Essays on The Impact of Corporate Culture in Finance

Sahar Wahbi Alabdullah

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Abstract

In recent years, the implications of corporate culture on firm policies and decision-making have gained growing attention within the field of finance. In this thesis, I define four corporate cultural dimensions based on the Competing Values Framework (CVF): *Collaborate, Control, Create,* and *Compete.* I quantify corporate culture by employing a text-based analysis and investigate its association with three corporate finance topics.

First, I start with the impact of corporate culture on CEO compensation structure. Using a sample of non-financial non-utility publicly traded US firms over the period 1999-2018, I find that firms with a competitive corporate culture, that promotes risk-taking, optimally design their compensation plans with more equity-based and less cash-based compensation to motivate risk-taking behaviour and link these rewards with shareholders' wealth. The results are robust to multiple robustness and endogeneity tests. A further test shows that pay-performance sensitivity (PPS) is stronger in firms with competitive and creative cultures.

Second, I explore the role of corporate culture on corporate cash holdings by proposing and testing two competing hypotheses. I find that corporate culture dimensions with low information asymmetry (i.e., competitive, creative, and collaborative) have higher cash holdings. The findings remain significant after implementing several robustness and endogeneity tests. Extra analysis shows that competitive and creative firms hold more cash when those firms have higher R&D investments. These results hinder the validity of the precautionary motive in explaining the increase in cash holdings and support the research hypothesis. I also demonstrate that those firms with creative and competitive cultures use excess cash holdings in a way that enhances the firm's future profitability proxied by ROA.

Finally, I explore whether corporate culture can be shaped by the firm's board of directors. I provide evidence that independent directors' connectedness has a positive and significant impact on firms' corporate culture (an aggregate measure of the four dimensions of the CVF). The results of additional robustness and endogeneity checks show that the original finding is robust to these tests. In further tests, I reveal that this positive impact stems from the advisory advantage, suggesting that well-connected independent directors are more influential in enhancing firms' cultures when those firms require more advising due to the complex nature of their operations. In addition, I show that the joint impact of independent

directors' connectedness and corporate culture is positive and significant for firms' Tobin's Q and ROA when those firms require more advising. My thesis has important implications for multiple stakeholders, including academic research, firms, shareholders, and regulators.

Dedication

In the Name of Allah, Most Gracious, Most Merciful

This thesis is dedicated to my loving parents

Wahbi & Maha

who paved the way and made the ground solid for my path

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All praise is to God, Allah, by whose grace good deeds are completed.

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Chapter 1: Introduction

1.1. Motivation and objectives

"I would put culture as one of our most important risks alongside cybersecurity, operations risk and regulatory risk. We discuss culture at every board meeting because of its importance."

Brendan McDonagh
Deputy Chair, AIB[1]

"Focusing on culture is one of the most important things a leader can do to change performance and outcomes."

Darren Childs
CEO of UKTV[2]

"Company culture is the backbone of any successful organization"

Gary Vaynerchuk
CEO of VaynerMedia[3]

Promoting the concept of corporate culture and demonstrating how crucially important it is, is certainly one of the top priorities of the firm's board of directors as exhibited in the above quotes. Policymakers, as well, shed light on the importance of corporate culture in maintaining institutions' stability (e.g., Financial Stability Board 2014). In academic research, a study of the significance of corporate culture is provided by Graham et al. (2022). In their fieldwork, they surveyed senior executives of 1,348 US firms and report that 79% of those executives consider corporate culture as an important asset for impacting firm performance, and 92% deem that enhancing their corporate culture would increase their firm value. Guiso et al. (2015b) also reveal that 85% of the Standard and Poor's (S&P) 500 companies dedicate one or two sections to their websites to advertise their corporate culture values.

