5.290
		Chairman (Non-Executive)	1,309	4.890
		CFO	1,106	4.140
		Others	7,763	29.000

Table constructed by the author. The above table sets out the director attributes concentration for FTSE All-Share index 2005 – 2018.

It is worth knowing that supervisory directors denominate this study's sample with a percentage of 61.620 and independent non-executive directors (Independent NED) represent only 37.890 per cent.

4.5.2. Dependent variable: corporate performance

This section describes the variables used in this study to illustrate how the chapter has proposed a comprehensive proxy for board diversity and firm performance. Except for some market-based performance measures, such as Tobin's Q, and profitability measures, such as ROA, ROE and RI, obtained from DataStream, all other variables are calculated.

Before this chapter describes the variables of this study, it considers them adequate for discussion on performance indicators, related CG research addressing non-financial firms, and the performance was based on market-based indicators and financial accounting indicators and a combination of two profitability performance measures. The performance indicator may be

fundamental because there is some disagreement as to what extent any board or executive decisions could influence accounting vs market-based financial performance measures. Financial accounting performance measures have frequently been criticised for reasons such as: (i) being subject to manipulation; (ii) may undervalue assets systematically; (iii) distortions caused by nature of selected depreciation policies, inventory valuation and treatment of some items of revenue and expenditure; (iv) difference in methods used to consolidate accounts; and (v) lack of standardisation in international accounting principles (Chakravarthy 1986). In addition, accounting performance measures are susceptible to changing methods of accounting (Lev and Thiagarajan 1993) and financial revenues which are challenging to interpret companies' performance in the case of participation in multi-industry (Nayyar 1992).

The ROA (performance indicator of how profitable a company is relative to its total assets; it is equal net income divided by total assets) shows the capacity and capability of the management to use the corporate assets which belong to the shareholders (Knauer et al. 2018); a lower ROA reflects the inefficiency of firm management (Alexandridis et al. 2017). The ROA is widely used as a performance indicator in prior diversity articles (Khan et al. 2013). Some recent research proxies firm performance with the ROA in compliance with prior gender diversity studies (Nekhili and Gatfaoui 2013; Isidro and Sobral 2015). Also, these study proxy's firm performance with the ROE (performance indicator of how effectively management is using a company's assets to create profits; it is equal to net income divided by average shareholder's equity) (Lückerath-Rovers 2013; Van Peteghem et al. 2017; Sarhan et al. 2018).

Therefore, this study embraces key market-based performance indicators as in appendix 4.3 (e.g., Tobin's Q) in compliance with prior gender diversity articles

(Hafsi and Turgut 2013; Nekhili and Gatfaoui 2013; McGuinness et al. 2017), in addition to a VB measure such as EVA (Bacidore et al. 1997; Biddle et al. 1997; Forker and Powell 2008; Alexandridis et al. 2017; Alsoboa 2017; Russo 2017; Knauer et al. 2018) and residual income (can be used as a measure of corporate performance, whereby a company's management team evaluates the income generated after paying all relevant costs of capital) (Ismail 2006; Grant and Trahan 2009; Lee and Kim 2009; Holloway et al. 2016; Chiwamit et al. 2017).

EVA differs from traditional accounting measures because it accounts for the firm's overall capital costs altogether (Dekker et al. 2012; Sloof and van Praag 2015; Firk et al. 2016). This analytical difference is essential to the firm's owners because the EVA metric is net of both the direct cost of debt capital and the cost of equity capital – as reflected in the shareholders' required return on common stock. In this context, EVA can be expressed in more terms as $EVA = ROIC - WACC * IC$ and concerned with performance evaluation of levels of management in the firms (see Table 4.4).

Table 4.4 Variables definition

Dependent variables	Measure
Economic value-added (<i>EVA</i>)	Value-based performance indicator. It is the weighted average cost of capital subtracted from return on invested capital, and the product is multiplied by total invested capital. EVA can also be referred to as economic profit, as it attempts to capture the true economic profit of a company.
$EVA = (ROIC - WACC) * IC$	
Tobin's Q (<i>TOBINQ</i>)	Market-based performance: the market value of the firm as captured by enterprise value divided by the book value of total assets
$Q = \text{Enterprise value} / \text{the book value of total assets}$	
Residual income (<i>RI</i>)	Value-based performance indicator. It is the minimum required return of operating assets subtracted from operating income. It is also considered as the company's net operating income or the amount of profit that exceeds its required rate of return.
Net Operating Profits after Taxes – Charge for all capital used	
Return on equity (<i>ROE</i>)	Accounting returns indicator measured by dividing net income by average shareholder equity. It shows how effective managers use the assets of a company to generate profits.
$ROE = \text{Net income} / \text{Average Shareholder Equity}$	

Thomson Reuters: DataStream

Dependent Variables	Measure
Return on asset (<i>ROA</i>)	Accounting returns indicator measured by dividing net income by the total assets. It shows the capacity and capability of the management to use corporate assets.
$ROA = \text{Net income} / \text{Total assets}$	
Independent Variables	Measure
Gender diversity	The proportion of male directors relative to board size at the Annual Report Date selected
Nationality diversity	The proportion of Directors from different countries relative to board size at the Annual Report Date selected
Surface-level diversity	The joint effect of differences in age and gender attributes.
Identity-level diversity	The joint effect of differences in board identity attributes age, gender, nationality.
Demographic diversity	The joint effect of differences in demographic board attributes age, gender, nationality, number of educational qualifications, director role, seniority, and director network size.
Meso-level board diversity	The joint effect of differences in (non-)demographic board attributes age, gender, nationality, number of educational qualifications, director role, seniority, director network size, and director pay.
Control variables	Measure
Board Structure	<p>Does the company have a staggered board structure or classified Board Structure?</p> <ul style="list-style-type: none"> - Staggered Board Structure: A structure in which a portion of the board members are elected each year instead of all members being elected annually. Board terms are often staggered and same in length to thwart unfriendly takeover attempts since potential acquirers would have to wait longer before they could take control of a company's board through the standard voting procedure. - Classified Board Structure: A structure in which the board members serve different term lengths, depending on their classification. Under a classified system, directors serve terms lasting between one and eight years. Longer terms are often awarded to more senior board positions. - Mixed of staggered and classified
Attrition rate	Concerning the number of directors that have left a role as a proportion of the average number of directors for the preceding reporting period at the annual report date selected
Succession	Measurement of the clustering of directors around retirement age at the annual report date selected.
Board stability	Std. Dev. of the population of the number of quoted boards that have been sat on overtime for all the directors at the annual report date selected
Board nomination independence	Per centage of independent board members on the nomination committee as stipulated by the company.
Board Activity	The number of board meetings during the year.

BoardEx

Thomson Reuters: DataStream

CEO Duality	CEO chairman separation: Does the CEO simultaneously chair the board? Moreover, has the chairman of the board been the CEO of the company?
Board size	Number of directors on the board at the Annual Report Date selected

Table constructed by the author. The above table sets out the definitions of the primary dependent variables, where column 1 lists the five performance mechanisms and the abbreviations of the dependent variables that will be used hereafter in italics. Column 2 defines the measures used to reflect performance mechanisms. Column 3 presents the data source used to collect each variable.

4.5.3. Independent variables: board diversity

This chapter follows the empirical model tested by earlier research to study the causality relationship between board diversity and corporate performance (Dekker et al. 2012; Firk et al. 2016), where causality exists when the values of board diversity explain the movement of corporate value and market-based performance.⁴⁶

The most current faultline mechanisms based on clustering methods do not consider team-information-related characteristics due to computational constraints (Greene 2003; Haque 2017). For example, Bahargam et al. (2019) proposed that the costs of divisive diversity measures increase exponentially with the number of attributes. Carton and Cummings (2012) rely on a thorough assessment of all possible groups of two or more subgroups. Similarly, Shaw's

⁴⁶ There are obvious difficulties in accepting the reliability of self-report information. There are certain problems with the use of focus groups. One of these is that there is difficulty to replicate experimental outcomes into a real business situation. This study incorporated a panel data methodology, which facilitates a more reliable picture than that arising from cross-sectional studies and allows the elimination of any unobservable heterogeneity that may be present among the companies in the sample. Several authors (Adams and Ferreira 2009; Hermalin and Weisbach 1998) have posited that board composition and diversity are endogenous. To study directors' attributes, this chapter uses univariate and multi-variate analyses. Although the firm fixed effect method is used to perform the multi-variate analysis to study the relationship between directors' attributes and the overall faultline strength, correlations technique is used to perform the univariate one. Hausman test is carried out for the unbalanced panel data set. Panel data are recommended for this investigation because of its accuracy regarding maintaining neglected variables (missing observations) (Berrone and Gomez-Mejia 2009; Gallego-Álvarez, Segura and Martínez-Ferrero 2015; Hsiao 2014).

FLS measure depends on the computing and combining of each attribute with its subgroups regarding all possible internal alignments and cross-product alignments (Carton and Cummings 2012). Since each of these structures should be modified when a person is added or removed from a team, the FLS formula cannot be changed constantly. Van Knippenberg et al.'s (2011) proposed measure utilises regression analysis to explain the estimate for the variance of each attribute compared to all other attributes. However, its advantages in the calculation environment and several regressions for each candidate team are not a practical choice in a team environment.

4.5.4. Measuring control variables: board-level corporate governance variables

In an effort to control the systemic variation of financial performance that was never attributed to the particular characteristics of the board alluded to above, multiple variables of the control were included in this study's regression model. In principle, larger boards should have the potential to play more different functions, which would enhance the overall perception of the company.

Separation and independence can also gain from board members (Carton and Cummings 2012). There are many other board-level characteristics related to board size that can influence the composition of the team, the productivity of the board and the success of the organisation (Guest 2009; Bai 2013). This chapter also tests the average board tenure of CEO duality (Daily et al. 2003) following preceding articles of boards of directors and the age of the board (Rechner and Dalton 1991).

Therefore, the current study has selected the following eight sets of control variables based on a review of prior studies of CG and board diversity. The variable board size is measured as the number of directors serving on the board

(Lau and Murnighan 1998; Ali et al. 2014a), and board activity is measured as the total number of meetings held in the year and is a proxy for the level of activity (Kang et al. 2007; Lim et al. 2007). CEO duality equals 1 if the CEO and chairperson are different individuals and 0 otherwise (Laksmana 2008). Board structure is a dummy variable, which equals 1 if a portion of the board members are elected each year, instead of all members being elected annually (staggered board structure) and 0 otherwise (mixed structure), and board stability is measured as the Std. Dev. of the population of the number of quoted boards that have been sat on overtime for all the directors at the annual report date selected. Nomination committee independence is proxied as a percentage of independent board members on the nomination committee as stipulated by the company. Attrition ratio is measured as the number of directors that have left a role as a proportion of the average number of directors for the preceding reporting period at the annual report date selected, however, succession ratio is measured as the clustering of directors around retirement age at the annual report date selected. These characteristics are discussed in more detail in the following sections.

Governance literature extensively studies board diversity, relating to issues such as corporate financial performance (Dalton et al. 2007), strategic events and board processes (Zajac and Westphal 1996), and corporate social performance (Wang and Zhang 2009). However, for board-level diversity, the precise meaning remains unclear (Harrison and Klein 2007). The ambiguity in diversity constructs is sometimes related to demographic differences of directors, sometimes differences between boards' structure, processes and board characteristics, or the interlinking of directors and boards. These inconsistencies in embracing board-level diversity approaches have improved this study's understanding of boards' performance, but also creates confusion about which

diversity attributes are meaningful in assessing the effects of boards and comparing various outcomes on dynamics and effectiveness as a more accurate explanation needs to be added to diversity types for clarity reasons.

The term 'board diversity' is used as differences in the attributes at the director-level (Adams et al. 2015), and the board-level characteristics relate to the formal structure of the boards. For example, boards can be differentiated by size, organisational structure, chairman's duality and CEO, and number of international board directors, independence of the board, control of directors, tenure of the director and compensation of the director.

Board structure. The board-level characteristics of the board (Haniffa and Cooke 2002) are important for the CG process and the effect the disclosure made in the company's annual reports (Haniffa and Cooke 2005). With the suggestion of the resource dependence theory, board-level characteristics guarantee that the board fulfils its fiduciary role by aligning client objectives with the interests of stakeholders (Fama and Jensen 1983; Haniffa and Cooke 2005). Such alignment improves clarity in coverage and contributes to better social knowledge dissemination (Hoang et al. 2018).

Board size. Company boards with limited numbers of directors are argued to improve management oversight and control through low levels of communications conflict and good teamwork (Jizi 2017). Boards of directors with small numbers may, on the other hand, be subject to high workload and activities that could hinder their position as supervisors. Moreover, because of the lack of diverse expertise and experiences, the consistency of advice and control given by small boards may be affected (Guest 2009).

CEO duality. Agency theory demonstrates that executives are likely to abuse their power to favour groups of people (Hermalin and Weisbach 1998; Haniffa and Cooke 2002; Khan et al. 2013). In this situation, management processes have to be monitored to protect the rights of shareholders and, in particular, boards of directors (Guest 2009; Li 2014; Arena et al. 2020). The Cadbury report reveals the importance of the management board in setting the company's tone (Patelli and Pedrini 2013). The appointment of CEOs to the board of directors is typically determined by a substantial proportion of their successful career records (Hermalin and Weisbach 1998; Arena et al. 2020). Thus, handling control is implied by CEO position duality. This influences executives inside, as they can make decisions that are not in the interests of shareholders to avoid conflict with their president-CEO. In addition, the strength of the duties of the CEO could lead to the appointment of the chairman's directors (Haniffa and Cooke 2002). CEO duality constrains the board's objectivity in the role of a controlling body (Krishnan and Visvanathan 2008); it is a body which is aware of the chairman's authority in the establishment of an agenda, the choice of members and the concealment of vital information from other board directors. Earlier articles have shown that the detrimental impact on monitoring is considered by CEO duality (Tuggle et al. 2010).

Studies offer conflicting findings with respect to accountability. Some empirical results indicate that disclosure rates are lower when duality between CEOs occurs (Donnelly and Mulcahy 2008; Chau and Gray 2010). Finkelstein and D'Aveni (1994) have nevertheless concluded that the role of CEO and chairman of the board (within the board's vigilance) is not always inefficient.

Board nomination committee independence. A main function of the board is to direct and oversee management and staff to ensure that they operate for the

best interests of shareholders and other stakeholders (FRC 2012; The UK corporate governance code 2018). A board with a higher proportion of independent nomination committee is generally recognised as being able to govern the appointment process for board directors more efficiently. This is primarily due to the independent nomination committee not being intimately involved in the daily activities (de Villiers et al. 2011) and carrying a non-official position in the organisation (Donnelly and Mulcahy 2008). They can thus provide more reliable recommendations about environmental and societal processes, and productivity of a business.

Moreover, CEOs possess less control toward independent directors, as independent nomination committees' jobs are not contingent on CEOs (Core et al. 1999). The independence of the nomination committee is less executive-friendly and has less willingness to collude with CEOs (Carter et al. 2003; Eng and Mak 2003). Internal and external directors typically have different motivations, principles and time frames (Donnelly and Mulcahy 2008; Post et al. 2011). Independent directors have subjective commercial interests within and outside the company. Coffey and Wang (1998) argued that disclosures regarding unearned pay rises and ego-serving trends give legitimacy to the perception that dependent directors are more concerned with narrow-term economic objectives, whereas independent directors prefer to hold top management in check for agency behaviour, and they can interfere when managers act in an opportunistic manner. Furthermore, Wang and Dewhirst (1992) argued that outside directors have a consistent stakeholder interest because of their diverse backgrounds and lack of financial interest in the business. This alignment of stakeholders allows a board to accommodate the various needs and desires of the stakeholders,

beyond the concerns of mere shareholders and incumbent board members (Johnson and Greening 1999; Michelon and Parbonetti 2012).

Studies show that boards with a higher proportion of independent members show greater capacity to appoint directors who balance financial and environmental disclosure, and the company's short-term and long-term goals. Previous studies have, for all these reasons, found clear evidence that independent nomination directors prefer to channel knowledge and expertise toward the exploration of available SED, as this can increase their credibility (O'Neill et al. 1989; Donnelly and Mulcahy 2008; Prado-Lorenzo and Garcia-Sanchez 2010).

Board meetings frequency (board activity). On the other hand, Hahn and Lasfer (2016) note that a lower number of board meetings impairs the involvement of directors with diverse nationalities, signalling a poor board monitoring position. Remarks made by (Knyazeva et al. 2013; Hahn and Lasfer 2016), regarding the extensive spending of foreign directors on travel, time and resources, argue that, given specific international expertise, the price and benefits contest of appointing foreign directors and domestic directors has reduced the governance efficiency of the company, because businesses have to bear greater co-managership (Liao et al. 2015; Katmon et al. 2017; Hoang et al. 2018).

In this respect, prior research investigates these attributes' contribution to specific results such as company performance (Zhu et al. 2016), governance and management practices (Hillman and Dalziel 2003; Dalton et al. 2007). The agency theory emphasises board control function, and both are specifically prescribed board freedom from board and management, duality structure or

separation of CEO functions and chairman of the board of directors, as shown in appendix 4.2.

Few studies show the insignificance of the relation between board-level structural diversity and firm performance (Zajac and Westphal 1996; Carpenter and Westphal 2001). Thus, in this study's multi-dimension diversity analysis at meso-level, faultline considers the joint effect of differences in demographic along with other board-level-related attributes. This research considers the structural/macro aspect of statutory board characteristics (see appendix 4.2) (e.g., board size, stability, structure, succession, activity, attrition, nomination independence and CEO duality).

4.5.5. Common tests

Several assumptions have to be satisfied before conducting any regression analysis (see appendix 4.5), for example, multi-collinearity between the explanatory variables; the variance of the distribution of the dependent variable should be the same for all values of the independent variable (homoskedasticity); the relationship between the dependent and independent variable should be linear (linearity); the distribution of the values of the dependent variable for each value of the independent variable should be normal (normality); and there should be no errors related to measurement and specification. Tests of each of these assumptions and possible ways to overcome them are discussed below.

Linearity. When this chapter does linear regression, it assumes that the relationship between the response variable and the predictors is linear in parameters. If this assumption is violated, the linear regression tries to fit a straight line to data that does not follow a straight line. Checking the linear assumption in the case of simple regression is straightforward. A scatter plot is

used between the response variable and the predictor to see if the nonlinearity is present, such as a curved band or a big wave-shaped curve.

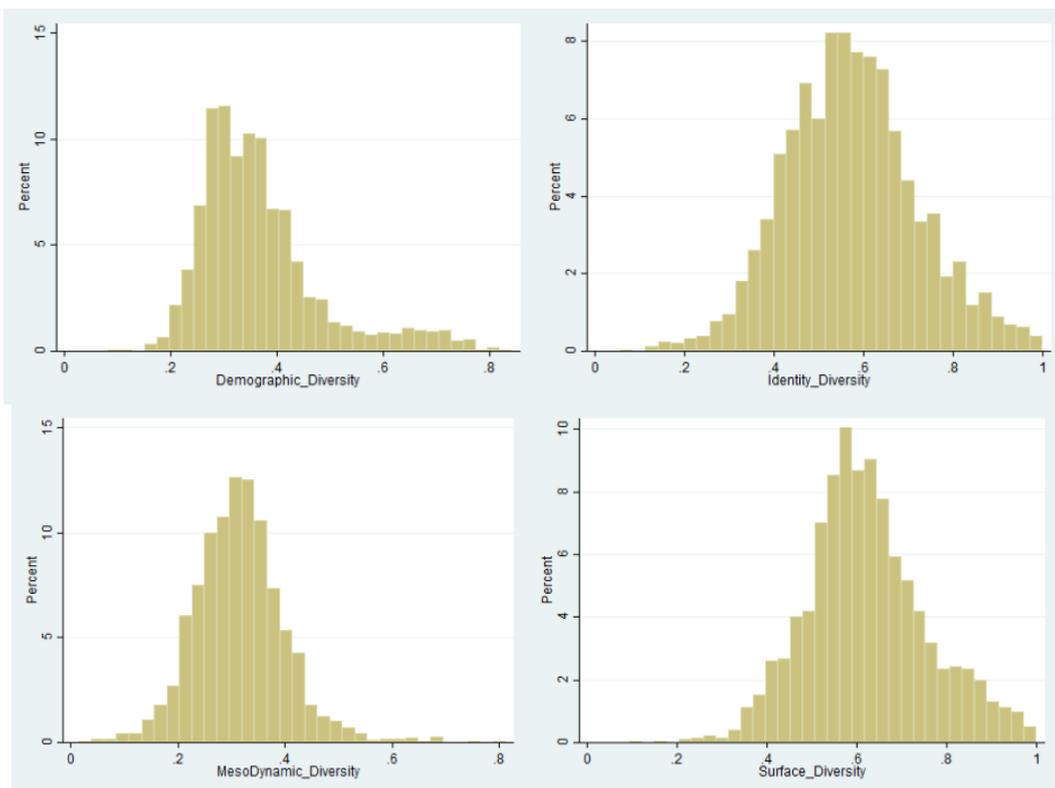
Checking the linearity assumption is not so straightforward in the case of multiple regression, to plot the standardised residuals against each of the predictor variables in the regression model.⁴⁷ If there is a clear nonlinear pattern, there is a problem of nonlinearity. Linearity is checked by plotting the studentised residuals against the predicted values as in figure 4.4, which show that this study's model is linear.⁴⁸

Normality. In particular, tests of normality based on skewness and kurtosis for both the dependent and independent variables were conducted. The skewness indicates the symmetry of the distribution while kurtosis entails information about the peak point of the distribution. A distribution with skewness and kurtosis of 0 indicates perfect normality, a rather uncommon occurrence in social sciences research. The rule of thumb for normality tests based on skewness and kurtosis is ± 1.96 and ± 3.00 , respectively (Greene 2003; Wooldridge 2011; Hsiao 2014). Many powerful statistical methods require approximate normality of the data. Normality tests are tests of a null hypothesis that the data are drawn from an

⁴⁷ To predict corporate performance mechanisms by the developed multi-dimensional diversity index, the first step is to build a linear regression model between the dependent and the independent variables. The scatter plots of variables are generated before the regression analysis. The purpose of creating the scatterplot matrix of these variables is to show any potential outliers. Plots for this study's results show no outliers are detected.