The prominence of corporate culture stems from it being an intangible asset and a driver of the firm's effectiveness that helps create value and enhance the firm's outcomes (Schein 1996; Hartnell et al. 2011). It is directly linked to the firm's performance because it could accelerate or hamper the firm's strategic planning (Hsieh et al. 2018). Furthermore,

[1] https://www.ey.com/en_gl/risk/four-ways-boards-can-govern-culture-to-reduce-risk
[2] https://www.ey.com/en_gl/purpose/how-to-inspire-your-people-to-innovate
[3] https://faberinfinite.com/culture-the-backbone-of-any-organization/

corporate culture is relevant because it catalyses attracting and retaining employees who hold values that are similar to those of the firm (Guiso et al. 2015b), thus increasing the employees' commitment to the firm, which eventually should reflect positively on the firm value.

Being an intangible asset that contributes to explaining firms' outcomes, the growing empirical evidence demonstrates that corporate culture could provide answers that complement the observable traditional factors in finance models. In corporate governance, within corporate finance research, corporate culture has only gained attention in recent years. For example, the literature sheds light on the effects of corporate culture on different firm outcomes, such as CEO turnover (Fiordelisi and Ricci 2014); R&D and innovation development (Grieser et al. 2017; Fiordelisi et al. 2019; Wang et al. 2021); investments-cash flow sensitivity (Jiang et al. 2019); stock options backdating (Biggerstaff et al. 2015) and financial reporting and fraud (Davidson et al. 2015); audit pricing (Chen et al. 2021a); and firm value (Li et al. 2021; Fang et al. 2023). Still, as this literature is evolving, several questions remain unanswered. Thus, in this thesis, I attempt to fill three research gaps in the corporate finance and governance literatures by answering questions that have not been addressed in previous studies.

To begin, the research on corporate culture requires a robust definition of culture. Thus, in this investigation, I apply Schein's (1996, p. 236) definition that corporate culture is: "the set of shared, taken-for-granted implicit assumptions that a group holds and that determines how it perceives, thinks about and reacts to its various environments".[4]

To test the relationship between corporate culture and the related firm issues in this thesis, I adopt a theoretical foundation of corporate culture, known as the Competing Values Framework (CVF), which was established by Quinn and Rohrbaugh (1983) and developed by Cameron et al. (2006). The CVF has begun to be applied to corporate finance topics recently, including CEO turnover (Fiordelisi and Ricci 2014); innovation (Fiordelisi et al. 2019); bank risk-taking (Nguyen et al. 2019); audit pricing (Chen et al. 2021a); banking stability (Barth and Mansouri 2021); and firm value (Fang et al. 2023). The key advantage of adopting the CVF is that it is grounded in theory and has been empirically applied in these previous

[4] The selection of this particular definition is based on several points mentioned in Chapter 2: Section 2.1.

studies, and it defines the core cultural values that are directly linked to firm performance (Thakor 2016; Fang et al. 2023).

The framework consists of four main dimensions: *Collaborate*; *Control; Create*; and *Compete*. *Collaborate* culture focuses on human affiliation and attempts to develop a robust communication system among firms' employees. This type of culture promotes teamwork, open communication, employee involvement, and participation. The *Control* culture is influenced by control mechanisms, whereby the roles of employees are clearly defined and follow standardised procedures. This type of culture promotes conformity, efficiency, and predictability. The *Create* culture emphasises firm growth by encouraging employees to be innovative. As such, it promotes creativity, risk-taking, and innovation. The *Compete* culture informs the objective of profitability by increasing market share, which is achieved by fostering internal competition and allowing employees to be compensated based on their achievements.

I measure the CVF dimensions by applying Quantitative Textual Analysis (QTA) on companies' 10-K filings. QTA is a relatively new methodology in the finance literature, adopted in relatively recent years compared to other fields. I follow the few studies that currently exist that adopt the CVF to measure corporate culture (Fiordelisi and Ricci 2014; Fiordelisi et al. 2019; Nguyen et al. 2019; Barth and Mansouri 2021; Chen et al. 2021a; Wang et al. 2021; Andreou et al. 2022; Fang et al. 2023). In particular, I use the dictionary introduced by Fiordelisi and Ricci (2014) and then updated by Fiordelisi and Ricci (2021). This dictionary is established using the two-step process of obtaining a set of synonyms describing each cultural dimension of the CFV suggested by Cameron et al. (2006), and then identifying additional synonyms of these keywords from the Harvard IV-4 Psychosocial Dictionary. I apply QTA to capture the frequency of each corporate culture keyword in the dictionary. The measurement of each cultural dimension is then calculated as the frequency ratio of its keywords divided by the total count of words in the 10-K report. Thus, for each firm, I have four scores that measure the four dimensions of corporate culture each year.

Having defined and measured corporate culture under the CVF, and after reviewing the literature and identifying a few research gaps, I focus my thesis on three topics that would have an association with corporate culture, but remain unexplored. In the first of three empirical chapters, I examine whether corporate culture influences CEO compensation structure by emphasising the risk-taking preferences shaped by the CVF cultural values in

affecting these compensation plans. In the second, I test whether the informational environment (i.e., information asymmetry) shaped by these cultural values can act as a catalyst that explains firms' cash holdings. Finally, I take a different approach in the third empirical chapter to provide the first examination of the link between the firm's directors and its culture. In particular, I test whether independent director connectedness has a role in establishing and promoting the firm's culture. The next section provides an overview of the thesis structure, summarises the main findings of each empirical study, and highlights the research contributions.

1.2. Thesis structure, findings, and contributions

Following this chapter, the thesis is structured into six additional chapters as follows:

Chapter 2 presents a literature review on culture including the definitions of culture and corporate culture, the frameworks of culture and their importance to firm policies and value, and introduces the Competing Values Framework (CVF). **Chapter 3** provides the methodological background to the thesis, which explains the measurement of corporate culture and its dimensions applied in this research.

Chapter 4 addresses the first empirical study of this thesis that examines the impact of corporate culture on CEO compensation. According to agency theory (Jensen and Meckling 1976), conflicts of interest may arise between risk-neutral shareholders and risk-averse CEOs, which need to be controlled by incentivising CEOs with valuable compensation plans that link their wealth to those of shareholders (Eisenhardt 1989; Wiseman and Gomez-Mejia 1998). The empirical evidence on CEO compensation implements the agency approach to explain the effectiveness of optimal contracting on the design of CEO compensation packages in mitigating conflicts resulting from dissimilarities in risk preferences between the firms' directors and shareholders (e.g., Smith and Watts 1992; Mehran 1995; Ryan and Wiggins 2002; Alessandri and Pattit 2014). In Chapter 4, I argue that the relationship between corporate culture dimensions and their associated attitudes towards risk matters when the firm sets its CEO's compensation and whether this is done to induce risk-taking.

I analyse a sample of 1,511 unique non-financial non-utility firms in the Standard and Poor's (S&P) 1500 index, ranging from 1999 to 2018. The empirical analysis reveals results that firms with corporate culture promoting risk-taking optimally design their compensation plans with more equity-based and less cash-based compensation to motivate risk-taking

behaviour and link these rewards with shareholders' wealth. The influence is focused on the competitive culture. The results remain consistent when subjected to multiple robustness and endogeneity tests including alternative measures of corporate culture dimensions; propensity score matching; entropy balancing matching; and two-stage least squares (2SLS) regression.

To understand the relationship between corporate culture and CEO compensation more thoroughly, I examine the impact of corporate culture on CEO incentives and pay-performance sensitivity (PPS). Together, the PPS tests add to the theoretical arguments and empirical evidence by demonstrating that competitive and creative cultures as a growth-focused culture involves more risk-taking, and therefore, firms with such cultures optimally structure CEO incentives to match these risk-taking preferences and ensure that these compensation plans are directly linked with and sensitive to firm performance.