⁴⁸ Parametric tests are more powerful when the assumption of normality, assumption of linearity, assumption of homoskedasticity, and assumption of independence of error terms are met. However, if any of the OLS assumptions are violated by the data, non-parametric tests become more appropriate (Balian 1982). According to Zhang and Liu (2009), non-parametric statistical techniques can be considered as an alternative to parametric techniques to avoid the need for satisfying the assumptions required by parametric techniques. Non-parametric tests are considered a distribution-free method, as they make no assumption regarding the distribution of the sample scores. Additionally, non-parametric tests do not require the measurement of data on an interval scale and do not require data to meet the rigorous assumptions of normality and homogeneity of variance required by the parametric methods (Zhang, Zhu, and Ding 2013). Moreover, 3SLS model overcomes autocorrelations and heteroskedasticity. Also, this study employs a two-way fixed-effects approach to mitigate endogeneity concern (Gippel, Smith, and Zhu 2015).

average population, specifically a goodness-of-fit test. It is vital to do normality tests because this determines if the data are well approximated by the normal distribution, and also, to provide information on the deviation from normality. Due to the unique nature of this study's variables, as the independent variables have between 0.25 and 0.75 in panel A, and close to 0 and 1 as in panel B, it shows normal distributional behaviour as in the Q-Q plot. This chapter can see some clusters at lower values of board diversity with few observations at higher levels (see figure 4.4-5). As many values are close to 0 or a natural limit, the data distribution is skewed to the left. Although, continuous independent variables can be converted to ensure the normality of the data.



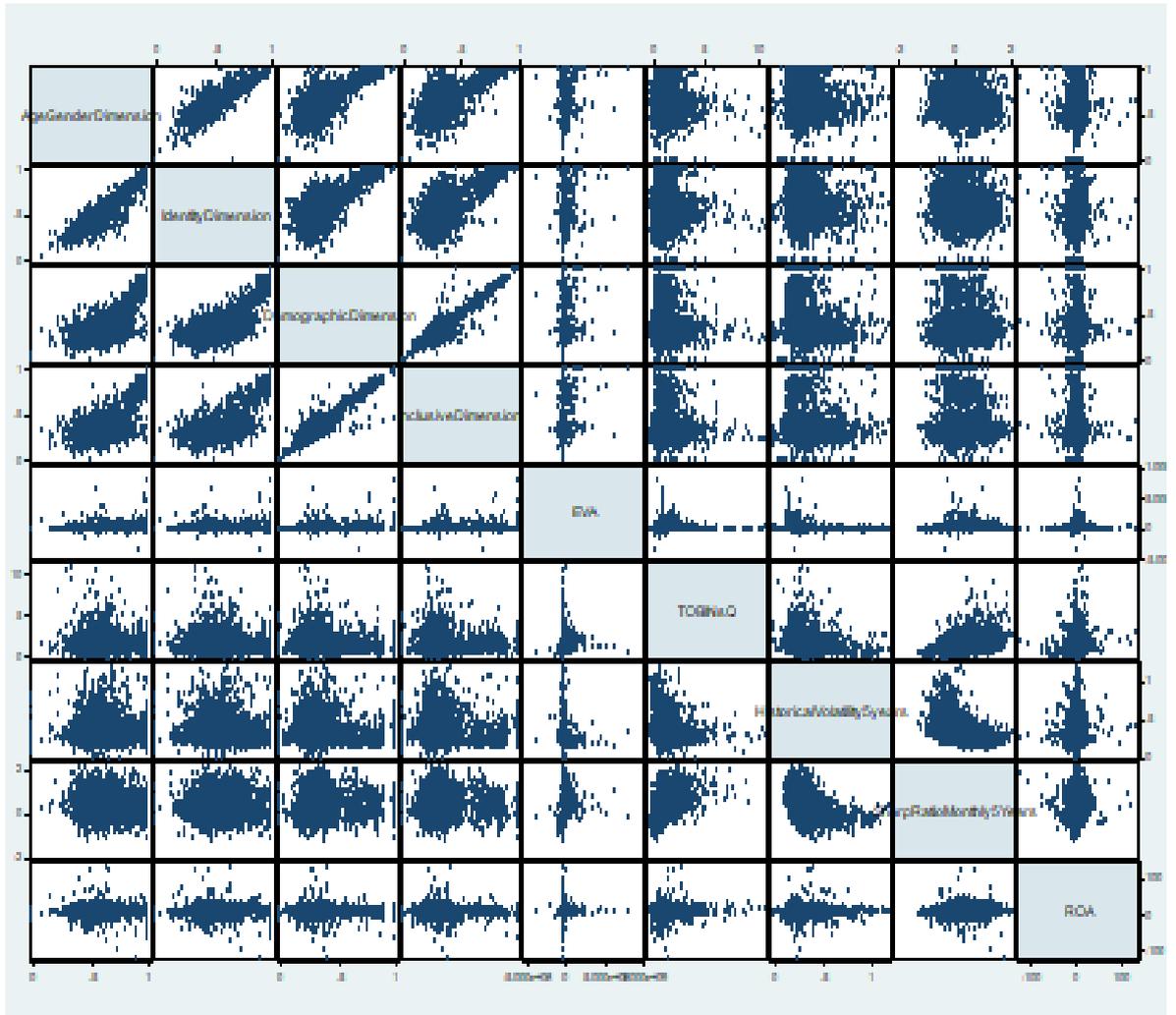


Figure 4.4 Tests for normality of residuals

This study's results suggest that the variable is normally distributed, and the normality assumption is said to be met as the points in the Q-Q plot fall more or less on a straight line, and in the case of the detrended Q-Q plot, the points fall randomly in a band around zero. Furthermore, this chapter uses the Jarque-Bera normality test for the case of panel data and the Shapiro-Wilk W test.

This chapter uses the `kdensity` command to produce a kernel density plot with the normal option requesting that a normal density be overlaid on the plot. `kdensity` stands for kernel density estimate as in figure 4.4. It can be thought of as a histogram with narrow bins and moving average. In `kdensity r`, normality

tests based on skewness and kurtosis help indicate whether the sample comes from a normal population. Besides these tests, visual inspection of the normal Q-Q plot of standardised residuals as well as the detrended Q-Q plot of residuals also indicates whether the normality assumption is satisfied. Thus, the normality assumption is not rejected according to the Jarque-Bera test (skewness = -0.960 and kurtosis = 1.300), and this is supported with the Shapiro-Wilk W test ($W = 0.03, P < 0.01$).

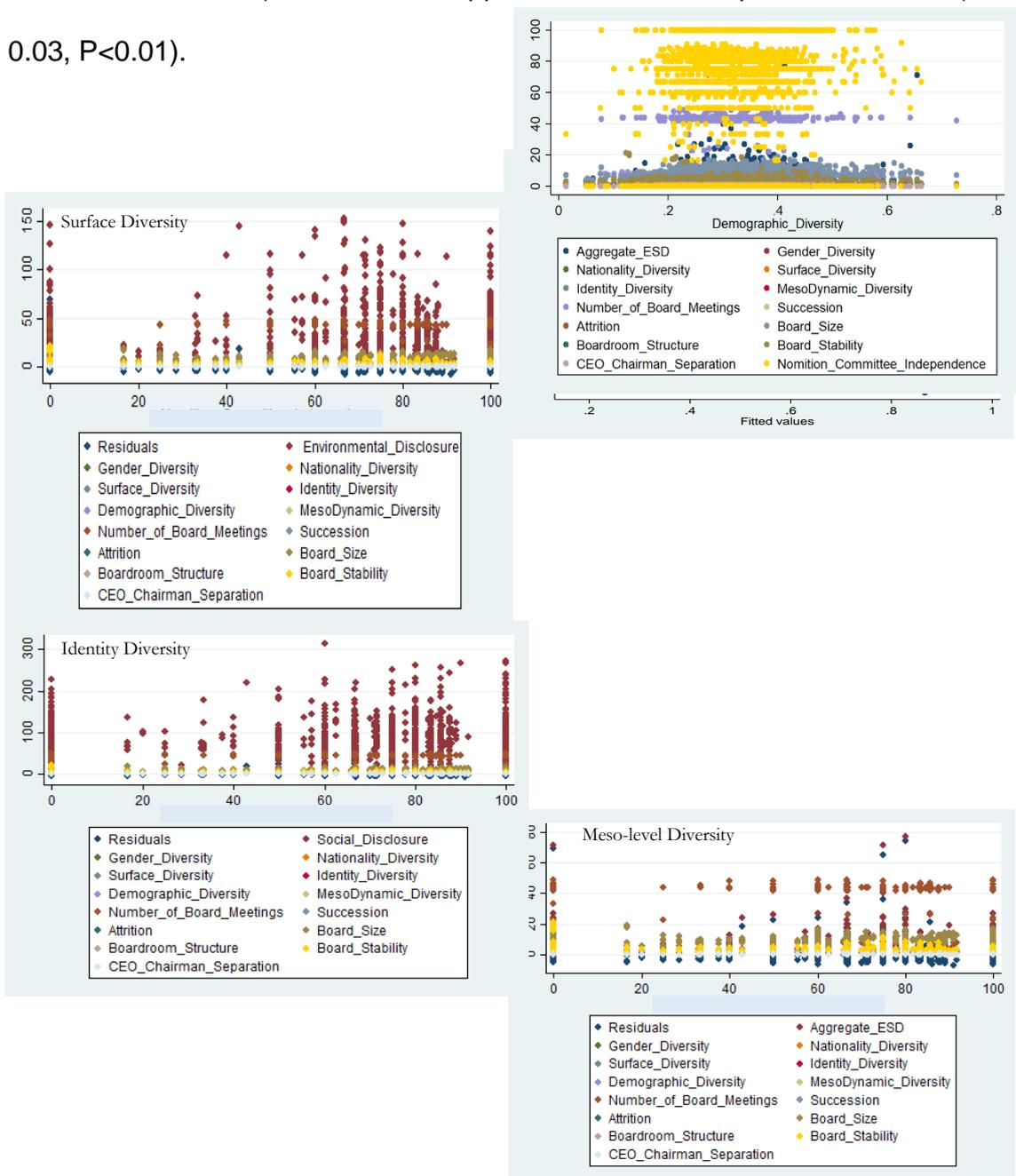


Figure 4.5 Tests for homoskedasticity and detecting unusual and influential data

4.5.6. Descriptive statistics and univariate tests

The results show that the faultline score has a value between 0 and 1, with an average value of 0.5 (moderate). Thus, diversity scores of 1 point to the existence of very strong (extreme) faultline and boards with very diverse members, whereas a value close to 0 points to very weak (extreme) faultline between subgroups (Crucke and Knockaert, 2016). Causality association is a more complex relationship between diversity and group process, and outcome variables than typically described in prior diversity research (Veltrop et al. 2015b; Mo et al. 2017). In this aspect, this chapter suggests a more complex relationship between diversity and corporate performance variables.⁴⁹

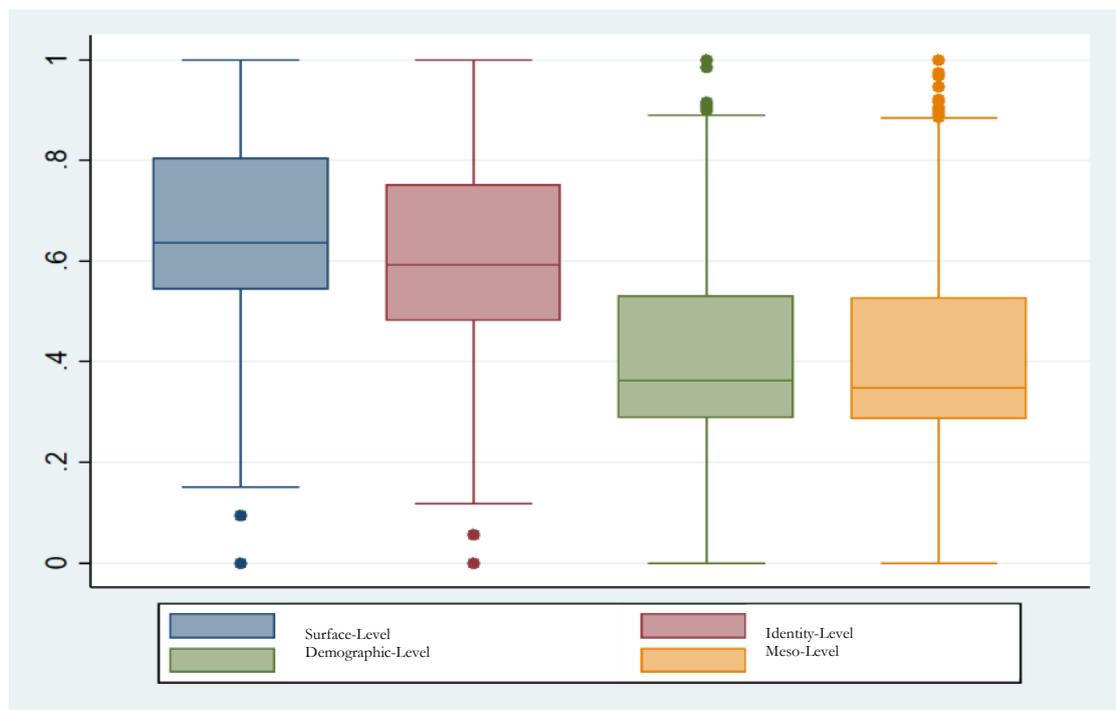


Figure 4.6 Faultline mean values across diversity levels

⁴⁹ As the effect of the differences in relationship and process conflicts results in high levels of interrelationship and process disagreement for groups of very weak and strong faultline scores, but groups of moderate-faultline scores have low levels of interrelationship and process conflict. In other words, the curvilinearly effects of diversity faultline are U-shaped. There was no support for a curvilinear effect of unbalanced diversity on board dispute. Therefore, the curvilinear relationship between diversity faultline and corporate performance is consistent with the suggestions of earlier faultline studies (Mallin et al. 2014).

Descriptive statistics show that diversity scores are considerably high at surface level with an overall mean value of 0.624 which has moderated to 0.578 by adding nationality attribute to the ASW calculation process (see figure 4.6). Notably, these results have dropped to 0.380 and 0.374 through adding director pay as a non-demographic attribute for demographic and inclusive levels, respectively. Besides, boards with extreme faultline values are in the sectors such as automobile, renewable energy, and tobacco sectors with median values of 0.290, 0.285 and 0.704, respectively.

The following graphical representation (figure 4.7) shows that nationality diversity witnesses an annual increase over the last 14 years with a mean value that varied from 0.247 in 2005 to 0.297 in 2018.

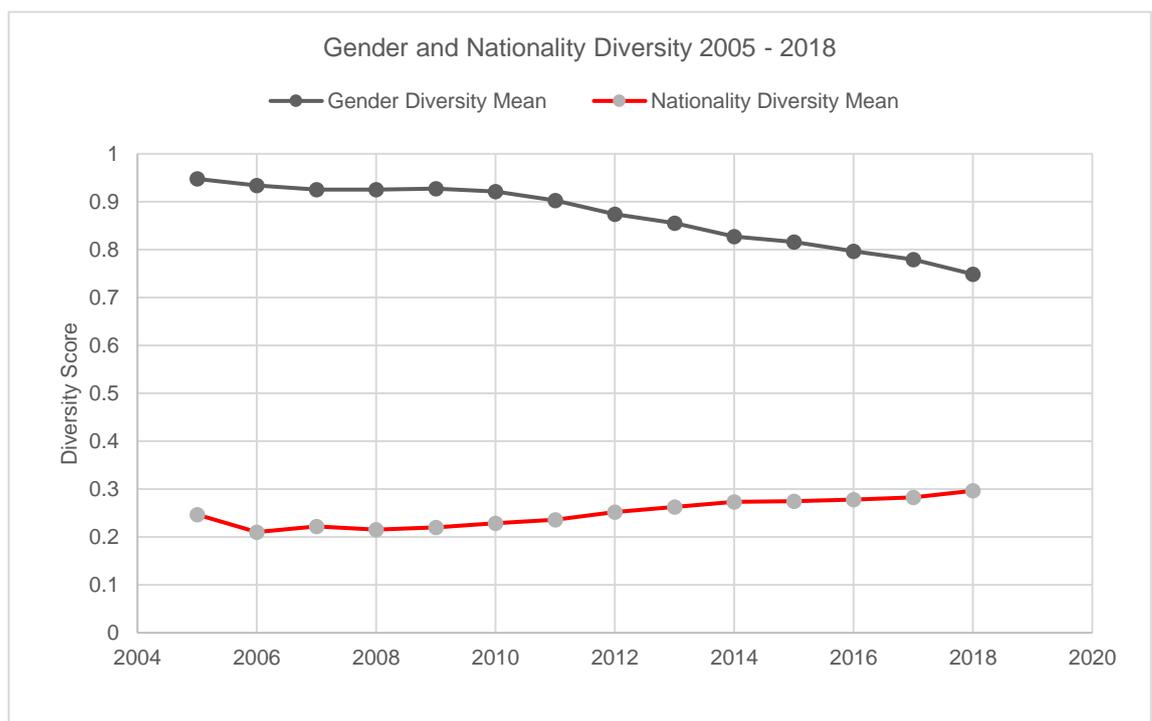


Figure 4.7 Gender and nationality diversity trend

Also, results show that male dominance in boardrooms is declining with a mean value that varied from 0.948 in 2005 to 0.749 in 2018. Table 4.5 reports the mean and median values of EVA varied between 10.759 and 10.615. EVA values are the highest compared to other performance measures. For example, Tobin's Q,

RI, ROA, and ROE have mean values of 1.466, 9.644, 7.556 and 9.484, respectively. However, ROE has the highest median value of 14.895 compared to 1.114, 9.752 and 6.960 for Tobin's Q, RI, and ROA, respectively.

Table 4.5 Descriptive statistics for the entire data set

Entire data set						
Variable	Obs.	Mean	S.D.	Median	Q1	Q3
Dependent Variables: Corporate Performance						
EVA	3357	10.759	1.902	10.615	9.566	11.862
Tobin's Q	3357	1.466	1.293	1.114	0.754	1.738
Residual income	3357	9.644	2.387	9.752	8.088	11.129
ROA	3357	7.556	11.210	6.960	3.840	11.180
ROE	3357	9.484	924.841	14.895	6.670	25.393
Independent Variables: Board diversity						
Gender Diversity	3357	0.863	0.120	0.875	0.778	1.000
Nationality Diversity	3357	0.252	0.253	0.200	0.000	0.400
Surface Diversity	3357	0.624	0.179	0.608	0.520	0.717
Identity Diversity	3357	0.578	0.190	0.561	0.458	0.673
Demographic Diversity	3357	0.380	0.191	0.337	0.272	0.411
Meso-level Diversity	3357	0.374	0.191	0.327	0.269	0.397
Control variables: Board-level characteristics						
Board Activity	3357	12.872	15.033	6.000	4.000	9.000
Succession	3357	0.339	0.123	0.300	0.300	0.400
Attrition	3357	0.040	0.056	0.000	0.000	0.100
Board Size	3357	8.318	2.202	8.000	7.000	9.000
Board Structure	3357	1.952	0.739	2.000	1.000	3.000
Board Stability	3357	2.632	1.495	2.400	1.900	3.100
CEO duality	3357	0.070	0.255	0.000	0.000	0.000
Nomination com. Independence	3357	52.668	38.999	66.670	0.000	83.330

Table constructed by the author. This table presents summary statistics for all variables: the entire data set and scores over the period 2005 to 2018 – the entire sample. In addition, for these variables, t-statistics report the differences between moderate and extreme diversity firms.

The preliminary analysis of the dependent variables in panel A (firms with moderately diversified boards) shows that the mean VB performance proxy (EVA) is 10.564 and this chapter finds that Tobin's Q has the lowest value of around 1.496 (see Table 4.6). Notably, profitability indicators ROA and ROE have mean values of 7.630 and 0.164, respectively. In panel B (firms with extreme faultline score), ROE has a very high mean value of 22.398 compared to firms with moderate MDI score in panel A.

Table 4.6 Descriptive statistics for panel A and B

Variable	Panel A: boards with moderate faultline strength (0.25-0.75)					Panel B: boards with extreme faultline strength close to 0 and 1.					Difference t-statistics
	Obs.	Mean	Q1	Median	Q3	Obs.	Mean	Q1	Median	Q3	
Dependent Variables: Corporate Performance											
EVA	2,612	10.564	9.495	10.510	11.640	745	11.116	9.747	10.856	12.234	-0.497
Tobin's Q	2,612	1.496	0.761	1.128	1.753	745	1.404	0.742	1.093	1.696	1.971**
Residual income	2,612	9.571	8.115	9.670	11.031	745	9.771	8.046	9.881	11.369	-2.011**
ROA	2,612	7.630	3.730	6.850	11.130	745	7.457	3.970	7.130	11.295	-0.827
ROE	2,612	16.400	6.230	14.450	25.600	745	22.398	7.020	15.395	25.110	0.458
Independent Variables: Board diversity											
Gender Diversity	2,612	0.859	0.778	0.857	1.000	745	0.879	0.786	0.875	1.000	-0.543
Nationality Diversity	2,612	0.233	0.000	0.200	0.400	745	0.318	0.000	0.300	0.600	3.977***
Surface Diversity	2,612	0.569	0.507	0.576	0.644	745	0.816	0.788	0.866	0.969	1.800*
Identity Diversity	2,612	0.523	0.439	0.528	0.609	745	0.770	0.714	0.824	0.956	3.167***
Demographic Diversity	2,612	0.322	0.264	0.317	0.378	745	0.583	0.344	0.621	0.833	4.740****
Meso-level Diversity	2,612	0.316	0.261	0.313	0.363	745	0.577	0.335	0.616	0.825	3.555***
Control variables: Board-level characteristics											
Board Activity	2,612	12.720	4.000	6.000	9.000	745	13.407	4.000	6.000	9.000	-0.693
Succession	2,612	0.344	0.300	0.300	0.400	745	0.322	0.200	0.300	0.400	-0.752
Attrition	2,612	0.039	0.000	0.000	0.100	745	0.042	0.000	0.000	0.100	4.453****
Board Size	2,612	8.253	7.000	8.000	9.000	745	8.545	7.000	8.000	10.000	-9.551****
Board Structure	2,612	1.935	1.000	2.000	2.000	745	2.011	1.000	2.000	3.000	-4.304****
Board Stability	2,612	2.653	1.900	2.400	3.100	745	2.559	1.900	2.500	3.200	-0.901
CEO duality	2,612	0.065	0.000	0.000	0.000	745	0.087	0.000	0.000	0.000	0.489
Nomination com. Independence	2,612	52.009	0.000	66.670	83.330	745	54.976	0.000	75.000	83.330	-5.259****

Table constructed by the author. This table presents summary statistics for all variables: the entire data set comprises 2,612 moderately diversified boards matched with 745 extremely diversified boards and scores over the period 2005 to 2018.

At the identity diversity level, faultline score is calculated and developed based on the joint effect of differences in board identity attributes: age, gender, nationality. Identity-related faultline reports a mean and median of 0.523 and 0.528, respectively. These scores show that the average faultlines in boards are around 0.5 and the moderateness of diversity faultline is higher by including director nationality attribute. Identity-related diversity scores reflect the impact of nationality diversity on the moderateness of the surface-level faultline dimension.

At the demographic diversity level, faultline score is calculated and developed based on the joint effect of differences in identity board attributes: age, gender, nationality, number of educational qualifications, director role, seniority, and director network size. Demographic dimension faultline reports a mean and median of 0.322 and 0.317.⁵⁰

At the meso-level board diversity, panel A scores show that the average faultlines in boards have declined by including director pay attribute in the calculation process. This decline in faultline scores has a mean of 0.316 and 0.313 at the deep-level of diversity, where faultline score is generated based on the joint effect of differences in three identity board attributes, four information-related characteristics and one non-demographic characteristic. This score reflects how the transition to deep and complex levels of diversity mitigates the extreme faultline score. In panel B, faultline scores have a mean of 0.577 and 0.616, respectively. This shows how the move to meso-level diversity moderates MDI scores, especially for boards with extreme faultline strength.

⁵⁰ Another study shows that diversity faultlines measured by combining demographic characteristics (years of work experience, type of functional background, degree major, sex, age, race, and country of origin) have a mean of 0.409 (Thatcher et al. 2003).

In the following Tables 4.7, Pearson and Spearman show all correlations between the dependent variables (surface-level diversity, identity diversity, demographic diversity, meso-level board and independent performance variables EVA, Tobin's Q, RI, and ROA). Results are consistent with corporate performance studies and stewardship theory, and coefficients are in line with the expected signs, except for ROE (see appendix 4.6-7).

Nationality diversity (Parker 2016) has a positive effect on corporate performance as measured by VB performance measure EVA and RI. Although two contradictory views exist, some articles find a robust negative effect of board faultlines on firm performance (Tobin's Q) (Veltrop et al. 2015b) and some studies show positive and consistent results to this study's research (Ben-Amar et al. 2013; Sarhan et al. 2018). In contrast, gender diversity measured as the proportion of male directors in boards shows that the dominance of male members leads to a negative influence on corporate performance, which is consistent with earlier studies (Chapple and Humphrey 2014).

Moreover, demographic diversity is negatively correlated with performance. Results are consistent with a recent study that documents a negative relationship between board diversity based on gender, ethnicity and nationality, and corporate performance (Kaczmarek et al. 2012; Veltrop et al. 2015b).

Many of the empirical articles carried out to date have analysed differences in the ability of directors to process information, and the effect those differences have on the relationship between board diversity and firm performance. As the responsibility for enhancing corporate value and market-based firm performance lies with the board of directors, this chapter addresses these issues by empirically investigating the relationship between board diversity and VB

performance proxy (EVA and RI), market-based indicators (Tobin's Q) and profitability (ROA and ROE). In this study, this chapter adopts the term 'Faultline' referring to a conceptual divide that separates boards of directors into subgroups and thus to the structure of diversity within subgroups (Thatcher and Patel 2012). This chapter argues that identity faultlines (e.g., differences in age, gender, and nationality) have insignificant correlations with market-based performance measures such as Tobin's Q. Also, results are inconsistent with a prior study which shows identity faultlines based on age and nationality can lead to friction within the team that disrupts information processing and coordination, and thus has a negative moderating effect (Lau and Murnighan 1998). Based on this observation, the insignificance of the (Tobin's Q) results are a two-way function; namely, limitations in capturing the surface-level of diversity and ignore task/information-related attributes (e.g., education level and director network). Moreover, the Code's (2018) current principle as to board diversity is not substantial enough since it just calls for diversity based on identity attributes (e.g., age, gender, and ethnicity).⁵¹

⁵¹ The use of variance inflation factors is a typical method for assessing collinearity (VIFs) (Greene 2003). This is possible in R by utilising the 'vif' function from the 'car' package. This has an advantage overlooking solely at the correlations between two variables as shown by the Pearson correlation coefficient, because VIF analyses the correlation between one variable and the rest of the variables in the model at the same time (Farrar and Glauber 1967). Thus, this chapter do not rely on Pearson correlation only to analyse multicollinearity between independent variables. This chapter do not either neglect the high correlations between diversity scores at demographic and identity levels, nor suggest dropping diversity scores at any of these levels and ignore the moderating effect of moving to deep level diversity. Thus, this analysis keeps all predictors variables as long as VIF score is < 2. Also- there is nothing necessarily invalid about using correlated predictors (so long as they are not perfectly correlated > 0.99) (Christ 1965). This chapter rely on large sample size of 3,357 firm year observations and thus the credibility of results increases, and the generalisability improves to separate effects.

Table 4.7 Full data set: Pearson (top) and Spearman (bottom) correlation coefficients

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1 EVA		0.180	0.636	0.078	0.003	-0.337	0.378	0.105	0.005	0.135	0.182	0.007	-0.160	0.032	0.554	0.399	0.145	-0.025	0.456
2 Tobin's Q	0.109		0.112	0.082	0.086	-0.115	0.070	0.035	0.014	0.037	0.048	-0.039	0.029	0.031	0.032	0.056	0.011	0.030	0.071
3 RI	0.644	0.056		0.044	-0.008	-0.218	0.307	0.091	0.012	0.137	0.178	0.020	-0.121	0.021	0.409	0.281	0.078	-0.031	0.333
4 ROA	0.072	0.060	0.049		0.881	0.005	0.078	0.006	0.014	-0.001	-0.018	0.007	-0.044	0.043	0.081	0.016	0.018	0.049	-0.060
5 ROE	0.043	0.010	0.017	0.052		0.032	0.040	0.016	0.038	0.020	0.008	-0.009	-0.028	0.093	0.009	0.009	0.016	0.043	-0.098
6 Gender Diversity	-0.329	-0.072	-0.211	-0.022	0.001		-0.120	0.196	0.236	0.031	0.023	-0.037	0.081	-0.116	-0.197	0.047	-0.136	-0.029	-0.267
7 Nationality Diver	0.418	0.021	0.342	0.071	0.024	-0.130		0.060	-0.225	-0.024	0.045	0.018	-0.162	0.051	0.374	0.078	0.169	-0.019	0.123
8 Surface Diversity	0.164	-0.010	0.132	-0.016	0.028	0.132	0.080		0.867	0.555	0.523	-0.037	-0.037	0.004	0.180	0.151	0.067	0.008	0.079
9 Identity Diversity	0.075	-0.022	0.060	-0.023	0.022	0.176	-0.160	0.907		0.576	0.521	-0.051	0.030	-0.027	0.068	0.143	0.022	-0.004	0.040
10 Demographic Diver	0.214	0.005	0.186	-0.030	0.003	-0.013	0.080	0.738	0.754		0.866	-0.040	-0.004	0.017	0.204	0.147	0.072	-0.016	0.130
11 Meso-level Diver	0.250	0.003	0.216	-0.038	-0.002	-0.012	0.126	0.724	0.728	0.958		-0.039	-0.042	-0.001	0.246	0.157	0.078	-0.017	0.163
12 Board Activity	0.013	-0.044	0.010	0.025	0.011	-0.022	0.016	-0.039	-0.044	-0.007	-0.013		-0.057	0.024	-0.150	-0.017	0.004	-0.024	-0.007
13 Succession	-0.169	0.074	-0.122	-0.010	0.019	0.087	-0.123	-0.065	-0.019	-0.068	-0.089	-0.050		-0.024	0.008	-0.051	-0.130	0.024	-0.140
14 Attrition	0.006	0.037	0.003	0.018	0.015	-0.045	0.034	0.021	0.001	0.013	0.005	0.005	-0.009		0.016	-0.051	0.061	0.203	0.023
15 Board Size	0.573	-0.030	0.434	0.073	0.014	-0.187	0.390	0.203	0.104	0.194	0.225	-0.154	-0.021	-0.001		0.359	0.112	0.029	0.338
16 Board Structure	0.366	-0.017	0.265	-0.033	0.002	0.051	0.073	0.182	0.169	0.150	0.159	-0.023	-0.046	-0.022	0.345		0.052	-0.003	0.551
17 Board Stability	0.062	-0.004	0.006	0.032	-0.015	-0.040	0.097	0.057	0.024	0.016	0.017	-0.008	-0.112	0.012	0.042	-0.024		0.039	0.121
18 CEO duality	-0.025	0.008	-0.035	0.047	0.005	-0.029	-0.015	-0.019	-0.021	-0.031	-0.026	-0.022	0.033	0.136	0.016	-0.003	0.009		-0.024
19 Nomination Committee independence	0.466	-0.006	0.340	-0.053	-0.014	-0.234	0.146	0.142	0.094	0.157	0.173	-0.016	-0.140	0.006	0.346	0.642	0.028	-0.027	

Table constructed by the author. This table reports the correlation coefficients for regression variables. Bold text indicates significance based on two-tailed t-tests, at the .05 level or better.

4.6. Regression analysis

By calculating all diversity and performance indices, this chapter then shows the correlations between dependent and independent variables. The next stage is to carry out a regression analysis. The statistical tools used in the analysis are discussed below. This chapter uses 3SLS regression models and follows the empirical model tested by earlier research to study the causality relationship between board diversity and corporate performance (Greene 2003; Haque 2017) (Greene 2003; Haque 2017). Causality exists when board diversity values explain the movement of corporate value and market-based performance. The causality relationship between board diversity and corporate performance is examined in two ways. First, the correlations matrix is undertaken to determine causality between various levels of board diversity and firm VB management. Second, a regression analysis is performed, and board diversity is regressed on a comprehensive set of corporate economic, financial, and market-based performance mechanisms. Based on the previous discussion regarding hypotheses development, the current study predicts the following model using Stata as this study's statistical analysis package.⁵² By doing this, this chapter follows the earlier work of (Van Peteghem et al. 2017; Sarhan et al. 2018).

⁵² This chapter primarily ran the pooled OLS regressions in examining the association between board diversity and corporate performance. Then, this chapter ran two-stage least square (2SLS) and three-stage least square (3SLS) regressions to check for the endogeneity bias in this study's data set.

The following model is employed to examine the study hypotheses:

$$\begin{pmatrix} \text{Corporate performance:} \\ \text{EVA} \\ \text{TOBINQ} \\ \text{RI} \\ \text{ROA} \\ \text{ROE} \end{pmatrix}_{it} = \beta_0 + \beta_1 \begin{pmatrix} \text{Corporate governance:} \\ \text{Board gender diversity} \\ \text{Board nationality diversity} \\ \text{Board surface diversity} \\ \text{Board identity diversity,} \\ \text{Board demographic diversity,} \\ \text{Board Meso-level Diversity} \end{pmatrix}_{it} + \beta_2 \begin{pmatrix} \text{Control variables:} \\ \text{Board Activity} \\ \text{Succession ratio} \\ \text{Attrition ratio} \\ \text{Board size} \\ \text{Board structure} \\ \text{Board stability} \\ \text{CEO duality} \\ \text{Nomination committee independence} \end{pmatrix}_{it} + \sum \beta_1 \text{Year Effects} + \sum \beta_1 \text{Industry Effects} + \epsilon_{it}$$

Where:

Dependent variables:

Y_{it} = Corporate performance (EVA, Tobin's Q, RI, ROA, and ROE)

Economic value added (EVA) = Value-based performance measure

Tobin's Q (TOBINQ) = Market-based performance measure

Residual income (RI) = Value-based performance measure

Return on equity (ROE) = Accounting performance measures

Return on asset (ROA) = Accounting performance indicator

Independent variables:

Gender diversity (GENDIV) = Board diversity based on the director's gender

Nationality diversity (NATDIV) = Board diversity based on the director's nationality

Board diversity = diversity based at four levels of surface diversity (SURFDIV), identity diversity (IDENDIV), demographic diversity (DEMODIV), meso-level diversity (MESODIV).

Control variables:

Board-level CG variables = Board size, stability, structure, succession, activity, attrition, nomination independence and CEO duality, ϵ_i = error term⁵³

⁵³ It is assumed that the error term has a constant variance as this chapter is running this study's regression model. This chapter might encounter heteroskedasticity and may be overstating the goodness of fit. To test this concern, this chapter ran the Breusch-Pagan/Cook-Weisberg method to test for heteroskedasticity and to produce robust standard errors (Sáenz González and García-Meca 2014; Black et al. 2017; Chen et al. 2017a). Moreover, this chapter uses the Ramsey RESET test for omitted variables and model misspecification.

This study's results show that the Ramsey RESET test uses powers of the fitted values with a significant F value of 3 with a probability of 0.030. Accordingly, it could be argued that the threat of omitted variables in the model is minimised, indicating that this chapter cannot reject that panel is normally distributed (Prob > F = 0.000).

The term error is further broken down into two parts: the combined effect (lit) that differs between individuals and periods, and the individual effect (gi), which is characteristic of each firm (in this case the board). Such equations are calculated empirically, using a simultaneous equation estimator such as three-stage least square estimator. The equation of differences shows differences in the level equation from year to year. Therefore, the difference equation represents the year-to-year variance in results, the year-to-year shift in explaining variables and the difference in error terms. Note that in the difference equation, the fixed effect error term disappears, since it is invariant by definition. By estimating these equations simultaneously, the system 3SLS approach controls for heterogeneous endogeneity (stemming from time-invariant variables) and includes the relationship between board diversity and corporate performance (Hafsi and Turgut 2013).

In guiding this study's choice of the econometric model (e.g., 3SLS, IV and GMM), this chapter builds on prior research (Van Peteghem et al. 2017) which investigated board diversity structure and corporate performance using 3SLS. Previous research shows that problems of endogeneity between CG and company performance can arise when certain governance characteristics are not randomly distributed between companies (Bhagat and Black 2002; Van Lent 2007; Adams and Ferreira 2009). Van Peteghem et al. (2017), due to the endogeneity concern, show that multiple equation models (e.g., 2SLS and 3SLS) are more robust than IV and GMM. Thus, because of the nature of this study, this chapter employs the 3SLS model, which takes into account changes in corporate performance in the 14 years as a result of changes in board diversity and board-level CG variables. The model is responsible for any prejudice induced by corporations. This model excludes from the regressor variables the effects of time-invariant functions. The error term is also broadened from the between-firm error μ_{it} , to include ε_{it} , which encompasses the within-firm error.

Literature provides a way of dealing with the omitted variable which is to use the 3SLS model (Saeed et al. 2016; Bennouri et al. 2018). Concerning simultaneity, one view holds that the theory should guide the model structure as to the direction of the causal relationship (Chenhall and Moers 2007). However, CG literature shows that the relationship is found to be from CG to firm value and not vice versa (Beiner et al. 2006). A set of exogenous variables are selected for the typical 3SLS method, depending on how many instruments are needed for the analysis. The 3SLS model controls the unrealised heterogeneity of the company and thus cancels all firm fixed effects (Larcker et al. 2013). Any subsequent relationship cannot, therefore, be attributed to an endogenous problem (Dahya et al. 2008).

Also, results can be interpreted only as partial correlations without causality identification (2007). In general, if simultaneity is likely to be present, 3SLS methods are used to overcome such a problem using multiple equation models (e.g., multiple equations instead of only one equation used in case of omitted variables).

The 3SLS methods are most widely known as a solution to endogenous regressors: explanatory variables correlated with the regression error term; 3SLS methods provide a way to obtain consistent parameter estimates. This chapter has stated the problem as that of endogeneity: the notion that two or more variables are jointly determined in the behavioural model. Endogeneity arises naturally in the context of a simultaneous equations model such as a supply-demand system in economics, in which price and quantity are jointly determined in the market for that good or service. A shock or disturbance to either supply or demand affects both the equilibrium price and quantity in the market. In this context, the 0 conditional mean assumption cannot hold, even in terms of weak exogeneity of the regressors. The solution provided by 3SLS methods may be viewed as: the additional variable z is termed an instrument for x . In general, this chapter may have many variables in x , and more than one x correlated with u . In that case, this chapter shall need at least that many variables in z . However, it may be difficult to find variables that can serve as valid instruments. Many variables that affect included endogenous variables also have a direct effect on the dependent variable.

The 3SLS regression analysis is run to probe the results more deeply and to verify results reliability as from the comparison highlighted in the following section. This chapter can deduce that there are no noticeable variations found while using these regression approaches in this study's context.

Generally, two causes lead to problems with endogeneity: variables omitted, simultaneity and balance. If omitted variables are responsible for endogeneity, then explained (dependent) and explanatory (independent) variables have a systematic relationship to other variables not covered by the model (e.g., omitted variable) (García-Meca et al. 2015). In this case, the variable explained is wrongly regarded as exogenous, but it is an endogenous variable. The omitted variable problem affects the most existing firm value literature as it ignores corporate valuation measures from the context of CG. Simultaneity is the second reason for endogeneity. At the same time, the causal relationship between an explanatory variable and the explained variable takes both forms. The explanatory variables are determined in conjunction with the expounded variable in that instance (Chenhall and Moers 2007). Another definition states that simultaneity occurs when a new variable is determined by both the dependent and the independent (Chenhall and Moers 2007). This chapter sheds light on the endogeneity of the relationships among CG. The following section describes the nature of endogenousness and its mitigation approaches.

In contrast, the model has an endogenous variable that is not correlated to the error term (Van Lent 2007). The endogenous variable is the same as that found in the model. Furthermore, endogenous studies linking CG, quality of disclosure and firm value were always a concern (Larcker et al. 2013). Core (Ammann et al. 2011) states that the theory of corporate finance predicts that corporate shareholders optimise disclosure policies, CG, and management incentives in an endogenous way to maximise their corporate value.

This chapter also checks the issue of endogeneity since it is argued to be a common problem in CG research (2001).⁵⁴ Using 3SLS models is seen as one method of dealing with the problem of endogeneity, as it eliminates the influence of time-invariant unobservable variables (e.g., Larcker et al. 2007). Further to that, heteroskedasticity (unequal variance) results in loss of efficiency, and the standard errors may be biased. The test on heteroskedasticity given by *hettest* is the Breusch-Pagan, which tests the null hypothesis that the variance of the residuals is homogenous. Since the p-value is very small, this chapter would have to reject the hypothesis and accept the alternative hypothesis that the variance is not homogenous. So, in this case, the evidence is against the null hypothesis that the variance is homogeneous. The Breusch-Pagan (Cook-Weisberg) test may be executed with *estat hettest* after *regress*. If no regressor list (of Zs) is provided, *hettest* employs the fitted values from the previous regression (the \hat{y}_i values). Therefore, it is common practice to combine the tests with diagnostic plots to make a judgement on the severity of the heteroskedasticity and to decide if any correction is needed for heteroskedasticity.

4.7. Regression results summary

The impact of CG on firm performance is studied and it is found that firm performance with moderate diversity score is similar to those with extremely diversified boards at surface-level. There are three alternative ways of interpreting the similar performance of companies with extreme, moderate faultline MDI scores. First, these results could be sample period specific; hence, these companies during the study period may not have exhibited superior performance. Second, firms with extremely diversified boards at surface-level (e.g., the joint effect of differences in the

⁵⁴ Management and financial accounting endogeneity problems have only been raised recently as an important issue that affects the validity of results (Chenhall and Moers 2007). It has an impact on the correct model estimation method (Lent 2007). Endogeneity can primarily be expressed differently according to its causes.

directors' age and gender attributes) have an inclined moderate MDI at meso-level. Therefore, the reliance on surface-level diversity leads to a vague relationship between diversity and performance, and raises doubts about the causality explanation. Third, it is still possible that governance might have a positive impact on performance, but that performance measure, as measured by profitability tools, might not be the appropriate choice.

Table 4.8 Aggregate level regression of board diversity on corporate performance

Variables	Full data set				
	EVA	Tobin's Q	RI	ROA	ROE
Gender Diversity	-2.646 **** (0.116)	0.243*** (0.095)	-1.216**** (0.167)	-6.286**** (0.949)	-325.035** (121.019)
Nationality Diversity	1.380 **** (0.061)	0.013 (0.050)	1.718**** (0.087)	2.845**** (0.497)	314.935**** (63.354)
Surface Diversity	-1.295 (0.164)	0.584**** (0.134)	-1.736**** (0.235)	-1.957 (1.339)	221.420 (170.897)
Identity Diversity	0.132 (0.172)	-1.119**** (0.140)	1.092**** (0.246)	4.895**** (1.398)	533.896** (178.398)
Demographic Diversity	-1.050*** (0.208)	0.755**** (0.170)	-1.226**** (0.297)	11.871**** (1.693)	443.704** (216.044)
Meso-level Diversity	1.682*** (0.201)	-0.031 (0.164)	2.404**** (0.288)	-17.347**** (1.642)	- (209.482)
Attrition	1.753** (0.185)	-1.199**** (0.151)	0.966**** (0.264)	6.279**** (1.504)	688.834**** (191.902)
Succession	-1.268** (0.095)	0.916**** (0.077)	-1.381**** (0.136)	-2.847**** (0.772)	331.295*** (98.503)
Board Activity	-0.003 (0.001)	0.005**** (0.001)	-0.004*** (0.001)	0.024**** (0.006)	1.857** (0.801)
Board Size	0.283**** (0.006)	-0.044**** (0.005)	0.246**** (0.009)	0.430**** (0.052)	12.162* (6.627)
Board Structure	0.433**** (0.024)	0.121**** (0.020)	0.288**** (0.035)	-0.096 (0.198)	33.859 (25.259)
Board Stability	-0.017 (0.007)	0.034**** (0.006)	-0.069**** (0.011)	-0.046 (0.063)	-21.297*** (8.023)
CEO duality	-0.0138 (0.050)	0.186**** (0.038)	-0.161** (0.067)	2.074**** (0.384)	40.430 (48.955)
Nomination Committee independence	0.005**** (0.000)	-0.002**** (0.000)	0.007**** (0.001)	-0.027**** (0.004)	-1.356*** (0.485)
Constant	9.559 (0.164)	0.474 (0.134)	7.881 (0.235)	15.994 (1.338)	-112.405 (170.750)
Observations	3,357	3,357	3,357	3,357	3,357
Average RVI	0.298				
Largest FMI	0.572				
Mean VIF	2.07				
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes
Adj. R-squared	44.000%	17.050%	25.080%	7.210%	1.190%
F values	287.59****	79.700****	124.090****	30.220****	5.510

Table constructed by the author. * $p \leq 0.10$ (confidence at the 90 per cent level) ** $p \leq 0.05$ (confidence at the 95 per cent level) *** $p \leq 0.01$ (confidence at the 99 per cent level) **** $p \leq 0.001$ after imputing missing values. Standard errors are reported in parentheses.