Chapter 5 examines the implications of corporate culture on corporate cash holdings. Building on information asymmetry to link corporate culture to cash holdings, I argue and provide empirical evidence that the CVF dimensions influence the firm's informational environment. In the cash holdings literature, the *investment opportunity hypothesis* proposes that cash holdings are a valuable buffer when information asymmetry is high and external financing is costly. Alternatively, the *monitoring cost hypothesis* predicts that larger cash reserves exacerbate managerial discretion to waste these liquid assets, particularly when there is high information asymmetry that results in poor shareholder monitoring (Drobetz et al. 2010; Chung et al. 2015). To explore the association between corporate culture and firms' cash holdings, I test these two competing hypotheses by elaborating on the informational environment in each of the cultural dimensions and the role of information asymmetry between the firm's directors and shareholders on cash holdings.

Before testing these hypotheses, I perform empirical tests using three proxies for information asymmetry to assess whether a firm's corporate culture reflects its informational environment. I reveal that *Compete, Create* and *Collaborate* all have lower information asymmetry compared to *Control*. To test the *investment opportunity hypothesis*, I debate that in cultures signifying low information asymmetry (i.e., *Compete, Create,* and *Collaborate*), cash holdings levels might be lower because external financing would be less costly to finance their investments. Alternatively, in cultures where information asymmetry might be a symptom (i.e., *Control*), shareholders would be more concerned about their cost of capital, and cash holdings would be more desired to fund investment opportunities. Alternatively, to

test the *monitoring cost hypothesis*, I argue that in corporate cultures demonstrating low information asymmetry, shareholders are willing to accept more cash holdings because they will have a better monitoring role in a such transparent environment. In contrast, when corporate culture is informatively opaque, shareholders' monitoring would be less effective, thus, higher cash holdings would be avoided.

Using a sample comprising all publicly traded non-financial non-utility US firms from 1999 to 2019, the empirical evidence supports the monitoring cost hypothesis. Precisely, the baseline regression results show that corporate culture dimensions with low information asymmetry (i.e., competitive, creative, and collaborative cultures) have higher cash holdings. The findings remain significant after implementing several robustness and endogeneity tests.

As it could be argued that firms could hold cash as a precautionary motive to hedge against cash shortfalls (Opler et al. 1999; Almeida et al. 2004; Ozkan and Ozkan 2004), I delve into whether the precautionary motive, as an alternative theoretical explanation, drives the results. I find that firms with competitive and creative cultural dimensions hold cash when they have higher R&D investments. Yet, these results hinder the validity of the precautionary motive in explaining the increase in cash holdings and support the *monitoring cost hypothesis* on the role of information asymmetry on cash holdings. As well, the test reveals that control culture may reinforce firms to hold more cash for different purposes other than the proposed research hypotheses and the precautionary motive. In a final analysis for this chapter, I shed light on the joint impact of corporate culture and cash holdings on the firm return on assets (ROA). In general, the results demonstrate that competitive and creative cultures accumulate more cash holdings and when they do, they use the excess cash in a way that enhances profitability as proxied by ROA. The joint impact of the collaborative culture (and control culture) and cash holdings is insignificantly linked to the firm's ROA.

Chapter 6 presents evidence on the influence of independent directors' connectedness on corporate culture. Building on the connectedness literature, directors' networks as social capital have important implications at the firm level (Hillman et al. 2009). According to the agency theory (Jensen and Meckling 1976), the vital role of the board of directors is to monitor the firm's executives on behalf of the shareholders and a connected independent director implies superior human capital and reputation (Fama and Jensen 1983). Thus, for these reputational reasons, independent directors' connectedness signifies a monitoring advantage. According to the resource dependence theory (Pfeffer and Salancik

1978), directors' connections could help in providing information on new regulations, market circumstances, industry trends, other companies' corporate culture and hierarchies, and vital market information (Hillman et al. 2000; Hillman and Dalziel 2003; Hillman et al. 2009; Anderson et al. 2011; Larcker et al. 2013). Meanwhile, in a different vein, the literature emphasises the instrumental role of the firm's leadership in building an effective and strong corporate culture (Li et al. 2021; Graham et al. 2022). Combining these two streams, I hypothesise that independent directors' connectedness is significantly associated with firms' corporate culture.