Table 4.8 reports the results of the 3SLS regression model for examining the relationship between board diversity and firm performance. Results suggest that nationality, meso-level diversity, attrition rate, the board size and nomination

committee independence of firms in panel A are positively and significantly related to VB, market-based and profitability measures (see Table 4.9). In panel B, the signs of coefficients of demographic and meso-level diversity are negative, and results are significant at the 1 and 5 per cent levels. Moreover, the results suggest that gender, demographic diversity, and succession rate of firms in panel A are negatively and significantly related to VB, market-based, profitability measures. In panel B, the signs of coefficients of demographic diversity are changed, and results become positively related to and significant to Tobin's Q at the 1, 5 and 10 per cent levels (see Table 4.9). This study's results support the suggestion that the impact of the board of directors is conditionally associated with some characteristics of the board members (Beiner et al. 2006).⁵⁵

Table 4.9 shows the results for the UK firms' performance. They show that large boards of directors, nationality diversity and meso-level diversity lead to better financial performance (the t-statistics 14.90, 4.11, 3.03 and 2.91 at the 1 per cent level, respectively). Moreover, results show that board size is a very strong factor that positively enhances firm performance even in firms with extremely diversified boards. These results are consistent with this study's expectation based on stakeholder theory and the prior empirical research (Brammer and Pavelin 2006; García-Meca and Sánchez-Ballesta 2010).

⁵⁵ The coefficient of board activity (proxied as the number of board meetings per year) is not significant with EVA and RI measures, suggesting that there is no direct link between the overall activity of the board and corporate value-based performance as in panel A. This significant relationship is converted into firms with extreme MDI scores as in panel B. The regression results (see Table 4.8) show that female directors still play an essential role, but that CEO duality does not have with a significant coefficient. Although this result appears counter-intuitive, it is not inconsistent with some prior studies (Sharma et al. 2009). The possible reason is that the board directors would decide whether the firm should increase corporate performance, but the decision as to which items should be disclosed is likely to be processed at the lower level of technical managers. This study's model probably does not capture the factors associated with the decision at levels below the board.

Table 4.9 Sublevel regression of board diversity on corporate performance

Variables	Panel A: Board with Moderate Faultline (Obs=2,612)					Panel B: Board with Extreme Faultline (Obs.=745)				
	EVA	Tobin's Q	RI	ROA	ROE	EVA	Tobin's Q	RI	ROA	ROE
Gender Diversity	-2.668**** (0.307)	- 1.085**** (0.260)	-1.518**** (0.450)	-1.026 (2.272)	-202.309 (247.019)	-3.466**** (0.559)	-0.164 (0.335)	-3.036**** (0.785)	-6.869 (4.397)	-54.534 (39.183)
Nationality Diversity	0.797**** (0.194)	-0.013 (0.158)	1.169**** (0.268)	3.840*** (1.367)	240.535 (150.518)	1.678**** (0.294)	0.713**** (0.164)	1.470**** (0.412)	4.408** (2.286)	18.158 (19.945)
Surface Diversity	-0.370 (0.658)	0.935* (0.525)	-0.470 (0.859)	-3.634 (4.580)	336.041 (487.514)	-0.670 (0.715)	0.520 (0.393)	-0.317 (0.971)	-6.264 (5.028)	17.252 (44.426)
Identity Diversity	0.132 (0.643)	-0.645 (0.507)	-0.216 (0.851)	7.581 (4.408)	479.024 (475.275)	-0.492 (0.837)	-1.032** (0.453)	-0.789 (1.171)	8.671 (5.767)	-19.272 (51.005)
Demographic Diversity	-1.909*** (0.641)	-0.696 (0.550)	-1.866** (0.922)	7.894 (4.986)	186.936 (520.949)	0.883 (0.912)	2.391**** (0.584)	0.914 (1.300)	4.522 (8.467)	-65.055 (71.148)
Meso-level Diversity	1.895*** (0.625)	0.832 (0.543)	2.594*** (0.904)	-10.554 (5.080)	-584.417 (527.230)	0.322 (0.872)	-1.710*** (0.559)	0.655 (1.229)	-10.272 (8.152)	48.961 (68.810)
Attrition	1.358** (0.589)	-1.305*** (0.493)	0.667 (0.849)	11.179*** (4.262)	417.726 (464.243)	2.090** (1.096)	-1.389 (0.601)	3.627*** (1.503)	0.147 (8.436)	-69.597 (71.519)
Succession	-0.688** (0.284)	1.087**** (0.237)	-0.495 (0.390)	-2.891 (2.008)	146.546 (216.727)	-1.988**** (0.526)	0.412 (0.305)	-1.526** (0.716)	3.661 (3.959)	5.190 (36.557)
Board Activity	-0.001 (0.002)	0.004** (0.002)	-0.001 (0.003)	0.022 (0.015)	1.188 (1.678)	-0.005*** (0.004)	-0.001 (0.002)	-0.004 (0.005)	-0.025 (0.029)	0.493** (0.254)
Board Size	0.260**** (0.017)	- 0.059**** (0.016)	0.237**** (0.026)	0.389*** (0.138)	4.164 (15.233)	0.384 (0.029)	-0.029 (0.018)	0.362**** (0.042)	0.844*** (0.248)	3.377 (2.211)
Board Structure	0.339**** (0.058)	0.034 (0.051)	0.230*** (0.082)	0.270 (0.482)	30.724 (50.609)	0.364 (0.109)	0.049 (0.066)	0.262 (0.160)	-1.759** (0.905)	-9.822 (8.008)
Board Stability	0.016 (0.020)	-0.006 (0.017)	-0.024 (0.027)	0.089 (0.146)	-15.241 (15.822)	-0.026 (0.056)	0.031 (0.035)	-0.091 (0.083)	1.077*** (0.454)	10.525*** (4.015)
CEO duality	-0.093 (0.124)	0.089 (0.116)	-0.290 (0.180)	2.080** (0.922)	-0.410 (98.490)	-0.134 (0.259)	-0.012 (0.125)	0.047 (0.327)	1.470 (1.552)	-2.036 (13.347)

Nomination Committee independence	0.009****	0.000	0.009****	-	0.029****	-1.063	0.007****	-0.001	0.007**	-0.013	-0.007
	(0.001)	(0.001)	(0.002)	(0.009)	(0.934)	(0.002)	(0.001)	(0.003)	(0.017)	(0.153)	
Constant	9.668	2.287	8.084	4.078	-279.670	9.987	1.349	8.795	6.355	31.939	
	(0.333)	(0.280)	(0.462)	(2.389)	(268.853)	(0.611)	(0.374)	(0.853)	(4.824)	(43.356)	
Observations	2,612	2,612	2,612	2,612	2,612	745	745	745	745	745	
Average RVI	0.257					0.298					
Largest FMI	0.415					0.524					
Mean VIF	2.07										
DF	Min=492.56	Avg=22,310.65			Max=439,667.82	Min=310.01		Max=655,745.52		Avg=36,453.47	
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Adj. R-squared	48.060%	14.280%	25.600%	3.490%	-0.930%	23.700%	23.690%	45.350%	14.070%	5.970%	
F values	35.630****	9.690****	14.630****	5.010****	0.580	26.770****	5.890****	11.350****	3.260****	1.810***	

Table constructed by the author. * $p \leq 0.10$ (confidence at the 90 per cent level) ** $p \leq 0.05$ (confidence at the 95 per cent level) *** $p \leq 0.01$ (confidence at the 99 per cent level) **** $p \leq 0.001$ after imputing missing values. Standard errors are reported in parentheses. Panel A represents boards with moderate faultline strength with values from 0.25 – 0.75. Panel B represents boards with extreme faultline strength with values close to 0 and 1.

To sum up, the main conclusions drawn based on Table 4.9 indicate that board diversity influences UK firms' performance. The analysis distinguishes between firms with moderate and extreme faultline scores. In terms of the factors that affect corporate performance in the UK, this chapter compares the standardised coefficients on corporate performance boards with moderate and extreme diversity scores. It is notable that the results for all firms are driven mostly by firms with a moderate faultline (0.25 – 0.75).

This study's results have both theoretical and practical implications. First, they show that the quality of CG is an important factor to consider when studying the impact of board diversity on corporate performance. The results further confirm the importance of improving CG factors in the UK to stimulate firms to provide more meaningful value- and market-based indicators. Without making any distinction between diverse performance mechanisms, Table 4.8 shows the factors that motivate UK firms to provide better performance in general, and how those factors work among firms with moderate diversity score.

Generally, this chapter finds that the corporate drivers in the UK are likely to be consistent with those associated with board diversity at meso-level rather than surface diversity, which was shown in Table 4.8. These results confirm the argument that it is quite difficult to draw conclusions in terms of the incentives for corporate performance based on board diversity since the two levels of board diversity (surface and identity diversity) have different implications (insignificant association) on performance.

For example, this study's results show that boards with moderate diversity score (e.g., panel A) show a significant positive effect of meso-level diversity on the VB performance (EVA and RI), in contrast to firms with extremely diversified boards

which show a significant negative effect on Tobin's Q (e.g., panel B). Moreover, demographic diversity has a negative effect on performance. Further to that, this study's results show that the dominance of male representation in boardrooms hinders value- and market-based performance mechanisms (e.g., EVA, Tobin's Q and RI) in a significant way. Further to that, there is a positive effect of nationality diversity on EVA, RI, and ROA.

These results support the study's hypothesis and are consistent with prior studies (Ben-Amar et al. 2013; Chapple and Humphrey 2014; Veltrop et al. 2015b; Parker 2016; Sarhan et al. 2018), stakeholder theory. Findings empirically indicate that board diversity is an essential factor in explaining the likelihood of corporate value creation. The theoretical implications of this finding contribute to enriching the continuing discussion about the usefulness of a well-balanced board on corporate performance.

These overall aims can be divided into the following objectives:

- Convincing corporate leaders of the importance of establishing a diversified boardroom to provide a proper image for corporate board functionality in the governance context, achieving higher corporate performance and increasing value creation.
- Convincing market authorities of the viability to expand the UK Code on board structure published in 2018 by the FRC to authorise and set disclosure requirement for a unified and generally accepted multi-dimensional diversity requirement.

To fulfil the current study's objective, multiple regression analyses are used to test the hypotheses and determine the impact of board diversity on firm performance at multiple levels. The independent variable is board diversity captured by a

proposed MDI, as highlighted earlier, and the independent variables are the five performance mechanisms. When interpreting Table 4.8, it is worth noting that empirically, to this study's knowledge, no prior study has examined board diversity at multiple levels. Therefore, the current analysis entails deep insights as to those board diversity mechanisms that are associated with corporate VB management; the R-squared values are reasonable. The model is significant at the 5 per cent significance level, which implies a good overall model fit.

In general, four hypotheses regarding the causality relationship between board diversity and firm performance are accepted (H2 and H4), whereas the remaining hypotheses are rejected (H1 and H3). Further to that, not rejected hypotheses are consistent with resource dependence and stewardship theories. This section discusses the results of the regression analysis, and whether each hypothesis is rejected or not rejected in the same order of the hypotheses development section. In doing so, the section relates the accepted hypotheses with the theory. In addition, the section discusses the rejected hypotheses and analyses the potential reasons behind such rejection.

4.8. The board hypotheses

The results of the regression analyses used in the forecast of board diversity and corporate performance are listed in Table 4.10.

Table 4.10 Summary of results

Hypothesis number	Board diversity Mechanisms at multiple levels and corporate VB performance	Expected sign	Reported result Panel A	Rejecting/ not rejecting the hypothesis)
H 1	Gender diversity (measured as the proportion of male directors relative to board size) significantly affect corporate performance.	+	-2.668****	Rejected
H 2	Nationality diversity significantly affect corporate performance.	+	0.797****	Not rejected
H 3	The joint effect of demographic identity and information-related attributes improve corporate performance.	+	-1.909***	Rejected
H 4	Meso-level board diversity based on the joint effect of demographic and director pay attributes significantly affect corporate performance.	+	1.895***	Not rejected

Table constructed by the author. This table lists the hypotheses developed along with the results of the analysis conducted in the current research. Column 1 reflects the hypothesis number. Lists of diversity variables are provided in column 2. Column 3 shows the expected association, as highlighted in each hypothesis. Column 4 shows the result of the analysis (rejecting/accepting the hypothesis).

The board diversity model was typically upheld where four original hypotheses were endorsed. Two of the four hypotheses demonstrate a causal relationship to VB performance measures, and two explain the effect on market-based performance measures. Further to that, only one hypothesis shows the influence of diversity on profitability measures as this chapter notes that ROE did not have statistically significant board diversity ties at gender, nationality, surface, identity, demographic, or meso-level diversity levels. There was also no support for the impact of boards with extreme faultline scores (panel B) and board-level characteristics as a major indicator of the financial success of companies.⁵⁶

In the analysis of corporate performance indicators, which is VB performance measures as in Table 4.8, EVA and RI are highly significant with nine of the

⁵⁶ Results support the efficacy of the CEO duality on profitability performance measures is meditating. Moreover, the dominance of male representation in boards, led to better value and market-based performance, which is rejected.

fourteen expected relationships indicating board diversity and control variables included ($F = 1783$, $p < 0.001$). For example, nationality diversity, demographic diversity, meso-level board diversity, board size; board structure; board stability; nomination committee independence is positive, $p < 0.05$. However, in the second group of corporate performance indicators, which is market-based performance measures as in Table 4.8, Tobin's Q was highly significant with eight of the fourteen expected relationships indicating board diversity and control variables included ($F = 2,490$, $p < 0.001$). For example, the number of board meetings and succession rate is positive, $p < 0.05$.

Further to that, in the third group of corporate performance indicators, which is profitability performance measures as in Table 4.8, ROA was highly significant with eight of the fourteen expected relationships indicating board diversity and control variables included ($F = 2,254$, $p < 0.001$). For example, nationality diversity, identify diversity, the board size and the attrition rate are positive, $p < 0.05$ and higher, apart from the unexpected positive impact of CEO duality. The board diversity variables, along with the control variables, were able to describe the transition between multiple diversity levels and how it impacts ROA.

The effectiveness of the board was shown to have a significant and direct impact on firm performance ($p < 0.05$) within this study's model. Board diversity and the board-level characteristics can describe more than 45 per cent of the variation on corporate performance. Nevertheless, the R-squared value was not significant at $p < 0.05$, in the stage where the attribute variables were incorporated. Therefore, the hypothesis is supported by the significant relationship between board diversity, CG, and firm performance. Many of the expected relationships were found to be important in the model between board characteristics and performance (Rejchrt and Higgs 2015).

This conclusion lends itself to the possible justification that the significance of board diversity for the FTSE All-Share index on market-based performance mechanisms is increasing by moving to deep levels of diversity. Arguably, one of two possibilities could back the weak role of board diversity based on identity attributes (e.g., age, gender, and nationality) on firm performance. The first possibility is ignoring other diversity types. The second possibility of this insignificant association is that the identity attributes are not strong enough to improve a firm's Tobin's Q score. The following sections provide a reasonable basis for further in-depth evaluation of these two possibilities.

The current research considers the impact of the new director's entry on subgroup dynamics by measuring board attrition rate and nomination style (Forbes and Milliken 1999). Also, board size is correlated to member entry which determines subgroup concentrations (Thatcher and Patel 2012).

Therefore, calling for a deep level of diversity as cumulative meso-level diversity according to this chapter aims to improve board diversity and consequently promotes the board's effectiveness, particularly concerning firm value. Secondly, some firms do not even adhere to this principle. The informational advantage of directors over outsiders thus presumably provides a measure of the potential for these directors to add value (Hutzschenreuter and Horstkotte 2013b; Spoelma and Ellis 2017). In short, the insignificance of the results could be jointly justified by these two arguments.

Meso-level diversity shows the effect of information processing and team outcomes. This chapter argues that demographic faultlines which consider task-related attributes (e.g., educational qualifications, experience, and director network size) within directors positively impact their ability to process information

and coordinate diversification, and thereby moderate the influence on the corporate market and VB performance mechanisms.

Based on the work of (Hutzschenreuter and Horstkotte 2013b), this chapter distinguishes between two types of faultlines depending on the faultlines' underlying characteristics. Identity Faultline, which was discussed earlier, and task-related or information faultlines (e.g., differences in the number of educational qualifications, director role, seniority and director network size), have a positive effect on information processing, task conflict and learning, and thus may help the board to successfully handle adding economic value in a given period resulting in improved firm performance (Kaczmarek et al. 2012). Regression results show a significant and positive impact on board diversity (demographic) at meso-level on EVA and Tobin's Q. Therefore, hypothesis number two is accepted.

As to cumulative meso-level Faultline, diversity is captured based on differences in demographic and board-level attributes (e.g., age, gender, nationality, number of educational qualifications, director role, seniority, director network size, board attrition rate, the board size, board structure): "*boards with strong faultlines are associated with lower firm performance, lower CEO turnover-performance sensitivity, and higher abnormal CEO compensation*" (Hutzschenreuter and Horstkotte 2013b). The current study, which responds to calls for research on board diversity (Van Peteghem et al. 2017), contributes to the governance literature by offering a potential explanation for the mixed evidence on the effects of board diversity. Empirical studies differ on the merits of board diversity characteristics, such as director independence (Kaczmarek et al. 2012; Ben-Amar et al. 2013; Nekhili and Gatfaoui 2013; Zhu et al. 2016; Ben-amar et al. 2017a; Sarhan et al. 2018) or financial expertise (Bhagat and Black 2002; Cornett

et al. 2010; Ferreira 2015). Whereas these articles focus on various aspects of diversity in isolation, this chapter extends the notion of board structure by considering how different diversity characteristics jointly relate to group performance, providing a potential explanation for why a chosen board composition does not necessarily result in better performance.

The underlying empirical evidence shows significant associations to performance. Board diversity based on demographic and structural attributes has a positive effect on corporate performance through a significant positive effect on EVA. Arguably, the current average board size of nine members does not suit the large FTSE All-Share index nature. Larger boards are expected to positively influence performance, as evidenced in Table 4.8. Looking at the Code (2018), it is apparent that it does not specify an optimal diversity mechanism that influences the board's influential role in enhancing firm value and performance. Consequently, the first justification of the insignificant effect at surface levels or the negative influence on performance is backed by the absence of a specific requirement with regards to board attrition rate, the board size and board structure.

In conclusion, capturing board diversity at cumulative meso-level (e.g., based on age, gender, nationality, number of educational qualifications, director role, seniority, director network size, board attrition rate, the board size, board structure) is positively associated with firm performance in the UK, namely, EVA and Tobin's Q. Arguably, the current analysis documents an inverse relationship to ROA. Overall, it can be argued that board diversity based on demographic and board-level characteristics is more effective in the UK than the diversity based on identity attributes only (e.g., age, gender, and nationality). Board faultlines at

multiple levels highlight diversity to be effective in improving firm value and market-based performance.

The arguments derived from the above discussion are supported by the latest review of the Code in 2018, which places emphasis on structuring a well-balanced board with diverse knowledge (Sealy 2018). However, it focuses on diversity *per se*. The first recommendation of the Code is consistent with the underlying study's finding that many firms are merely trying to comply with the letter of the Code, with no observable actions to contribute to go into the deep levels of diversity. This argument is in line with that put forth by Rejchrt (Defond et al. 2005; Krishnan and Visvanathan 2008). The second recommendation, which is in line with the current study's findings, pertains to the weak role of ROA as a corporate performance mechanism.

Up until this point of the analysis, the Code (2018) is consistent with the current study's findings, and should lead to a secure and healthy directorship environment and to govern the board of directors' strategic decisions. Therefore, it is necessary to investigate the development process and move from traditional diversity to board Faultline. Although the Code considers diversity as a significant evaluation criterion for performance, it is unclear how companies should report evaluation outcomes.

4.9. Further analysis

Motivated by the present study's theoretical foundation, in addition to considering the difficulty in distinguishing moderate and extreme diversity in some of the previous research, this chapter investigates whether well-balanced boards would

promote corporate value and market-based performance. This chapter thus uses the following robustness checks to validate the findings.⁵⁷

4.9.1. Robustness checks

The issue of endogeneity is checked since it is argued to be a common problem in CG research (e.g., Larcker et al. 2007; Rejchrt and Higgs 2015) using SIG (2-TAILED), 2SLS and 3SLS models to test the robustness of regression results using multiple regression estimator; Table 4.11 shows that the results are robust.⁵⁸

Table 4.11 Robustness check for regression results

Variables	EVA	Tobin's Q	Residual income	ROA	ROE
1)Gender Diversity					
SIG.(2-TAILED)	0.000	0.001	0.000	0.912	0.239
2SLS	0.000	0.001	0.000	0.912	0.239
3SLS	0.000	0.001	0.000	0.912	0.236
MI3SLS	0.000	0.000	0.001	0.652	0.413
2)Nationality Diversity					
SIG.(2-TAILED)	0.000	0.265	0.001	0.072	0.013
2SLS	0.000	0.265	0.000	0.072	0.013
3SLS	0.000	0.263	0.000	0.070	0.012
MI3SLS	0.000	0.932	0.000	0.005	0.110
3)Surface Diversity					
SIG.(2-TAILED)	0.582	0.924	0.423	0.296	0.251
2SLS	0.582	0.924	0.423	0.296	0.251
3SLS	0.580	0.923	0.420	0.293	0.248
MI3SLS	0.574	0.075	0.584	0.428	0.491
4)Identity Diversity					
SIG.(2-TAILED)	0.685	0.607	0.272	0.070	0.030
2SLS	0.685	0.608	0.272	0.070	0.032
3SLS	0.683	0.606	0.671	0.069	0.031
MI3SLS	0.838	0.203	0.799	0.085	0.314
5)Demographic Diversity					
SIG.(2-TAILED)	0.002	0.243	0.110	0.748	0.474
2SLS	0.002	0.243	0.110	0.748	0.474
3SLS	0.005	0.240	0.108	0.747	0.471
MI3SLS	0.003	0.205	0.043	0.133	0.720

⁵⁷ This chapter conducts robustness checks including (a) consideration of alternate instruments for estimating the system of equations, (b) consideration of diagnostic tests to ensure that this study's instruments are valid, and the system of equations is well-identified, and (c) alternative estimates of the standard errors of the model's estimated coefficients. These robustness checks provide consistent results and increase this study's confidence in the performance-governance relationship as noted above.

⁵⁸ Using Stata as this study's statistical analysis package, this chapter primarily ran the pooled OLS regressions in examining the association between board diversity and performance. Then, this chapter ran two-stage least square (2SLS) and three-stage least square (3SLS) regressions to check for the endogeneity bias in this study's data set (see Table 4.11). Results suggest stability in regression outputs across various regression models.

6)Meso-level Diversity						
	SIG.(2-TAILED)	0.006	0.727	0.028	0.273	0.002
	2SLS	0.006	0.727	0.028	0.273	0.002
	3SLS	0.003	0.725	0.027	0.271	0.002
	MI3SLS	0.002	0.126	0.004	0.038	0.268
7)Num. of Board Meetings						
	SIG.(2-TAILED)	0.800	0.439	0.466	0.629	0.203
	2SLS	0.800	0.439	0.466	0.629	0.866
	3SLS	0.906	0.437	0.464	0.627	0.865
	MI3SLS	0.496	0.039	0.706	0.147	0.479
8)Succession Rate						
	SIG.(2-TAILED)	0.005	0.002	0.965	0.305	0.203
	2SLS	0.005	0.002	0.965	0.305	0.203
	3SLS	0.004	0.000	0.965	0.302	0.200
	MI3SLS	0.016	0.000	0.204	0.150	0.499
9)Attrition Rate						
	SIG.(2-TAILED)	0.021	0.033	0.356	0.012	0.758
	2SLS	0.021	0.033	0.356	0.012	0.758
	3SLS	0.020	0.032	0.353	0.012	0.756
	MI3SLS	0.021	0.008	0.432	0.009	0.368
10)Board Size						
	SIG.(2-TAILED)	0.000	0.002	0.000	0.001	0.159
	2SLS	0.000	0.002	0.000	0.002	0.159
	3SLS	0.000	0.002	0.000	0.002	0.156
	MI3SLS	0.000	0.000	0.000	0.005	0.785
11)Board Structure						
	SIG.(2-TAILED)	0.000	0.015	0.159	0.887	0.101
	2SLS	0.000	0.015	0.007	0.887	0.101
	3SLS	0.000	0.014	0.007	0.887	0.099
	MI3SLS	0.000	0.504	0.005	0.575	0.544
12)Board Stability						
	SIG.(2-TAILED)	0.078	0.480	0.985	0.033	0.624
	2SLS	0.078	0.480	0.985	0.035	0.624
	3SLS	0.077	0.477	0.985	0.032	0.622
	MI3SLS	0.405	0.712	0.374	0.541	0.335
13)CEO Duality						
	SIG.(2-TAILED)	0.697	0.755	0.445	0.199	0.964
	2SLS	0.697	0.755	0.445	0.199	0.964
	3SLS	0.695	0.754	0.442	0.196	0.964
	MI3SLS	0.452	0.444	0.108	0.024	0.997
14)Nomination comm. Indep.						
	SIG.(2-TAILED)	0.000	0.232	0.000	0.450	0.204
	2SLS	0.000	0.232	0.000	0.450	0.204
	3SLS	0.000	0.230	0.000	0.448	0.201
	MI3SLS	0.000	0.654	0.000	0.001	0.255

Table constructed by the author.

4.10. Summary and conclusions

The current analysis examines the relationship between board diversity and corporate VB performance mechanisms. In doing so, this chapter attempts to overcome prior literature limitations which rely on analysing the impact of diversity at surface-level on ROA. Therefore, the current study extends the literature and uses this study's proposed MDI to test board faultlines instead of

using gender or age as a proxy for diversity *per se*. Additionally, the current study tests a comprehensive diversity at multiple levels by incorporating 18 demographic director and board-level characteristics. Further to that, the current study employs five performance proxies i.e., VB measures (e.g., EVA and RI) along with market-based performance measures (e.g., Tobin's Q), besides accounting profitability measure (e.g., ROA and ROE).

The findings show that diversity based on identity attributes at the surface level failed to improve Tobin's Q score for the UK FTSE All-Share index non-financial firms. Board information attributes moderate the impact of board diversity on Tobin's Q. This result posits a positive association between the developed diversity mechanism (MDI), which is a proxy for diversity. To sum up, the current study presents a novel contribution to both CG and faultline literature, being timely and relevant in light of the recent worldwide appraisals of board diversity (e.g., the Code, 2018). More specifically, this chapter also contributes to the two research streams (e.g., diversity and corporate performance) by explaining and justifying the mixed results as to the association between board faultline and firm performance. Lastly, this chapter introduces empirical evidence of diversity mechanisms in the UK-influenced performance.

Although this chapter is empirically conducted on a systematic basis under the supervision of qualified and specialised supervisors, there are potential limitations of this study, and the reader should be aware of these when interpreting its research findings. Nevertheless, a considerable effort is made to ensure that the objectives of this chapter are met, and the research question is answered in terms of the dependent variable measuring board diversity using a cluster analysis approach in teams where there are more than two homogeneous sub-teams. The process of splitting into subgroups is done

according to the extent of similarities between members of the subgroup. This measurement technique is processed at two levels – the first level includes the use of a dividing analytic mechanism to split the team. In the second level, each member is allocated to a specific subgroup, and this process is known as hierarchical clustering. Due to the complexity of the computation process, there might be some computational errors. Currently, no precise method exists for making this distinction. A further limitation of the chapter is that there may be other factors that influence corporate financial performance. However, the effect of these limitations on the findings might be of minor consequence. This investigation analyses the potential contribution of board diversity on corporate VB performance. After several trials to accurately and successfully measure diversity and corporate performance, this chapter is considered the first of its kind to utilise a combination of the most recent measurement mechanisms (multi-dimensional) combined in one analysis to measure the effectiveness of board performance that is reflected in firm value generation. In terms of the dependent variables, EVA in this chapter as an indicator of VB performance may have some limitations. Whilst its use can be justified theoretically, it cannot be accurately measured empirically. This limitation is minimised through the clear operational definitions of the measure. Future work, in particular, should consider how closely the boards' technical experience matches the companies' needs and how this degree of alignment impacts not only quality but also financial results.

Chapter 5: Conclusion

5.1. Overview

This dissertation contributes to the existing literature on diversity across different channels. The first contribution is to fill the gap in the literature of CG by moving to the use of faultline methodology beyond traditional diversity measures. The current study highlights the importance of simultaneously studying the distribution of multiple attributes of diversity. In doing this, the current research extends prior work done in developing a multi-dimensional measure for diversity.

The second contribution adds to the literature of disclosure by developing a highly reliable approach to computerised content analysis. In order to avoid an overcounting problem that is likely to be associated with the coding of words, the current study counts the number of phrases rather than the number of words. Thus, SED is a continuous variable reflecting the number of social and environmental sentences found in a company's annual report. Developing an MDI quantifies multiple levels of diversity as the current study provides new factors that affect the provision of SED. Moreover, presenting a robust method for capturing SED is based on textual analysis techniques.

The third contribution is related to the association between diversity and firm performance mechanisms. Results reinforce the theoretical view and report a positive association between diversity and corporate performance. In this sense, results are mixed concerning which performance mechanism i.e., VB, market-based and profitability measures, are associated with diversity at the UK level.

The aim of this thesis is to provide the UK market authorities with a replicable finding, reliable MDI, appropriate recommendations, and sound guidance on the diversity aspect of companies by highlighting the viability of multi-dimensional firm-level governance. Although the Code considers diversity as a significant

evaluation criterion for board effectiveness, it is unclear how companies should report diversity evaluation outcomes. Therefore, this thesis still emphasises the practicality of the analysis, not only in aiding the FTSE All-Share index corporations to evaluate board diversity, but nevertheless, as a manual to various stakeholders to know where they should invest.

This thesis includes three interrelated studies, each with a specified purpose(s). The following chapter summarises the key findings and the consequences for literature, policymakers, and the public interest of these findings. The chapter then highlights the shortcomings of existing research and recommends potential research areas.

The current research is built on the faultline methodology. The research uses quantitative techniques in answering the research questions. Director-related attributes and board-level characteristics were collected from the BoardEx database after some necessary work on the raw data. For example, this thesis measures the joint effect of differences between director-related attributes to detect the MDI score. Social and environmental information are extracted from annual reports for each firm and downloaded from official corporate websites, available online. Performance data are collected from DataStream after some necessary work on the raw data. For example, the present study calculates EVA as presented in chapter four.

In meeting the second research objective, an innovative, computerised content analysis approach is used, and two new keyword lists relevant to the disclosure context are developed. Such an approach provides the premise for the SED, which should allow for large-scale disclosure studies. For the third research objective, the influence of multi-dimensional diversity based on eight (non-

)demographic director attributes (e.g., identity-related, information-related, and non-demographic diversity) on firm performance using five performance measures (e.g., EVA, RI, Tobin's Q, ROA, and ROE) is studied. Moreover, this chapter considers eight board-level characteristics (e.g., board size, stability, structure, succession, activity, attrition, nomination independence and CEO duality). These associations are comprehensive and econometrically well-specified, and through the solid analysis of the causal relationship between board multi-dimensional diversity and board-level characteristics to corporate performance is taken into account by employing a simultaneous equation framework.

In achieving the second and third research objectives, this thesis uses a 3SLS regression model in investigating whether board diversity provides a proper proxy for better disclosure quantity and enhances firm performance. This thesis builds on prior research (Van Peteghem et al. 2017) which investigated the boards' diversity structure and corporate performance using 3SLS. Previous research has shown that problems of endogeneity between CG and company performance can arise when certain governance characteristics are not randomly distributed between companies (Bhagat and Black 2002; Van Lent 2007; Adams and Ferreira 2009). Van Peteghem et al. (2017), due to the endogeneity concern, show that multiple equation models (e.g., 2SLS and 3SLS) are more robust than IV and GMM. Thus, because of the nature of this study, it employs the 3SLS model, which takes into account changes in corporate performance in the 14 years as a result of changes in board multi-dimensional diversity and board-level CG variables.

5.2. Research limitations

As is the case with any research, the current research has some limitations. Firstly, it focuses on large firms in the UK. Small firms might have different disclosure patterns, and thus results of this thesis might be inapplicable to small firms in other regions, for example, small firms might not find it economically beneficial to provide high MDI. Consequently, those firms might use firm-level CG mechanisms which are different from those employed by large firms.

Secondly, while the present study considers faultline methodology, it focuses only on faultline strength based on seven demographic director-related attributes along with single non-demographic attribute which is director fixed salary following earlier faultline studies Kaczmarek et al. (2012) however future research should consider other non-demographic incentive-related attributes such as equity-based rewards, bonuses, and director compensation. The faultline distance perspective is beyond the scope of the current research.

Thirdly, some data items are few, and thus, results related to those items should be interpreted with caution.

The sample used in this chapter is limited to non-financial corporations listed in the FTSE -ALL share index, to unify the structure of financial statements and accounting reporting. Consequently, caution should be considered in evaluating the results.⁵⁹ Thus, it might have been better to look at companies from a broader

⁵⁹ The selection of the study sample is based on a panel data for the non-financial corporations listed on the FTSE-ALL share index in LSE. Hence, this chapter introduces an inherent bias and possible inaccurate associations arising from the sample design. One country rather than a cross countries methodology with a sample of 26,743 director-year observations was chosen because corporate governance is path dependent to single-country legal, regulatory and compliance factors, and due to the expected difficulty of obtaining demographic characteristics since a limited number of firms that showed comprehensive and rich board demographic information. Moreover, this chapter involved intensive hand collection of many demographic\non-demographic board attributes and relevant financial information. The UK is selected for several reasons, due to the

range, to include the FTSE All-share financial firms. Also, the current study concentrates on a single market to investigating homogenous data, which might generate generalisation concerns. Further to this, more attention should be paid in the assessment and interpretation process of study outcomes considering the listed corporations in LSE, all statistical results, and conclusions are valid. The concentration on listed cooperation in FTSE-All share, where board members profiles cover multiple characteristics, and large board size played an essential part in variable definitions. In terms of measuring board diversity using a cluster analysis approach in groups, where there are more than two homogeneous subgroups, another limitation is that due to the complex computation process some directors attributed might be neglected. Currently, no straightforward method exists for making this distinction. A further limitation of this chapter is that there are other factors that influence corporate financial performance. However, the effect of these limitations on the findings might be of minor consequence.

This chapter does not cover several areas, but that could be relevant to board diversity and corporate governance research such as the relationship between board Faultline, corporate value-based management (VBM), and corporate social responsibilities (CSR). As well as, it highlights the implications of obtaining a well-diversified board on other corporate domains such as decision making, globalisation transition (Hillman and Dalziel 2003; Guillaume et al. 2012; Hafsi and Turgut 2013). These new disciplines are vital and need further analysis to broaden the current understanding of how multi-dimensional diversity ensures

availability of reliable data provided by well-known data bases such as FAME and THOMSON ONE. Therefore, a sampling concern is sample size in relation to the validity of statistical conclusions and the possibility that the statistical results are representative of the actual relationships within the data set.

that boards work for the best interest of stakeholders through creating value and enhancing corporate disclosure.

Finally, this thesis investigates the usefulness of board diversity through an economic measure (e.g., EVA) through a quantitative approach. An alternative approach would be to utilise a qualitative approach. A questionnaire could be used to determine what diversity dimensions are that investors use in valuing firms. Another questionnaire could be distributed to financial analysts to identify their views on which diversity dimensions they use in valuing firms. However, this thesis by itself entails a high degree of subjectivity, and its generalisability is doubtful. Therefore, the best approach would be to supplement the current study with a qualitative approach. This is an interesting point that could be covered in future research.

5.3. Suggestions for future research

The current study opens up various research avenues. Firstly, the newly developed diversity measure offers a promising research area to re-investigate research questions previously tested through different performance proxies (for example, the association between diversity and stock prices).

Secondly, the present study focuses on the overall MDI score because, based on the literature and confirmed by the empirical findings, stakeholders are interested in the overall faultline strength. However, from another angle – perhaps from policymakers' and professional bodies' perspectives – it would be interesting to analyse how faultline distance is related to specific firm characteristics. This is a wide area of research, with many research questions that could be examined. This could be linked with many variables, including firm characteristics such as profitability and liquidity.

The review of previous articles has led us to the following concluding remarks: first, the impact of board structure and members nomination on diversity is a new area that has not been touched before (Van Peteghem et al. 2017). Second, to work on identity faultline attributes and information faultline characteristics found to be effective in constraining the negative impact of extreme faultlines strength in this chapter and investigate their effects on other aspects of corporate governance (Ashforth and Mael 1989; Masulis and Reza 2015; Yoshikawa and Hu 2017). It would also be engaging in investigating the effect of this factor on a firm's risk disclosure strategy. Replication of this chapter using data from other international stock markets is likely to entail insight into different market responses to board dynamics and corporate governance. Also, the quantitative technique could be combined with the qualitative approach, whereby future investigation could benefit from interviewing board members. This would help to recognise more clearly how various member attributes affect group dynamics.⁶⁰ Furthermore, it would also be of great interest if future research could address the issue of board motives for complying with corporate governance, whether that is to increase perceived board diversity index reporting quality, to satisfy shareholders and regulators, or to achieve some other objectives.

⁶⁰ Theories support the view that faultlines might have contradictory impact on board performance. Although Social identity and self-categorization theories (Turner, 1982), documented the negative influence of faultlines on performance at group-level. The Categorization-elaboration model describes how decision-making approach as a control variable in faultline research creates various effects on group performance (Tajfel & European Association of Experimental Social, 1978; Daan van Knippenberg, De Dreu, & Homan, 2004). Therefore, future research should embrace a cross-categorization approach, to study these conflicting outcomes. Such an approach could study factors that mitigate the conflict between subgroups (e.g., overlapping memberships) (Chen et al. 2017b). Therefore, further research might investigate the impact of faultline on performance. This can be achieved by adopting a mixed approach of cross-categorization model, self-categorization, and social identity theories. Social identity and self-categorization theories predict a negative association between high faultline and performance due to homogeneous subgroups creation.

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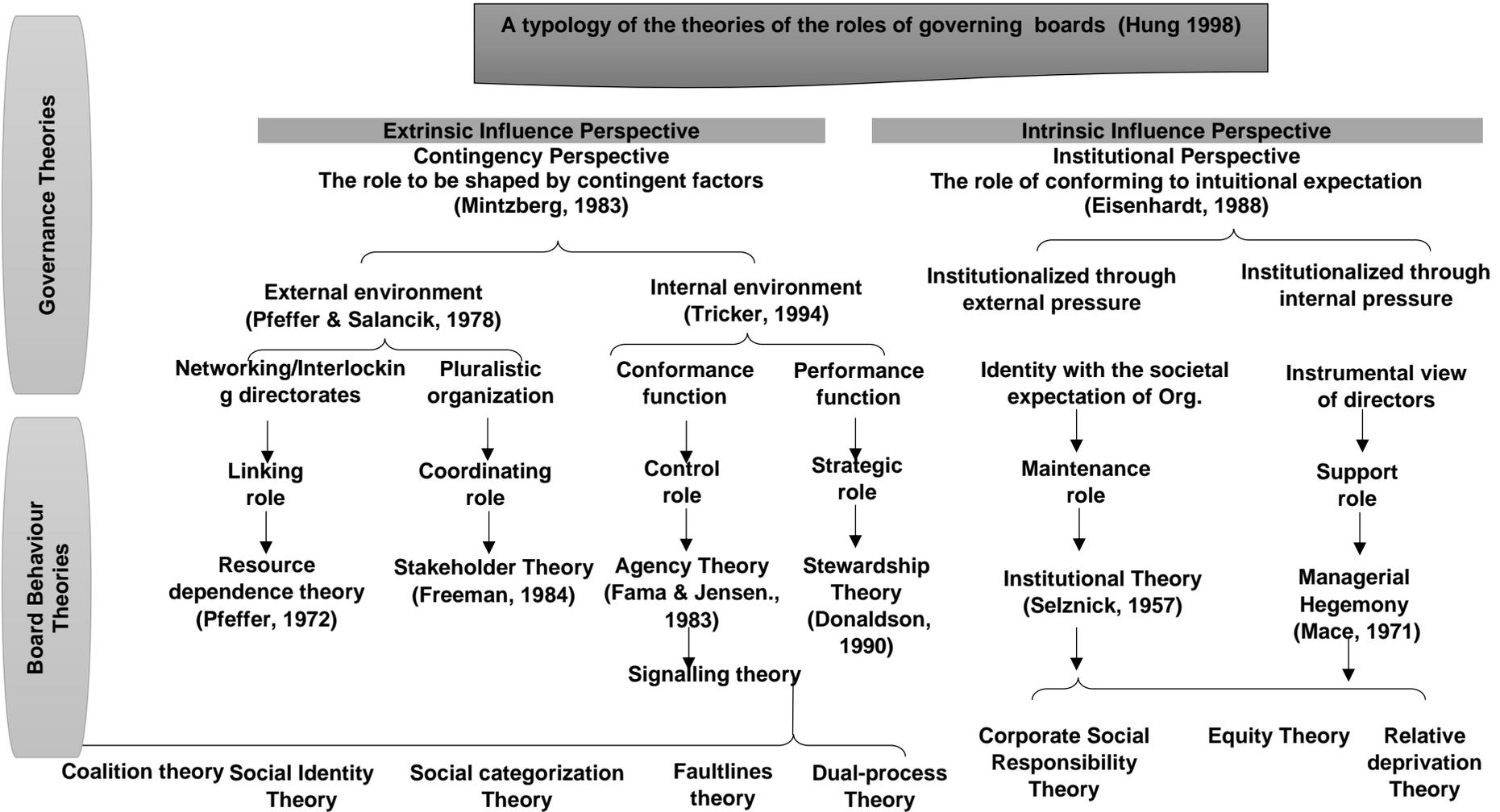
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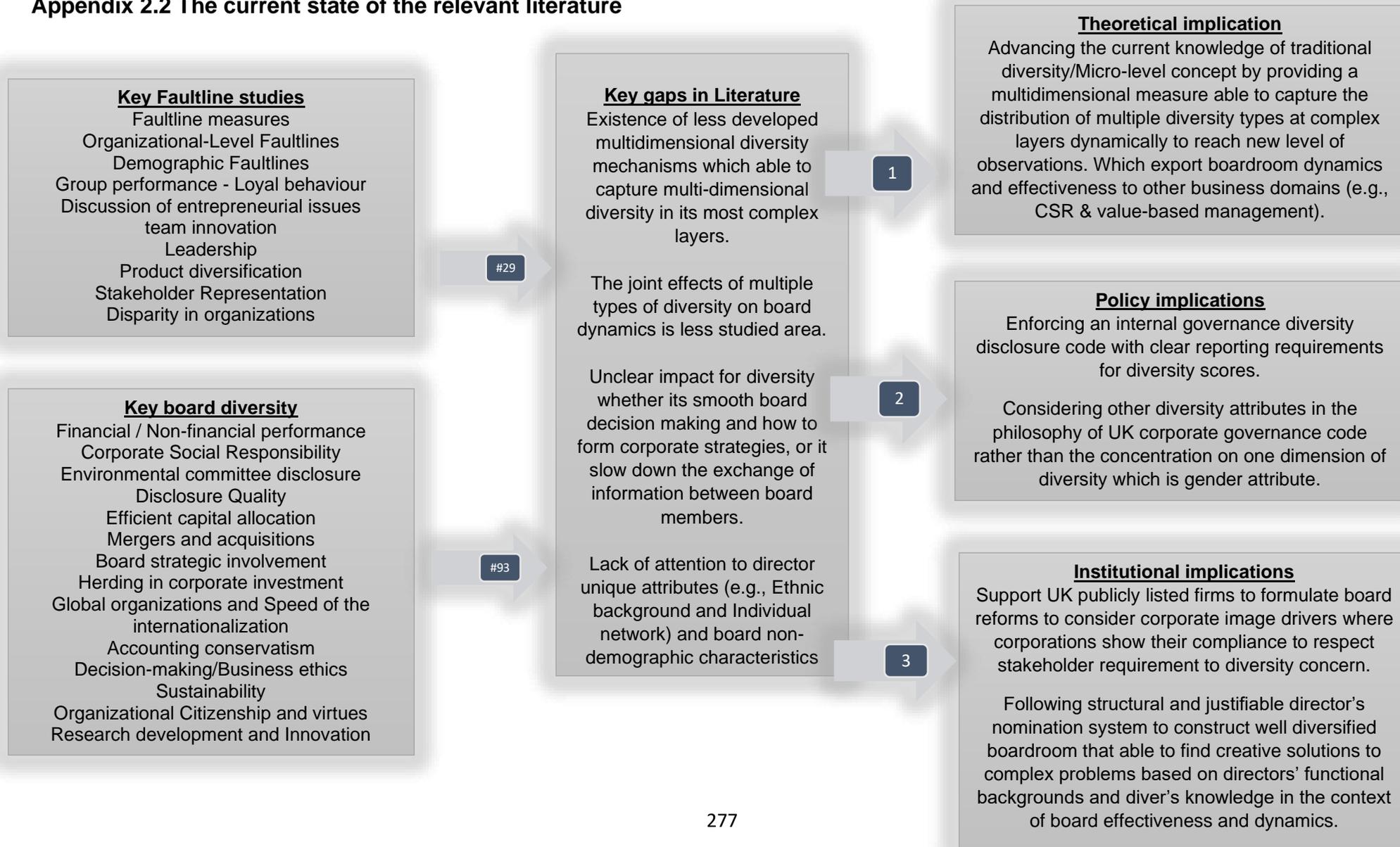
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Appendix 2.1 Theories support roles of governing boards