Focusing on a sample of 1,212 firms in the (S&P) 1500 index with 8434 firm-year observations ranging from 2002 to 2018, the empirical findings provide robust evidence that independent directors' connectedness has a positive and significant impact on firms' corporate culture (an aggregate measure of the four dimensions of the CVF). The results of additional robustness and endogeneity checks show that the original finding remains consistent under the challenges of these tests. To gain further insight, I test whether the impact of independent directors' connectedness on corporate culture stems from the monitoring and/or advising channel. Previous literature shows that firms benefit more from independent directors' connectedness when those firms are poorly governed and are more complex. I document evidence suggesting that independent directors' connectedness is more influential for corporate culture when those firms require more advice due to the complex nature of their operations, consistent with the advising channel. In subsequent analysis, I focus on the implications of independent directors' connectedness and corporate culture on firm value. The results show that the joint impact of independent directors' connectedness and corporate culture is positive and significant for firms' Tobin's Q and ROA when those firms require high advising due to their complexity. The monitoring advantage of independent directors' connectedness could not be confirmed.

Finally, **Chapter 7** concludes the thesis by summarising its main findings, highlighting the contributions it makes to the literature and the implications for both business and academic communities, and suggesting potential ideas for future empirical work.

This thesis contributes to the literature in four main ways. First, I complement the growing studies that apply Quantitative Textual Analysis (QTA) in the finance literature (e.g., Loughran and McDonald 2011,2016; Jiang et al. 2019; Li et al. 2021). Second, I add to the nascent literature that employs the CVF to measure corporate culture (Fiordelisi and Ricci

2014; Fiordelisi et al. 2019; Nguyen et al. 2019; Barth and Mansouri 2021; Chen et al. 2021a; Wang et al. 2021; Andreou et al. 2022; Fang et al. 2023).

Third, my study contributes to the literature on the role of corporate culture, as an intangible asset, in corporate finance and decision-making. In particular, in **Chapter 4**, I show the significant role of corporate culture in explaining CEO compensation structure, distinct from the traditional firm and governance characteristics that are popularly examined in the CEO compensation literature. In **Chapter 5**, I reveal the impact of corporate culture on cash holdings. While the previous studies focus on firm- and governance-level determinants, only a few studies looked at cultural factors, which are mainly related to national culture (Ramirez and Tadesse 2009; Chen et al. 2015; Dudley and Zhang 2016). My study differs from those as it focuses on corporate culture. I provide evidence consistent with corporate culture influencing firms' cash holdings via its role in determining the informational environment within the firm and its asymmetry between shareholders and managers.

Fourth, **Chapter 6** contributes to the limited literature on the determinants of corporate culture by focusing on how the structure and characteristics of the board of directors can be associated with corporate culture. According to O'Reilly et al. (2014) corporate culture values are reflected and shaped by the firm's board of directors. However, the empirical evidence on this premise is limited. My work in **Chapter 6** offers the first investigation of the role of the board of directors, and their connectedness, in influencing firms' culture. Connected independent directors have a positive and significant impact on firms' corporate culture and this positive association is more influential when firms require more advice due to the complex nature of their operations.

Chapter 2: Literature review on culture

2.1. Definition of culture

There are many definitions of what a solid perception of culture could be. Yet, the complexity of the definition of culture can be captured in the literature, as seen in Baldwin et al. (2006) who introduce a reference list that comprises more than 300 definitions of culture. Although these definitions come from different decades, they all reflect culture as a set of values and beliefs that are originally constructed within the individuals of a certain society (Hofstede 1980). As cited by Hofstede et al. (1990, p. 311), work going all the way back to Tylor (1924, p.1) defines culture as: "that complex whole which includes knowledge, beliefs, art, morals, law, customs and any other capabilities and habits acquired by man as a member of society". Culture can also be referred to as a comprehensive structure of communication that includes the genetic and practical attitudes of individuals with their spoken and non-spoken methods of expressive behaviour (Herbig and Dunphy 1998).