Appendix 2.2 The current state of the relevant literature



Appendix 2.3 An extended summary of fundamental Faultline studies

Study name (year)	Main outcomes	Theory
Faultlines and Subgroups: A Meta-Review and Measurement Guide (Meyer et al. 2014).	This review article discussed critical concerns on Faultline measures. The article expects both weight and number of attributes to influence faultline strength. The article considers these challenges as an open issue.	Faultlines theory; Social categorization theory; Optimal distinctiveness theory; Distance theory; Subgroup Theory; self-categorization theory
A measure of multi-dimensional polarization for categorical diversity data (Trezzini 2013).	The article state that group faultlines and intragroup conflict are moving in the same directions. Also, faultline strength is positively associated with the extent of correlation between members' attributes. Few and high homogeneous attributes increase faultline strength. Moreover, the research documented the rising trend in investigating multi-dimensional diversity	Not specified
Group Faultlines: A Review, Integration, and Guide to Future Research (Thatcher and Patel 2012).	This article stated that prior Literature deeply investigated various faultline attributes and their effect on group performance. Later, studies investigated faultlines impact on different firm-level outcomes. However, the article emphasizes on the need to analyse the influence of member entry into subgroups deeply and to bridge faultline research to include other disciplines such as internationalization and strategic management domains.	Not specified
How to get the timing right. A computational model of the effects of the timing of contacts on team cohesion in demographically diverse teams (Flache and Mäs 2008).	The research demonstrates how the timing of contacts between subgroup members deter the negative effects of extreme faultlines.	Faultline theory
What is the difference? diversity constructs as separation, variety, or disparity in organizations (Harrison and Klein 2007).	The main research recommendation for future diversity studies is never to neglect key types of diversity (e.g., separation, variety, and disparity) these fundamental classifications have different implications and outcomes that should be considered in any diversity research. Therefore, it is critical to specify, which diversity type is under investigation and select the relevant operationalization.	Not specified

Cont.,

Study name (year)	Main outcomes	Theory
The Development and Analysis of a Measure of Group Faultlines (Shaw 2004).	The study establishes faultlines methodological ground to measure the strength and wealth of sub-teams. Also, the authors suggest that faultline measures be quantitative and flexible to study various attributes.	Not specified
Demographic diversity and faultlines: The compositional dynamics of organizational groups (Lau and Murnighan 1998).	This theoretical investigation focusses on demographic attributes (e.g., age, sex, race, and job tenure or status). However, the article expects that non-demographic group characteristics have equal importance in team dynamics.	Not specified

Table constructed by the author. The above table summarises key Faultline studies.

Appendix 2.4 Summary of key empirical articles dealing with corporate governance and diversity

Study name (year)	Jurisdiction	Sample	Methodology	Main outcomes	Theory
The Curvilinear Relationship Between Ethical Leadership and Team Creativity: The Moderating Role of Team Faultlines (Mo et al. 2017).	China	50 Rand D teams from 8 high-tech firms	Data: self-report, survey-based assessments, \questionnaire. Design: Faultline strength measured with the ASW algorithm (Meyer and Glenz 2013)	The research empirically investigates one of the main team creativities constraints, which is ethical leadership. The result documented that there is an inverse relationship between creativity and extreme ethical leadership.	Social learning theory
Beyond Diversity: A Tale of Faultlines and Frictions in the Board of Directors (Van Peteghem et al. 2017).	US	Russell 3000 index 2953 US financial firms - 9687 observations 2008-2012	Data: Archival panel data from Institutional Shareholder Services (ISS) for the Russell 3000 index firms. Design: This study uses cluster analysis on the proxies for diversity by Thatcher et al. (2003) and Zanutto et al. (2011) using an OLS regression analysis.	This analysis confirms the existence of the negative influence of extreme faultlines strength on firm performance, CEO turnover, and abnormal CEO compensation by performing cluster analyses on nine diversity attributes. Moreover, the article suggests future research to focus on the impact of board structure and members nomination.	Faultline theory; Agency theory; Resource dependence theory
When too little or too much hurts: Evidence for a curvilinear relationship between team faultlines and performance (Chen et al. 2017c).	China	172 workgroups from 75 companies	Data: self-report, survey-based assessments, \questionnaire. Design: multivariate statistical clustering (age, gender, educational specialization, education level, and industrial experience) (Thatcher et al. 2003)	The findings documented a considerable influence of diversity level on group performance in Chinese corporations. The research also emphasises the need to rely on archival data rather than the use of self-reported survey data. Moreover, developing countries need more attention to involve unique demographic dimensions.	Faultline theory; Cross-categorization theory; social identity theory; Distance Theory

Cont.,					
Study name (year)	Jurisdiction	Sample	Methodology	Main outcomes	Theory
Fuse or Fracture? Threat as a Moderator of the Effects of Diversity Faultlines in Teams (Spoelma and Ellis 2017).	US	376 undergraduates -94 four-person teams.	Data: Observational method Design 2 experiments and 184 teams, each team consists of two men and two women to create a dormant gender Faultline.	The results showed a significant correlation between the type of Faultline, creativity, and decision-making. Although, there is a major indirect effect of information faultlines on decision-making and the effect of psychological factors such as threat on Faultline figures is notable.	Faultlines theory
Do Board Expertise and Networked Boards Affect Environmental Performance? (Homroy and Slechten 2017).	UK	Panel with 3244 firm-year and 16,212 director-year observations from FTSE 350 firms 2006–2014	Data: Archival panel data from the DataStream, BoardEx and European Pollutant Release and Transfer Register (E-PRTR). Design: This study uses a standard panel two-way fixed effects model.	This research proved that directors with solid experience in environmental protection and sustainability have a positive impact on greenhouse gas (GHG) emissions. Also, the article finds that members with well connections who are concerned with environmental issues decrease GHG emissions.	Resource dependence theory
When Stakeholder Representation Leads to Faultlines. A Study of Board Service Performance in Social Enterprises (Crucke and Knockaert 2016).	Belgium	54 organization from the federation of the sheltered workshops (VLAB) and the other 94 from the federation of the social workshops (SST) 2014	Data: self-report, survey-based assessments\questionnaire. Design: A regression-based path analysis- the PROCESS macro for SPSS developed by Hayes (2013)	The article showed that there is a negative influence of Faultline strength on board service performance. Sharing corporate goals mitigate this inverse relation. Also, the result shows that board meeting frequency is positively related to board outcomes.	Faultline theory; Social identity theory; Conflict theory

Cont.,					
Study name (year)	Jurisdiction	Sample	Methodology	Main outcomes	Theory
Cracking but not breaking joint effects of Faultline strength and diversity climate on Loyal behaviour. (Chung et al. 2015b).	-	1,652 managerial employees from Fortune 500 global manufacturer of consumer durable goods	Data: self-report, survey-based assessments\questionnaire. Design: Faultline strength measured Using the Statistical Analysis Software (SAS) program developed by Chung, Shaw, and Jackson (2006).	This analysis showed the inverse relationship between gender Faultline strength and loyalty. Moreover, supportive atmosphere plays a key role in containing the negative effect of non-task-related faultlines.	Faultline theory
A Tale of Two Factions: Why and When Factional Demographic Faultlines Hurt Board Performance (Veltrop et al. 2015b).	Germ any	318 board members of the Dutch pension fund.	Data: self-report, survey-based assessments, \questionnaire. Design: implementing Faultline activation by Jehn and Bezrukova (2010).	The analysis highlighted, not only the negative relationship between Factional demographic faultiness and return on investment, but also, the need to study the complex and indirect relationship between board demographic attributes and board performance.	Social categorization theory
On the Same Side of the Faultline: Inclusion in the Leader's Subgroup and Employee Performance (Meyer et al. 2015a).	Germ any	3263 financial consultants working in 325 teams 2005 - 2008	Data: self-report, survey-based assessments\questionnaire. Design: Faultline strength measured with the ASW algorithm (Meyer and Glenz 2013)	The article presented the negative impact of extreme faultlines on group performance in crisis time. However, this negative inference vanishes in moderate faultlines. Also, this study provides a multilevel investigation of the impact of diversity on group outcomes.	Faultline theory; Distance theory

Study name (year)	Jurisdiction	Sample	Methodology	Main outcomes	Theory
Language as a lightning rod: Power contests, emotion regulation, and subgroup dynamics in global teams (Hinds et al. 2014).	Germ any-US-India	96 globally distributed members of six development teams from GlobalTech corporation	Data: ethnographic Interviews and observations. Design: the analysis uses empirical Grounded-theory procedures (Strauss and Corbin, 1998).	The research highlighted the need to expand literature with focussing on team dynamics. As a result, geographic location effect on global teams faultlines.	Faultline theory
Performance effects of top management team demographic faultlines in the process of product diversification (Hutzschenreuter and Horstkotte 2013a).	Germ any	61 German non-financial firms listed in HDAX index 1985 – 2007	Data: Archival panel data collected from Thomson Reuters DataStream. Design: This study test multicollinearity by analysing variance inflation factors and condition indices.	The research proved that task-related Faultline strength has a positive impact on team outcomes. In contrast, biodemographic has a negative effect on Faultline strength.	-
Revisiting Faultline conceptualization: measuring Faultline strength and distance (Zanutto et al. 2011).	-	200 undergraduates 50 (4-5) teams	Data: self-report, survey-based assessments\questionnaire. Design: theoretical-based algorithm developed to assess the concept of faultlines measures.	The research succeeded to construct new Faultline measure that considers the distance between subgroups called Faultline width.	-
Cracks in Diversity Research: The Effects of Diversity Faultlines on Conflict and Performance (Thatcher et al. 2003).	-	742 MBA students 144 teams (5-6 participants)	Data: self-report, survey-based assessments\questionnaire. Design: theoretical-based algorithm developed to assess the concept of faultlines.	The research analysed multiple characteristics of group members simultaneously rather than assessing just one demographic characteristic at a time as most past diversity research has done. Also, it showed that the impact of faultiness on subgroups is not linear. As well as extreme faultlines is negatively correlated to group outcomes.	Self - categorization theory; Faultline theory

Table constructed by the author. The above table summarises research methods and key findings in prior diversity literature.

Appendix 2.5 Theoretical underpinnings for Faultline key measures

Measurement	Authors	Theoretical underpinnings
Latent class analysis	Barkema and Shvyrkov, 2007 Conceptual Articles: (Lau and Murnighan 1998; Thatcher et al. 2003; Flache and Mäs 2008; Thatcher and Patel 2012; Hinds et al. 2014) Empirical Articles: (Bezrukova et al. 2009; Bezrukova et al. 2016)	Social identity Theory: Team members identify themselves into sub-teams based on specific attributes for each member. Members of sub-teams prefer to establishing deep connection within subgroup rather than outgroup (Tajfel and Turner, 1986)
Polarized multi-dimensional diversity Index (cross-classification approach)	Trezzini, 2008 Conceptual Articles: (Lau and Murnighan 1998; Flache and Mäs 2008) Empirical Articles (Thatcher et al. 2003; Li and Hambrick 2005; Barkema and Shvyrkov 2007; Bezrukova et al. 2009; van Knippenberg et al. 2011; Rico et al. 2012; Bezrukova et al. 2016)	Self-categorization Theory: Members categorize themselves into social groups to formulate inside and outside group identities.
Multivariate cluster analysis (Euclidean distances)	 Conceptual Articles: (Thatcher et al. 2003; Bezrukova et al. 2009; Thatcher and Patel 2012) Empirical Articles: (Gibson and Vermeulen 2003; Huang et al. 2017)	Optimal distinctiveness theory (ODT) showed that members are making the trade-off between group harmony/integration and differentiation. This theory tries to illustrate the absence of cohesion between group members.
Hierarchical linear modelling (HLM)	Zanutto, Bezrukova, and Jehn, 2010 Conceptual Articles (Thatcher et al. 2003; van Knippenberg et al. 2011; Thatcher and Patel 2012) Empirical Articles: (Bezrukova et al. 2009; Tuggle et al. 2010; Bezrukova et al. 2012; Bezrukova et al. 2016)	Categorization elaboration models demonstrate the influence of self-categorization and integration between subgroups on team performance. Also, it showed the link between self-identification and decision-making theories in diversity research. This model considers both the negative and positive impact of diversity on group outcomes.
Multiple Linear Regressions	Van Knippenberg et al. (2011) Conceptual Articles:(Thatcher et al. 2003) Empirical Articles: (Bezrukova et al. 2009; Cronin et al. 2011; van Knippenberg et al. 2011; Zanutto et al. 2011; Bezrukova et al. 2012; Wageman et al. 2012; Mason et al. 2014; Bezrukova et al. 2016)	On the one hand, Distance theory demonstrates the level of differentiation and inter-subgroup distance on the other, Cross-categorization model decrease the extreme alignment in sub-team composition, improving team performance and declining contradictions between members. Also, it improves information sharing across subgroups. This model focus on similarities and overlapped areas to establishing strong connections among members of the group.

Appendix 2.6 Summary of Faultline attributes

Director Attribute	Authors	Description
Gender	(Hofstede et al. 2010; Liao et al. 2015; Gull et al. 2018; Smith and Parrotta 2018)	Women play a different role than men in society, and it could have an impact on the attitudes of women executives and inspire them to play another part in the boardroom as a proxy for identity Faultline.
Nationality	(Kaczmarek et al. 2012; Hinds et al. 2014; Estélyi and Nisar 2016)	Businesses need a diverse board to reach worldwide demands as they increase their diversification as a proxy for identity Faultline.
Education	(Payne et al. 2009; Katmon et al. 2017; Fakoya and Lawal 2020)	Multiple educational backgrounds can be used by the companies to help businesses make strategic decisions and gain a competitive advantage as a proxy for information Faultline. Measured as the number of educational qualifications.
Experience	(Gupta and Raman 2014; Sun et al. 2015; Boiral 2016; Buse et al. 2016; Chen et al. 2017b; Trittin and Schoeneborn 2017)	The professional background provides boardroom with a high-quality level of business information as a proxy for information Faultline. Measured as director role and seniority.
Network	(Larcker et al. 2013; Renneboog and Zhao 2014; El-Khatib et al. 2015; Wong et al. 2015).	Professional networking is one of the critical skills, which should be developed on the board as a proxy for information Faultline—measured as director network size.
Salary	(Core et al. 1999; Ben-Amar et al. 2013; Bugeja et al. 2016; Stathopoulos and Voulgaris 2016; Carter et al. 2017; Sarhan et al. 2018)	Importance to link Faultline and compensation research boards can be shaped based on pay- related attributes as a proxy for non-demographic board characteristics (i.e., director annual salary).

Table constructed by the author. The above summarises the definitions of director attributes.

Appendix 2.7 Measure stability and reliability test

Assessment of reliability of diversity scores. Stability, reproducibility, and accuracy tests are considered the main tests for governance indexes (Beretta and Bozzolan 2008). Although some prior studies did not assess governance index reliability (Henry 2008; Kothari et al. 2009), this research considers these tests to assess the validity and reliability of the proposed index. The stability test which assesses the consistency of the scores over time has been used by using different versions of the R application package in different sessions. The reproducibility test is checked as authors use open-source statistical software to guarantee that there are no obstacles to reproduce the scores by other studies. The last reliability test is assessing index accuracy by relying on only valid databases such as BoardEx as data goes through a rigorous quality assurance process. Where data are extracted from official company websites and annual reports. BoardEx avoids third-party, unofficial, and inaccurate internet data. This ensures that BoardEx data is accurate and up-to-date and allowing you to worry less about the reliability of data. Moreover, to assess the validity of the proposed measure this chapter follow Black, Carvalho, Khanna, Kim, and Yurtoglu (2017) and use Cronbach's alpha to assess the internal validity of the proposed measure. They defined Cronbach's alpha as a tool that measures the correlation among governance measure multiple components. The range of Cronbach's alpha score is between 0 and 1 as follow:

Where: n : the number of governance factors; r : the mean correlation among the elements.

A high α provides evidence that the elements measure a similar underlying concept. Our proposed MDI^{ASW} measure has a score of 0.92. If the elements of a sub-index collectively contribute to measuring the same general aspect of governance, one would expect high Cronbach's $0.70 \leq \alpha \leq 1.00$ (Black et al. 2017).

Also, to guarantee the validity of the proposed measure, gender and nationality ratios have been used instead of nominal gender and nationality variables, the calculation process led to a total variation of ≤ 0.03 .

$$\alpha = \frac{nr}{1 + (n-1)r}$$

Appendix 2.8 Preliminary descriptive

ASW algorithm is considered the most suitable and reliable Faultline measure (Mo et al. 2017). The following Table summarises descriptive statistics for diversity attributes examined in this study. Statistics are generated in sub-index level and multi-dimensional level. The analysis shows that Faultline values are considerably high at (age – gender) level with a mean value of 0.624, which has declined to 0.578 by adding nationality attribute to ASW calculation process. Notably, these results have dropped to 0.380 and 0.374 by adding non-demographic attributes for demographic and inclusive levels, respectively.

		Faultline Value					
Faultline multiple levels	N	Mean	Std. Error	Median	Std. Deviation	Skewness	Kurtosis
Surface-level diversity		0.624	0.003	0.608	0.179	-0.111	4.287
Identity diversity	26743	0.578	0.003	0.561	0.190	0.158	3.638
Demographic diversity		0.380	0.003	0.337	0.191	1.612	5.814
Meso-level diversity		0.374	0.003	0.327	0.191	1.675	5.908

Appendix 3.1 Mixed empirical results on the effect of board diversity per se on firm social and environmental disclosures

Measurement mechanism	Proxy	Authors	Relationship to Diversity
Content analysis	Dichotomous disclosure index	(Cabeza-García et al. 2018)	Positive
		(Jizi 2017)	Positive
		(Nekhili et al. 2017)	Positive
		(Katmon et al. 2017)	Positive
		(Ben-amar et al. 2017a)	Positive
		(Liao et al. 2015)	Positive
		(Tauringana and Chithambo 2015)	Positive
		(Jizi et al. 2014)	Positive
		(Hoang et al. 2018)	Insignificant
		(Cong and Freedman 2011)	Insignificant
		(Cahan et al. 2016)	Negative
		(Khan et al. 2013)	Negative

Table constructed by the author. The above table sets out the mixed outcomes in CSR disclosure literature of the main dependent variables.