Originally, the perception of culture was studied in anthropology, social psychology, and sociology. Based on theoretical frameworks derived from these fields, many scholars of management and organisational studies dedicated their work to examining how individuals' and groups' beliefs, values, and other cultural aspects impact their behaviour (O'Reilly et al. 1991). Essentially, a corporation is an ideal example of a society. It is a group of individuals who are united by a collective system that holds a unique set of cultural values representing the corporate culture. In line with this view, O'Reilly and Chatman (1996, p. 160) define corporate culture as: "a system of shared values that define what is important, and norms that define appropriate attitudes and behaviors for organizational members".

Similarly, Crémer (1993, p. 354) provides a definition of corporate culture that refers exclusively to the shared understanding between the firm members: "the part of the stock of knowledge that is shared by a substantial portion of the employees of the firm, but not by the general population from which they are drawn." Consequently, a system of shared knowledge that is embedded in a stable communication environment plays an efficient role in improving a firm's decision-making. This definition is in line with Hsieh et al. (2018), who state that the focus of corporate culture on the internal environment of the firm is particularly crucial for improving the effectiveness of the internal decision-making and the communication

among firm employees. Alternatively, Schein (1984, p. 3) explains that corporate culture involves both internal and external environments of the organization:

> Organizational culture is the pattern of basic assumptions that a given group has invented, discovered or developed in learning to cope with its problems of external adaptation and internal integration, and that have worked well enough to be considered valid, and, therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to these problems.

Schein (1996, p. 236) later provides a shorter version of this definition, in which corporate culture is: "the set of shared, taken-for-granted implicit assumptions that a group holds and that determines how it perceives, thinks about, and reacts to its various environments."

The concept of corporate culture in my research is consistent with that of Schein (1984,1996), in which corporate culture is a significant asset for the firm to facilitate the communication within the internal and external environments to accomplish its goals. Furthermore, this definition supports the view that corporate culture is a shared social system that shapes the organisation as a whole (O'Reilly and Chatman 1996; Hartnell et al. 2011). In addition, it is in line with the prior literature that argues corporate culture is a key factor influencing firms' decisions and value (Guiso et al. 2006; Tabellini 2008; Hartnell et al. 2011; O'Reilly et al. 2014; Guiso et al. 2015a), and the growing empirical work that examines these relationships (e.g., Fiordelisi and Ricci 2014; Guiso et al. 2015b; Fiordelisi et al. 2019; Nguyen et al. 2019; Andreou et al. 2022; Graham et al. 2022).

2.2. Frameworks of culture and their importance to firm policies and value

Sharing homogeneous values and norms is a vital trait to strengthen the cultural facet of a certain society. Generally, the research examining the impact of culture on companies' performance and outcomes can be structured into two main cultural streams: national culture and corporate culture. The difference between these two is that the former distinguishes the values held by the members of one nation with respect to another nation. On the contrary, corporate culture distinguishes the different practices of individuals who hold the same values at the same workplace, compared to other firms (Hofstede et al. 1990).

2.2.1. National culture

In terms of the national culture framework, the research in finance has recently integrated this cultural breadth into empirical studies to show that it is a significant factor that influences the environment in which the firms operate and eventually impacts the decisions that firms make (Bryan et al. 2015). For example, Western countries are different from East Asian countries concerning their legal systems and financial institutions, and these differences are attributed to the national culture of these countries (Griffin et al. 2017). Thus, country-specific variables are significant determinants of firms' governance and transparency (Doidge et al. 2007), which vary across countries. Furthermore, the national culture of individuals impacts their decision-making in the firms that they work for (Frijns et al. 2016; Nguyen et al. 2018). Accordingly, incorporating national culture in recent finance research has provided notable evidence to deepen our understanding of the institutional reasons behind the variation of financial decisions made by firms in different countries. Such institutional characteristics may not be captured in the traditional finance models.