Appendix 3.2 Board diversity and environmental disclosure

	Study name (year)	Jurisdiction	Sample	Model	Main outcomes	Theory
1	The impact of culture and governance on corporate social reporting (Haniffa and Cooke 2005)	Malaysia	Non-financial companies listed on the main board of the KLSE in 1996.	<ul style="list-style-type: none"> ▪ Method: Content analysis ▪ Tool: Dichotomous disclosure index 	<ul style="list-style-type: none"> ▪ A significant relationship between Malay directors, executive directors, chair with multiple directorships and foreign share ownership, firm size, profitability, multiple listing, and corporate social disclosure. 	<ul style="list-style-type: none"> ▪ legitimacy theory
2	Do Board Gender Diversity and Director Typology Impact CSR Reporting? (Cabeza-García et al. 2018)	Spain	Spanish firms listed in the Madrid Stock Exchange General Index (IGBM) over the period 2009–2013.	<ul style="list-style-type: none"> ▪ Method: Content analysis ▪ Tool: Dichotomous disclosure index 	<ul style="list-style-type: none"> ▪ A significant positive relationship between the percentage of women in boardrooms independent directors and better CSR disclosure. 	<ul style="list-style-type: none"> ▪ Critical mass theory
3	Board Diversity and Corporate Social Disclosure: Evidence from Vietnam (Hoang et al. 2018)	Vietnam	2010 annual reports to capture the quantity and quality of CSD of Vietnamese listed firms	<ul style="list-style-type: none"> ▪ Method: Content analysis ▪ Tool: Dichotomous disclosure index 	<ul style="list-style-type: none"> ▪ A significant positive relationship between demographic diversity (diversity in boards) and CSR disclosure. ▪ Insignificant relationship between board structure (diversity of boards) and CSR disclosure. 	<ul style="list-style-type: none"> ▪ Resource dependence theory ▪ Agency theory
4	The Influence of Board Composition on Sustainable Development Disclosure (Jizi 2017)	UK	FTSE 350 firms for the period 2007–2012	<ul style="list-style-type: none"> ▪ Method: Content analysis ▪ Tool: Dichotomous disclosure index based on Bloomberg CSR index 	<ul style="list-style-type: none"> ▪ A significant positive relationship between board gender diversity, board independence and CSR disclosure 	<ul style="list-style-type: none"> ▪ Agency theory

	Study name (year)	Jurisdiction	Sample	Model	Main outcomes	Theory
5	Gender-diverse board and the relevance of voluntary CSR reporting (Nekhili et al. 2017)	France	Using a sample of French listed companies belonging to the SBF 120 index from 2001 to 2011	<ul style="list-style-type: none"> ▪ Method: Content analysis ▪ Tool: Dichotomous Disclosure Index based on a prior framework (Botosan,1997). 	<ul style="list-style-type: none"> ▪ A significant positive relationship between gender diversity, ROA/ROE and CSR disclosure. 	<ul style="list-style-type: none"> ▪ Legitimacy theory, ▪ stakeholder theory ▪ voluntary disclosure theory
6	Comprehensive Board Diversity and Quality of Corporate Social Responsibility Disclosure: Evidence from an Emerging Market (Katmon et al. 2017)	Malaysia	Using 200 listed firms in Bursa Malaysia during 2009–2013	<ul style="list-style-type: none"> ▪ Method: Content analysis ▪ Tool: Dichotomous Disclosure Index based on a prior framework (Saleh et al. 2010; Mohamad et al. 2014). 	<ul style="list-style-type: none"> ▪ A significant positive relationship between board diversity (education/tenure) and CSR disclosure. 	<ul style="list-style-type: none"> ▪ The resource-based view (RBV) theory
7	Board Gender Diversity and Corporate Response to Sustainability Initiatives: Evidence from the Carbon Disclosure Project (Ben-amar et al. 2017a)	Canada	all firms with the available corporate governance data in the Canadian Spencer Stuart Board Index (CSSBI) for the years 2008–2014.	<ul style="list-style-type: none"> ▪ Method: Historical analysis, interviews, and document analysis ▪ Tool: Dichotomous Disclosure Index based on response to CDP questionnaire 	<ul style="list-style-type: none"> ▪ A significant positive relationship between gender diversity and CSR disclosure. 	<ul style="list-style-type: none"> ▪ critical mass theory

	Study name (year)	Jurisdiction	Sample	Model	Main outcomes	Theory
8	Gender diversity, board independence, environmental committee and greenhouse gas disclosure (Liao et al. 2015)	UK	FTSE350 2011	<ul style="list-style-type: none"> ▪ Method: Historical analysis, interviews, and document analysis ▪ Tool: Dichotomous Disclosure Index based on response to CDP questionnaire 	<ul style="list-style-type: none"> ▪ A significant positive relationship between board gender diversity, board independence and environmental (GHG) disclosure. ▪ Insignificant relationship between environmental board committee (large, independent, or active) and environmental (GHG) disclosure. 	<ul style="list-style-type: none"> ▪ stakeholder theory
9	The effect of DEFRA guidance on greenhouse gas disclosure (Tauringana and Chithambo 2015)	UK	FTSE350 2008-2011	<ul style="list-style-type: none"> ▪ Method: Content analysis ▪ Tool: Dichotomous Disclosure Index based on GHG reporting frameworks. 	<ul style="list-style-type: none"> ▪ A significant positive relationship between board size, director ownership, ownership concentration and environmental (GHG) disclosure. 	<ul style="list-style-type: none"> ▪ Stakeholder theory ▪ agency theory
10	Corporate Governance and Corporate Social Responsibility Disclosure: Evidence from the US Banking Sector (Jizi et al. 2014)	US	2009-2011	<ul style="list-style-type: none"> ▪ Method: Content analysis ▪ Tool: Dichotomous disclosure index 	<ul style="list-style-type: none"> ▪ A significant positive relationship between CEO duality, board independence and board size and CSR disclosure. 	<ul style="list-style-type: none"> ▪ Agency theory
11	Green Governance: Boards of Directors' Composition and Environmental Corporate Social Responsibility (Post et al. 2011)	US	78 Fortune 1000 companies	<ul style="list-style-type: none"> ▪ Method: Content analysis ▪ Tool: Dichotomous Disclosure Index based on a prior framework (Clarkson et al., 2007). 	<ul style="list-style-type: none"> ▪ A significant positive relationship between board diversity(gender/age/nationality), a higher proportion of outside board directors and CSR disclosure. ▪ A significant positive relationship between a higher proportion of outside board directors and KLD strengths scores. 	<ul style="list-style-type: none"> ▪ critical mass theory ▪ Agency theory

Appendix 3.3 Financial performance, governance and CSR performance

	Study name (year)	Jurisdiction	Sample	Model	Main outcomes	Theory
1	Determinants of voluntary CSR disclosure: empirical evidence from Germany (Gamerschlag et al. 2011)	Germany	130 listed firms 470 firm-year observations	<ul style="list-style-type: none"> ▪ Method: Content analysis ▪ Tool: Volume count (words) 	<ul style="list-style-type: none"> ▪ A significant positive relationship between profitability and CSR disclosure. 	<ul style="list-style-type: none"> ▪ Political cost theory
2	Board Attributes, Corporate Social Responsibility Strategy, and Corporate Social and Environmental Performance (Shaukat et al. 2016)	UK	Asset4 and DataStream a universe of UK listed companies, covering the period. 2002–2010.	<ul style="list-style-type: none"> ▪ NA 	<ul style="list-style-type: none"> ▪ A significant positive relationship between the board's independence, gender diversity, and financial expertise on the audit committee and CSR performance. 	<ul style="list-style-type: none"> ▪ Resource-Based View (RBV) ▪ Resource dependence theory (RDT) ▪ Structural equation modelling (SEM)
3	Exploring the reliability of social and environmental disclosures content analysis (Markus 1999)		49 annual reports	<ul style="list-style-type: none"> ▪ Method: Content analysis ▪ Tool: Volume count (sentence) based on a prior framework (Hackston and Milne, 1996) 	<ul style="list-style-type: none"> ▪ 	<ul style="list-style-type: none"> ▪

	Study name (year)	Jurisdiction	Sample	Model	Main outcomes	Theory
4	CSR disclosure: the more things change...? (Cho et al. 2015)	Fortune 500 data	1977 and 2010	<ul style="list-style-type: none"> ▪ Method: Content analysis ▪ Tool: Empirical survey based on Ernst & Ernst 	<ul style="list-style-type: none"> ▪ Social and environmental information increased significantly across the two time periods. 	<ul style="list-style-type: none"> ▪ stakeholder theory ▪ institutional theory ▪ Legitimacy theory,
5	Corporate Governance Quality and CSR Disclosures (Chan et al. 2014)	Australia		<ul style="list-style-type: none"> ▪ Method: Content analysis ▪ Tool: Dichotomous disclosure index based on Ernst & Ernst 	<ul style="list-style-type: none"> ▪ A significant positive relationship between corporate governance quality and CSR disclosure. 	<ul style="list-style-type: none"> ▪ Stakeholder theory ▪ Legitimacy theory
6	Corporate governance and environmental performance and disclosures (Cong and Freedman 2011)	US	1897 firms from 2003 to 2005	<ul style="list-style-type: none"> ▪ NA 	<ul style="list-style-type: none"> ▪ A significant positive relationship between corporate governance quality and CSR disclosure. ▪ No relationship between governance and pollution performance or between pollution performance and pollution disclosure was identified. 	<ul style="list-style-type: none"> ▪ legitimacy theory- ▪ stakeholder theory
7	Content analysis in environmental reporting research: Enrichment and rehearsal of the method in a British–German context (Beck et al. 2010)	UK and Germany	28 matched companies from the UK and Germany 2000–2004	<ul style="list-style-type: none"> ▪ Method: Content analysis ▪ Tool: Disclosure Index 	<ul style="list-style-type: none"> ▪ 	<ul style="list-style-type: none"> ▪

	Study name (year)	Jurisdiction	Sample	Model	Main outcomes	Theory
8	A note on comparative language interrogation for content analysis: The example of English vs German (Campbell et al. 2005)	UK and Germany	Top 30 British and German companies 2002	<ul style="list-style-type: none"> ▪ Method: Content analysis ▪ Tool: Volume count (sentences)- Volume count (words) 	<ul style="list-style-type: none"> ▪ The English rendering of the German environmental narrative is generally accurate (suggesting that companies do not discriminate by reporting jurisdiction) 	<ul style="list-style-type: none"> ▪
9	Monitoring Intensity and Stakeholder's Orientation: How Does Governance Affect Social and Environmental Disclosure? (Mallin et al. 2013)	US	100 companies listed in the Business Ethics 100 U.S. Best Corporate Citizens 2005–2007	<ul style="list-style-type: none"> ▪ Method: Content analysis ▪ Tool: Dichotomous disclosure index based on Guidry and Patten (2010) 	<ul style="list-style-type: none"> ▪ A significant positive relationship between corporate governance quality and CSR performance and environmental disclosure. 	<ul style="list-style-type: none"> ▪ agency theory ▪ organization theory
10	Revisiting the relationship between environmental performance and environmental disclosure: An empirical analysis (Clarkson et al. 2008)	US	191 firms from the five most polluting industries in the US	<ul style="list-style-type: none"> ▪ Method: Content analysis ▪ Tool: Disclosure Index based on prior framework GRI. 	<ul style="list-style-type: none"> ▪ A significant positive relationship between environmental performance and the level of discretionary environmental disclosures. 	<ul style="list-style-type: none"> ▪ disclosure theory ▪ economics disclosure theory ▪ socio-political theory

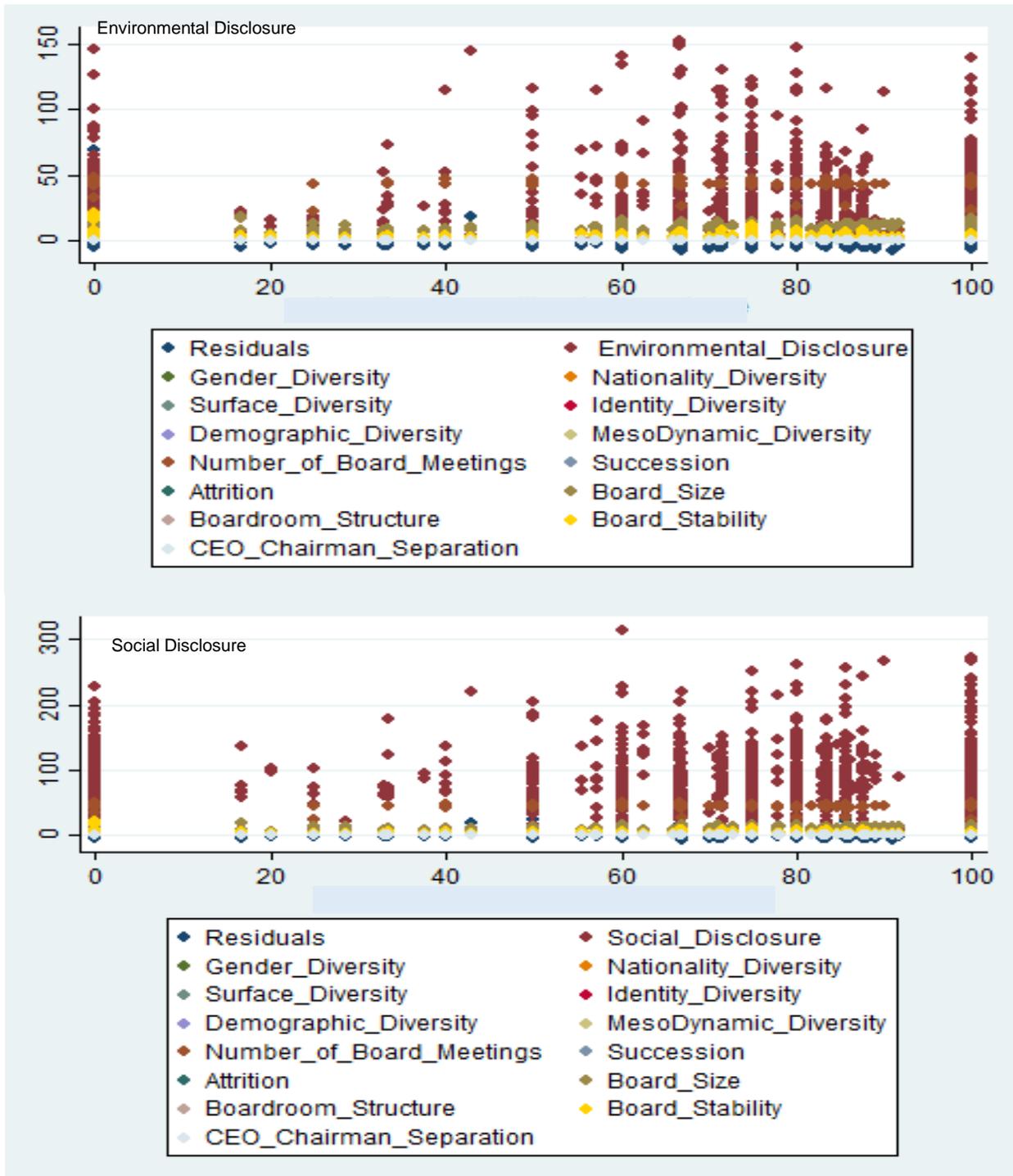
	Study name (year)	Jurisdiction	Sample	Model	Main outcomes	Theory
11	Corporate social responsibility, country-level predispositions, and the consequences of choosing a level of disclosure. (de Villiers and Marques 2016)	UK	366 firms. 2007–2010	<ul style="list-style-type: none"> ▪ Method: Content analysis ▪ Tool: Disclosure Index based on prior framework GRI. 	<ul style="list-style-type: none"> ▪ A significant positive relationship between investor protection, higher levels of democracy, more effective government ▪ services, higher quality regulations, more press freedom and CSR disclosure. ▪ A significant positive relationship between CSR disclosure and share prices. 	<ul style="list-style-type: none"> ▪ legitimacy theory ▪ agency theory
12	Corporate Social Responsibility and Firm Value: Disaggregating the Effects on Cash Flow, Risk and Growth (Gregory et al. 2014)		650 firms, composed largely of S&P 500 firms	<ul style="list-style-type: none"> ▪ NA 	<ul style="list-style-type: none"> ▪ A significant positive relationship between valuation, long-run growth prospects, a lower cost of equity capital and CSR performance 	<ul style="list-style-type: none"> ▪ Stakeholder theory
13	Corporate social responsibility and financial performance in Islamic banks (Mallin et al. 2014)	13 countries	2010–2011 160 Islamic banks	<ul style="list-style-type: none"> ▪ Method: Content analysis ▪ Tool: Adapted Haniffa and Hudaib Index. 	<ul style="list-style-type: none"> ▪ A significant positive relationship between financial performance, Shari'ah supervisory board (SSB) size and CSR disclosure 	<ul style="list-style-type: none"> ▪ Stakeholder theory
14	Signalling through corporate accountability reporting (Lys et al. 2015)	Russell1000	2002	<ul style="list-style-type: none"> ▪ NA 	<ul style="list-style-type: none"> ▪ A significant positive relationship between future firm performance and CSR expenditures 	<ul style="list-style-type: none"> ▪

Study name (year)	Jurisdiction	Sample	Model	Main outcomes	Theory
15 Determinants and Economic Consequences of Non-financial Disclosure Quality (Gao et al. 2016a)	Netherlands	2004 and 2012	<ul style="list-style-type: none"> ▪ Method: Triangulation/mixed ▪ Tool: Two-dimensional Disclosure: The Content-oriented Framework of Standards and the Quality-oriented Framework of Standards. 	<ul style="list-style-type: none"> ▪ A significant positive relationship between better CSR performance, greater external financing needs, stronger corporate governance, and CSR disclosures ▪ A significant positive relationship between CSR performance and analyst coverage, higher levels of institutional ownership, greater stock liquidity, higher valuations in SEOs, and lower yields to maturity in bond issuances ▪ A significant positive relationship between CSR disclosures and economic benefits 	<ul style="list-style-type: none"> ▪
16 Corporate Governance and Corporate Social Responsibility Disclosures: Evidence from an Emerging Economy (Khan et al. 2013)	Bangladeshi	135 manufacturing companies listed with Dhaka Stock Exchange (DSE) in Bangladesh from 2005 to 2009	<ul style="list-style-type: none"> ▪ Method: Content analysis ▪ Tool: Disclosure Index based on a prior framework. 	<ul style="list-style-type: none"> ▪ A significant positive relationship between public ownership, foreign ownership, board independence and presence of audit committee export-oriented industries and CSR disclosures ▪ A significant negative relationship between managerial ownership and CSR disclosures ▪ Insignificant relationship between CEO duality and CSR disclosures 	<ul style="list-style-type: none"> ▪ legitimacy theory
17 Are CSR Disclosures Value Relevant? Cross-Country Evidence (Cahan et al. 2016).	cross-country	676 firms	<ul style="list-style-type: none"> ▪ Method: Content analysis ▪ Tool: Disclosure index 	<ul style="list-style-type: none"> ▪ A significant positive relationship between unexpected CSR disclosure and firm value measured by Tobin's Q. ▪ The significant negative relationship between unexpected CSR disclosure and nation-level institutions 	<ul style="list-style-type: none"> ▪ Merton's (1987) theory

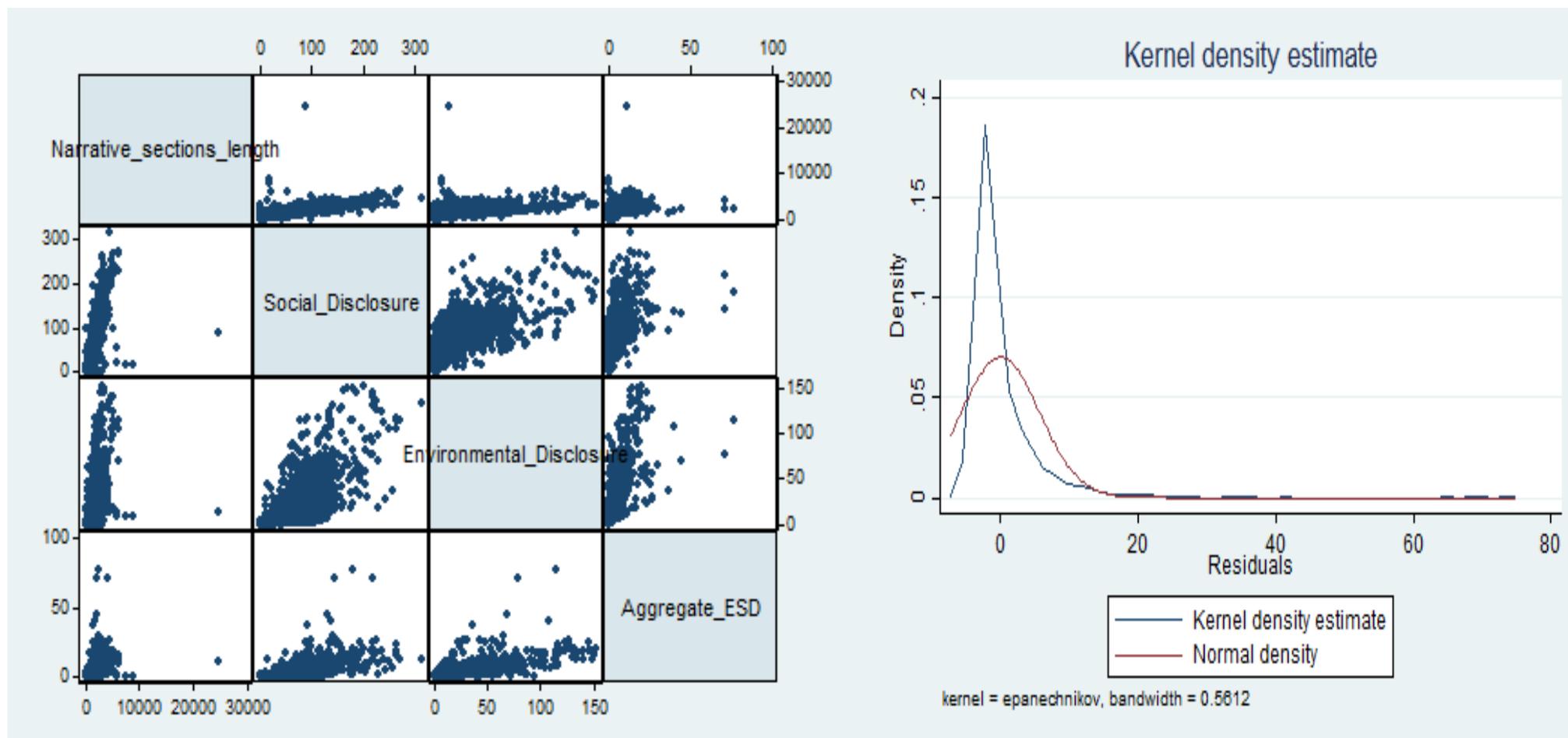
	Study name	Jurisdiction	Sample	Model	Main outcomes	Theory
18	Corporate social responsibility, country-level predispositions, and the consequences of choosing a level of disclosure (de Villiers and Marques 2016).		1227 observation	<ul style="list-style-type: none"> ▪ Method: Content analysis ▪ Tool: Disclosure index 	<ul style="list-style-type: none"> ▪ A significant positive relationship between better investor protection, higher levels of democracy, more effective government services, higher quality regulations, more press freedom, and a lower commitment to environmental policies and CSR disclosures ▪ A significant positive relationship between CSR disclosure and share prices. 	<ul style="list-style-type: none"> ▪ legitimacy theory ▪ Agency theory
19	Determinants and Economic Consequences of Non-financial Disclosure Quality (Gao et al. 2016a).	Amsterdam	491 firm-year observations between 2004 and 2012	<ul style="list-style-type: none"> ▪ Method: Content analysis ▪ Tool: Disclosure index 	<ul style="list-style-type: none"> ▪ A significant positive relationship between CSR performance, greater external financing needs, and stronger corporate governance and CSR disclosures ▪ A significant positive relationship between CSR disclosures and greater analyst coverage, higher levels of institutional ownership, greater stock liquidity, higher valuations in SEOs, and lower yields to maturity in bond issuances. 	<ul style="list-style-type: none"> ▪ theory of Coase (1937)
20	Board Attributes, Corporate Social Responsibility Strategy, and Corporate Social and Environmental Performance (Shaukat et al. 2016)	UK	2,028 firm-year observations 2008	<ul style="list-style-type: none"> ▪ Method: Content analysis ▪ Tool: Disclosure index 	<ul style="list-style-type: none"> ▪ A significant positive relationship between CSR orientation of the board (as measured by the board's independence, gender diversity, and financial expertise on the audit committee), and proactive and comprehensive the firm's CSR strategy, and the higher its CSR 	<ul style="list-style-type: none"> ▪ agency theory, ▪ Resource-based view theory
21	Corporate social responsibility research in Accounting (Huang and Watson 2015)			<ul style="list-style-type: none"> ▪ NA 	<ul style="list-style-type: none"> ▪ Most of the accounting literature on the consequences of CSR disclosures are shareholder-oriented. While the shareholder effects are interesting, a broader group of stakeholders benefits from CSR to identify how firms address their concerns. 	<ul style="list-style-type: none"> ▪ Stakeholder theory

Table constructed by the author.