The research on national culture within the field of management, and more recently in finance and economics, has largely been motivated and enabled by the extensive work of Hofstede (1980; 1984; 2010), supplemented by Hofstede and Bond (1988). Hofstede conducted several surveys of employees at International Business Machines Corporation (IBM) across 70 countries between 1967 and 1973 to measure the national culture of countries. His work proposes a set of five dimensions that differentiate the values of cultural systems between nations: individualism vs. collectivism; uncertainty avoidance; power distance; masculinity vs. femininity; and long-term vs. short-term orientation. The more detailed definitions of these dimensions as outlined by Hofstede (2001, p. 29) are:

1- Individualism vs. collectivism is "related to the integration of individuals into primary groups."
2- Uncertainty avoidance is "the level of stress in a society in the face of unknown future."
3- Power distance is "related to the different solutions to the basic problem of human inequality."
4- Masculinity vs. femininity is "related to the division of emotional roles between men and women."

5- Long-term vs. short-term orientation is "related to the choice of focus for people's efforts: the future or the present."

Hofstede's work on national culture provides a comprehensive framework for management, finance, and economics research. However, it has been and continues to be criticised for the selection of the sample (i.e., individuals) who participated in the surveys and for the period that was used for collecting the data (1967-1973), which is considered out-of-date (Antonczyk and Salzmann 2014; Karolyi 2016).

Similar to Hofstede's (1983; 2001) work on national culture, several other studies are dedicated to establishing a better understanding of national culture, including providing newer metrics for researchers to apply. For example, Schwartz (1992) and his updated work (1994) configured seven dimensions of national culture that build upon individuals' psychological and social aspects. The World Values Survey (WVS)[5] is an universal project that started in 1981 and aims to study the changes in the values and beliefs of people around the world. The survey covers a wide variety of items such as the perceptions of life, politics, and national identity. This project has been conducted in waves; the sixth wave was completed in 2012 including 60 countries, and the seventh wave started in 2017 and just completed recently in 2022 covering 65 countries. Another recent project on national culture is the Global Leadership & Organizational Behaviour Effectiveness project (GLOBE), which was founded by the late Professor Robert House at the beginning of the 1990s. Currently, the GLOBE project involves more than 200 scholars in 62 countries and measures nine cultural dimensions. This metric of national culture dimensions, however, is less frequently applied by finance scholars than the Hofstede (2001) and WVS measures (Karolyi 2016).

Although the field of finance is perhaps the last field among the business disciplines to recognise the importance of cross-cultural research (Hofstede 2001; Karolyi 2016), there is an increasing amount of empirical literature examining the impact of national culture on different aspects of corporate finance. In an editorial paper in the *Journal of Financial Economics*, Zingales (2015) points toward the importance of the "cultural revolution" in providing more insights and answers to complement the traditional explanations in

[5] http://www.worldvaluessurvey.org

economics and finance research. This view is supported by earlier and current evidence in the finance field that considers cultural aspects when investigating firms' issues.

For example, Bae et al. (2012) study the impact of national culture on firms' dividend policy and corporate governance systems using three of Hofstede's (1980; 1991) dimensions. They argue that the perceptions of firms' managers and investors towards agency costs, information asymmetry, and financial flexibility depend on their country's culture. Accordingly, these three issues influence firms' dividend pay-out policy significantly. Studying a sample of industrial firms from 33 countries between 1993 and 2004, they find that firms operating in countries with a high level of uncertainty avoidance, masculinity, and long-term orientation pay lower dividends to their shareholders than firms operating in countries with lower levels of these cultural dimensions. However, the nature of this relation fluctuates in response to the degree of investor protection corporate governance system, where investor protection interacts with national culture and thus provokes higher dividend pay-outs in cultures with high masculinity or/and uncertainty avoidance. Using the dimensions of (Hofstede 1980; 2001) and (Schwartz 1992; Schwartz 1994), Li et al. (2013) find that firms in highly individualistic countries are more risk-taking than firms in lower individualistic countries, whereas firms in countries with a higher level of uncertainty avoidance and harmony (a cultural dimension from Schwartz (1992; 1994)) are negatively associated with risk-taking. In addition, a higher degree of managerial earning discretion strengthens the relationship between culture and risk-taking, and some firms' characteristics, such as larger firm size, abate this relationship.