Appendix 3.4 Detecting unusual and influential data



Tests for Normality of Residuals



Appendix 3.5 Robustness check for regression of moderate board diversity (significance)

Variables	Social Disclosure	Environmental Disc
1)Gender Diversity		
SIG.(2-TAILED)	0.000****	0.001****
2SLS	0.000****	0.000****
3SLS	0.000****	0.000****
MI3SLS	0.000****	0.001****
2)Nationality Diversity		
SIG.(2-TAILED)	0.003***	0.001****
2SLS	0.001****	0.000****
3SLS	0.001****	0.000****
MI3SLS	0.001****	0.001****
3)Surface Diversity		
SIG.(2-TAILED)	0.151	0.295
2SLS	0.100*	0.236
3SLS	0.098*	0.234
MI3SLS	0.030**	0.124
4)Identity Diversity		
SIG.(2-TAILED)	0.253	0.608
2SLS	0.134	0.460
3SLS	0.131	0.458
MI3SLS	0.046**	0.310
5)Demographic Diversity		
SIG.(2-TAILED)	0.021**	0.000****
2SLS	0.011***	0.000****
3SLS	0.010***	0.000****
MI3SLS	0.011***	0.011***
6)Meso-level Diversity		
SIG.(2-TAILED)	0.001***	0.000****
2SLS	0.001****	0.000****
3SLS	0.001****	0.000****
MI3SLS	0.000****	0.000****
7) Board Activity		
SIG.(2-TAILED)	0.812	0.163
2SLS	0.931	0.168
3SLS	0.992	0.872
MI3SLS	0.780	0.984
8)Succession Rate		
SIG.(2-TAILED)	0.047**	0.007***
2SLS	0.066*	0.005***
3SLS	0.064*	0.005***
MI3SLS	0.008***	0.000****
9)Attrition Rate		
SIG.(2-TAILED)	0.923	0.847
2SLS	0.992	0.873
3SLS	0.931	0.165
MI3SLS	0.798	0.080*
10)Board Size		
SIG.(2-TAILED)	0.000****	0.006***
2SLS	0.000****	0.008***
3SLS	0.000****	0.008***
MI3SLS	0.000****	0.026**
11)Board Structure		
SIG.(2-TAILED)	0.000****	0.363
2SLS	0.000****	0.238
3SLS	0.000****	0.236
MI3SLS	0.002***	0.465

Variables		Social Disclosure	Environmental Disc
12)Board Stability	SIG.(2-TAILED)	0.023**	0.097*
	2SLS	0.021**	0.114
	3SLS	0.020**	0.112
	MI3SLS	0.056**	0.107*
13)CEO Duality	SIG.(2-TAILED)	0.074*	0.201
	2SLS	0.138	0.228
	3SLS	0.136	0.225
	MI3SLS	0.121	0.286
14)Nomination committee independence	SIG.(2-TAILED)	0.000****	0.001****
	2SLS	0.000****	0.001****
	3SLS	0.000****	0.001****
	MI3SLS	0.000****	0.006***

Table constructed by the author. *p ≤ 0.10(Confidence at the 90 per cent level) **p ≤ 0.05(Confidence at the 95 per cent level) ***p ≤ 0.01 (Confidence at the 99 per cent level) ****p ≤ 0.001

Appendix 4.1 Mixed effects of board diversity on firm performance

Measurement mechanism	Proxy	Authors	Relationship to Diversity
Market-based performance measures	Tobin's Q	(Sarhan et al. 2018)	Positive
		(Fang et al. 2018)	Positive
		(García-Meca et al. 2015)	Positive
		(Nguyen et al. 2015)	Positive
		(Pathan and Faff 2013)	Positive
		(Carter et al. 2010)	Positive
		(Isidro and Sobral 2015)	Insignificant
		(Van Peteghem et al. 2017)	Negative
		(Chapple and Humphrey 2014)	Negative
		(Kaczmarek et al. 2012)	Negative
Value-based performance measures	EVA RI	(Adams and Ferreira 2009)	Negative
		(Knauer et al. 2018)	Positive
		(Chiwamit et al. 2017)	Positive
		(Firk et al. 2016)	Positive
		(Grant and Trahan 2009)	Insignificant
Accounting profitability measure	ROA ROE	(Lee and Kim 2009)	Insignificant
		(McGuinness et al. 2017)	Positive
		(Isidro and Sobral 2015)	Positive
		(Nekhili and Gatfaoui 2013)	Positive
		(Hafsi and Turgut 2013)	Positive
		(Carter et al. 2010)	Insignificant
		(Adams and Ferreira 2009)	Negative

Table constructed by the author. The above table sets out the mixed outcomes for corporate performance studies in relation to diversity.

Appendix 4.2 Demographic and board-level diversity studies and firm performance

Variables	Relationship to Corporate performance	
Demographic Diversity	Positive	(Ben-Amar et al. 2013) (Hutzschenreuter and Horstkotte 2013a) (Rodan and Galunic 2004)
	Negative	(Veltrop et al. 2015b) (Bezrukova et al. 2012) (Li and Hambrick 2005)
	Positive	(Parker 2016) (Klein and Kozlowski 2016)
Attrition Rate	Positive	(Firk et al. 2016) (Sarhan et al. 2018) (Isidro and Sobral 2015)
Board Size	Positive	(Kaczmarek et al. 2012)
Board Structure	Positive	(Fauver et al. 2017)
Nomination Committee Independence	Positive	(Kaczmarek et al. 2012)
Succession Rate	Negative	(The UK corporate governance code 2018)
Board activity	Mixed	(Parker 2016) (Knauer et al. 2018)

Table constructed by the author.

Appendix 4.3 EVA equation breakdown

$$\text{EVA} = \text{NOPAT} - K_w(\text{NA})$$

$$\text{EVA} = \text{NOPAT} - (\text{WACC} * \text{IC}) \quad (\text{IC as a common factor})$$

$$\text{EVA} = (\text{NOPAT}/\text{IC} - \text{WACC}) * \text{IC} \quad - \quad \text{ROIC} = \text{NOPAT}/\text{IC} \quad ^{61}$$

Where,

EVA is Economic value-added

NOPAT is the reported net operating profits

K_w is the weighted-average cost of capital

NA is the adjusted book value of net capital at the beginning of the period.

WACC is the weighted average cost of capital

IC is the invested capital

ROIC is the return on invested capital

$$\text{WACC} (K_w) = \frac{D_M}{(D_M + E_M)} * K_D(1-T) + \frac{E_M}{(D_M + E_M)} * K_E \quad ^{62}$$

Where,

D_M is the Market value of the firm total debt

E_M is the Market value of the firm total equity

K_D is the Pre-tax cost of debt

K_E is the cost of equity

T is Firm's marginal tax rate

$$\text{WACC} (K_w) = \frac{D_M}{\text{EV}} * K_D(1-T) + \frac{E_M}{\text{EV}} * K_E$$

Where,

D_M is the Market value of the firm total debt

E_M is the Market value of the firm total equity

K_D is Pre-tax cost of debt

K_E is the cost of equity

T is Firm's marginal tax rate

EV is Enterprise Value

$$\text{EVA} = (\text{ROIC} - \text{WACC}) * \text{IC}$$

Where,

ROIC is Return on Invested capital = NOPAT/IC

NOPAT is the reported net operating profits

+ Any increase in bad debt reserve

+ Any increase in the LIFO reserve

+ Amortization of goodwill

+ Any increase in net capitalized R&D

+ Other operating income (including passive investment income: PV of operating leases)

- Minus cash operating taxes.

WACC is the weighted average cost of capital

IC is invested capital

$$\text{EVA} = \text{EVA Spread} * \text{IC} \quad ^{63}$$

⁶¹ Non-IFRS financial measures provide more insight into corporate performance as ROIC is calculated as adjusted operating (loss) profit after net taxes paid. Second, Thomson Worldscope database considered the following points in their calculations: ❶ Usage of return on invested capital as it entails a measure of how efficiently the company allocates resources to create value. ❷ Goodwill excludes amounts associated with deferred taxes. ❸ Present value of operating leases. ❹ In cases where the companies had altered their capital invested through their operating decisions (use operating leases), the capital and the after-tax operating income was adjusted to reflect true capital invested – Ignoring EVA-adjustments would potentially be problematic if these adjustments varied systematically across)

⁶² The calculated WACC level is affected by judgmental decisions regarding the calculations of β , a component of the capital asset-pricing model used to determine the required rate of return on equity, the levels of the risk-free rate and the risk spread

⁶³ As an example of a common accounting adjustment, Stewart (1991) (pp. 28—30) argues that research and development costs should be capitalized (if material) and amortized. This requires adjustments to both NOPAT (via *AcctAdj*) and to *Capital* (via *AcctAdj*). NOPAT is adjusted by adding back the period's R&D expense and deducting amortization of the R&D asset.⁵ In any given year, the net effect is an increase (decrease) in NOPAT if R&D expense is greater (less) than R&D amortization. *AcctAdj* reflect the cumulative effect on *Capital* of the capitalization and amortization of current and past R&D expenditures. At any point in time, *Capital* is higher by the amount of the net capitalized R&D asset.

Where,
EVA spread is $ROIC - WACC$
IC is invested capital

Other adjustments to NOPAT include adding the change in bad debt allowances; adding the change in the LIFO reserve; adding goodwill amortization; adding other operating income; and subtracting an estimate of taxes owed for the period (Stewart, 1991) (pp. 742—743). Stern Stewart do not disclose complete details about their accounting adjustments, e.g., asset lives and amortization patterns. Other adjustments to Capital include: capitalization and amortization of certain marketing costs; subtracting marketable securities and construction in progress (because neither contributes to current operating activities); adding the present value of non-capitalized long term leases; adding allowances for bad debts, inventory obsolescence, warranties, etc.; adding the LIFO reserve; adding net capitalized intangibles (including R&D); adding cumulative goodwill amortization; adding unrecorded goodwill; and adding (subtracting) cumulative unusual losses (gains), net of taxes (Stewart, 1991) (pp. 112—117). AcctAdj01 and AcctAdj# are not examined individually in subsequent empirical tests because Stern Stewart does not disclose them separately.

Appendix 4.4 list of complementary tests

A number of tools in Stata has been used for determining whether our data meets the regression assumptions. Below, this chapter list the major commands this chapter demonstrated organized according to the assumption the command was shown to test.

- **Detecting Unusual and Influential Data**
 - **predict** — used to create predicted values, residuals, and measures of influence.
 - **rvpplot** — graphs a residual-versus-predictor plot.
 - **rvfplot** — graphs residual-versus-fitted plot.
 - **lvr2plot** — graphs a leverage-versus-squared-residual plot.
 - **dfbeta** — calculates DFBETAs for all the independent variables in the linear model.
 - **avplot** — graphs an added-variable plot, a.k.a. partial regression plot.
- **Tests for Normality of Residuals**
 - **kdensity** — produces kernel density plot with normal distribution overlaid.
 - **pnorm** — graphs a standardized normal probability (P-P) plot.
 - **qnorm** — plots the quantiles of varname against the quantiles of a normal distribution.
 - **swilk** — performs the Shapiro-Wilk W test for normality.
 - **xstsktest** - Jarque-Bera for normality.
- **Tests for Heteroscedasticity**
 - **rvfplot** — graphs residual-versus-fitted plot.
 - **hettest** — performs Cook and Weisberg test for heteroscedasticity.
- **Tests for Multicollinearity**
 - **vif** — calculates the variance inflation factor for the independent variables in the linear model.
- **Tests for Non-Linearity**
 - **acprplot** — graphs an augmented component-plus-residual plot.
- **Tests for Model Specification**
 - **linktest** — performs a link test for model specification.
 - **ovtest** — performs regression specification error test (RESET) for omitted variables.

Appendix 4.5 Panel A correlation coefficients

Boards with moderate Faultline strength (0.25-0.75) Pearson (top) and Spearman (bottom)

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1 EVA		0.196	0.621	0.066	0.007	-0.324	0.316	-0.004	-0.136	0.024	0.092	0.028	-0.118	-0.002	0.504	0.408	0.144	-0.007	0.466
2 Tobin's Q	0.118		0.112	0.115	0.115	-0.123	0.029	0.014	-0.007	-0.021	0.000	0.029	0.030	-0.043	0.012	0.052	-0.004	0.042	0.061
3 RI	0.617	0.053		0.055	0.003	-0.195	0.265	-0.011	-0.115	0.027	0.087	0.022	-0.076	0.007	0.357	0.275	0.078	-0.022	0.323
4 ROA	0.055	0.078	0.067		0.897	0.027	0.063	0.032	0.034	0.019	-0.009	0.050	-0.056	0.013	0.059	0.026	0.011	0.054	-0.057
5 ROE	0.042	0.011	0.020	0.048		0.041	0.054	0.015	0.036	0.022	0.000	0.092	-0.065	0.001	-0.006	0.036	0.016	0.044	-0.086
6 Gender Diversity	-0.311	-0.070	-0.180	0.005	0.002		-0.093	0.269	0.319	0.088	0.071	-0.119	0.064	-0.041	-0.151	0.033	-0.142	-0.031	-0.279
7 Nationality Diver	0.340	-0.012	0.287	0.059	0.024	-0.107		-0.044	-0.429	-0.148	-0.052	0.031	-0.144	0.018	0.346	0.079	0.184	-0.004	0.120
8 Surface Diversity	0.009	-0.001	0.003	0.025	0.048	0.258	-0.041		0.783	0.312	0.258	-0.008	0.061	-0.056	0.143	0.095	0.013	0.025	-0.009
9 Identity Diversity	-0.137	-0.009	-0.119	0.009	0.034	0.309	-0.448	0.778		0.343	0.258	-0.056	0.162	-0.064	-0.019	0.080	-0.052	0.007	-0.068
10 Demographic Diver	0.047	-0.009	0.044	0.000	-0.003	0.069	-0.119	0.321	0.339		0.790	0.011	0.094	-0.051	0.147	0.113	0.029	0.000	0.067
11 Meso-level Diver	0.121	0.000	0.109	-0.019	-0.015	0.078	-0.018	0.271	0.257	0.811		-0.004	0.040	-0.042	0.204	0.124	0.044	-0.006	0.110
12 Board Activity	0.000	0.047	-0.007	0.029	0.015	-0.056	0.017	-0.003	-0.041	-0.001	-0.017		0.009	0.016	0.026	-0.040	0.050	0.197	0.040
13 Succession	-0.121	0.084	-0.081	-0.015	0.022	0.077	-0.104	0.068	0.151	0.098	0.046	0.008		-0.062	0.070	-0.035	-0.102	0.026	-0.116
14 Attrition	0.005	-0.043	-0.004	0.041	0.013	-0.022	0.016	-0.062	-0.064	-0.042	-0.044	0.002	-0.055		-0.158	-0.024	0.016	-0.024	-0.003
15 Board Size	0.510	-0.045	0.373	0.050	0.014	-0.154	0.366	0.154	-0.033	0.175	0.229	-0.010	0.038	-0.154		0.347	0.095	0.050	0.318
16 Board Structure	0.379	-0.019	0.261	-0.018	0.004	0.037	0.074	0.114	0.094	0.129	0.149	-0.023	-0.030	-0.032	0.335		0.027	-0.007	0.556
17 Board Stability	0.056	-0.012	0.003	0.020	-0.018	-0.034	0.109	0.042	-0.010	-0.017	0.003	0.008	-0.093	0.003	0.023	-0.047		0.036	0.114
18 CEO duality	-0.004	0.020	-0.026	0.052	0.005	-0.036	0.003	0.025	0.007	0.000	-0.002	0.125	0.038	-0.024	0.031	-0.006	-0.002		-0.020
19 Nomination Committee independence	0.478	-0.006	0.332	-0.055	-0.016	-0.245	0.150	0.019	-0.057	0.087	0.115	0.019	-0.121	-0.013	0.323	0.636	0.013	-0.022	

Table constructed by the author. This table reports the correlation coefficients for regression variables. Bold text indicates significance based on two-tailed t-tests, at the .05 level

Appendix 4.6 Panel B correlation coefficients

Boards with extreme Faultline strength (close to 0 & 1) Pearson (top) and Spearman (bottom)

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1 EVA		0.165	0.666	0.099	-0.009	-0.410	0.529	0.224	0.135	0.266	0.297	0.033	-0.251	0.021	0.689	0.349	0.135	-0.093	0.430
2 Tobin's Q	0.105		0.126	0.011	0.020	-0.097	0.226	0.165	0.093	0.199	0.183	0.041	0.023	-0.031	0.101	0.070	0.061	-0.010	0.116
3 RI	0.673	0.072		0.026	-0.027	-0.327	0.419	0.160	0.119	0.271	0.292	0.024	-0.235	0.043	0.557	0.284	0.064	-0.063	0.364
4 ROA	0.098	0.009	0.022		0.857	-0.063	0.146	-0.038	-0.062	-0.061	-0.066	0.023	0.003	-0.018	0.157	-0.019	0.041	0.036	-0.062
5 ROE	0.076	0.036	0.059	0.423		0.003	0.003	-0.015	-0.009	-0.016	-0.016	0.102	0.112	-0.041	0.059	-0.088	0.013	0.042	-0.135
6 Gender Diversity	-0.427	-0.078	-0.338	-0.110	-0.078		-0.253	-0.126	-0.070	-0.238	-0.235	-0.108	0.169	-0.035	-0.342	0.084	-0.116	-0.032	-0.240
7 Nationality Diver	0.553	0.198	0.444	0.131	0.097	-0.252		0.145	-0.085	0.106	0.138	0.111	-0.178	0.010	0.448	0.050	0.123	-0.088	0.122
8 Surface Diversity	0.223	0.030	0.196	-0.037	-0.001	-0.060	0.051		0.873	0.845	0.830	-0.001	-0.192	0.011	0.193	0.246	0.188	-0.104	0.250
9 Identity Diversity	0.165	-0.007	0.156	-0.043	-0.018	-0.030	-0.091	0.924		0.866	0.848	-0.036	-0.157	-0.023	0.147	0.243	0.109	-0.082	0.259
10 Demographic Diver	0.297	0.098	0.287	-0.042	-0.011	-0.227	0.111	0.740	0.807		0.970	0.003	-0.154	-0.007	0.257	0.202	0.158	-0.123	0.288
11 Meso-level Diver	0.331	0.077	0.311	-0.045	-0.004	-0.231	0.145	0.729	0.788	0.976		-0.011	-0.159	-0.021	0.283	0.212	0.140	-0.111	0.309
12 Board Activity	0.005	-0.004	0.025	-0.017	0.082	-0.016	0.078	0.037	0.032	0.008	0.000		-0.126	0.048	-0.013	-0.091	0.099	0.220	-0.038
13 Succession	-0.269	0.017	-0.218	-0.003	-0.012	0.153	-0.146	-0.172	-0.171	-0.184	-0.192	-0.059		-0.032	-0.174	-0.086	-0.225	0.030	-0.220
14 Attrition	0.021	-0.050	0.034	-0.031	-0.067	-0.030	0.006	-0.076	-0.078	-0.010	-0.027	0.015	-0.028		-0.131	0.005	-0.044	-0.024	-0.027
15 Board Size	0.699	0.037	0.573	0.149	0.092	-0.307	0.442	0.309	0.262	0.273	0.305	0.022	-0.184	-0.159		0.389	0.163	-0.033	0.402
16 Board Structure	0.328	-0.003	0.268	-0.080	-0.049	0.086	0.050	0.343	0.326	0.235	0.240	-0.022	-0.089	0.002	0.369		0.136	0.002	0.532
17 Board Stability	0.109	0.051	0.033	0.100	0.122	-0.061	0.077	0.238	0.201	0.154	0.128	0.036	-0.238	-0.064	0.143	0.102		0.044	0.139
18 CEO duality	-0.085	-0.032	-0.066	0.037	0.019	-0.019	-0.086	-0.148	-0.130	-0.138	-0.123	0.165	0.027	-0.020	-0.032	0.002	0.067		-0.040
19 Nomination Committee independence	0.445	0.000	0.363	-0.044	-0.016	-0.209	0.123	0.379	0.350	0.324	0.344	-0.043	-0.203	-0.032	0.416	0.661	0.116	-0.051	

Table constructed by the author. This table reports the correlation coefficients for regression variables. Bold text indicates significance based on two-tailed t-tests, at the .05 level