Furthermore, several studies have examined the role of national culture on various corporate governance issues. Carrasco et al. (2015) use Hofstede's (1980) power distance and masculinity dimensions to examine the impact of national culture on the level of female board representation in a cross-section of 32 countries in 2010. They base their study on institutional theory, in which companies follow the institutional environment they belong to, and since culture is part of this environment, companies would construct models according to the intuitional values held by their countries or societies (Meyer and Rowan 1977). Accordingly, a national culture defined by certain values and beliefs is correlated with outcomes of gender inequity and potentially discrimination, examined as female board representation in Carrasco et al.'s (2015) study. Overall, their study provides significant

findings on the negative impact of power distance and masculinity on the proportion of female directors on firms' boards.

In a similar vein, Humphries and Whelan (2017) document the significant influence of Hofstede's (1980) national culture dimensions on four main corporate governance variables: gender; board independence; CEO duality; and the number of board meetings. These dimensions are power distance; individualism vs. collectivism; masculinity vs. femininity; and uncertainty avoidance. The results show that gender composition on the board of directors is negatively associated with power distance, masculinity, and uncertainty avoidance and positively associated with individualism. Board independence is more frequent in countries with higher individualism scores, whereas other dimensions only require a sufficient independence level. In addition, CEO duality has a positive and significant association with only one cultural dimension, the power distance. Lastly, board meeting frequency is higher in countries with higher power distance, masculinity, and uncertainty avoidance scores, and less among countries with higher individualism scores. Also focussed on corporate governance, Urban (2019) uses the power distance dimension of Hofstede (1980; 2001), two comparable dimensions from Schwartz (1994), and the strong-leader dimension from the WVS to show that greater CEO power stems from cultures that tend to support the hierarchical system of power distribution in their societies. He finds that greater CEO power could weaken the governance system in firms operating in those cultures.

Moreover, many papers examine the impact of national cultural differences on a certain firm. Broadly, this cultural dimension is referred to as "cultural distance", which is defined as "the average of cultural distances between each two directors; cultural distances are based on value scores from the Hofstede culture framework, or alternative culture frameworks" (Frijns et al. 2016, p. 540). Many studies investigate the impact of cultural differences within the board of directors (BOD) on firms' policies and outcomes. For example, Frijns et al. (2016) study a sample of 243 non-financial UK companies and show that cultural distance between the BOD members is an economically significant factor affecting firm performance. In particular, the differences in individualism vs. collectivism and masculinity vs. feminist dimensions are the most influential. In addition, the negative association between a larger cultural distance between BOD members and firm performance is greater in firms operating in less than three market sectors, whereas this disappears among firms operating in more than three sectors and firms with a great presence in foreign markets.

Frijns et al. (2016) argue that a diverse board implies diverse knowledge and expertise, thus a larger cultural distance between BOD members would be more beneficial to firms with more complex settings.

Engaging a similar approach, Dodd et al. (2019) show that cultural diversity within the BOD is associated with better corporate social performance, particularly in companies operating in industries that are extremely competitive and are more exposed to consumers. Hence, having a more culturally diverse BOD helps to improve the board's ability to fulfil the needs of a larger number of the firm's stakeholders. The impact of BOD diversity is also supported by Giannetti and Zhao's (2019) study, however, they find that diversity could have both positive and negative consequences for firms' outcomes, suggesting greater market and financial performance volatility. Ferris et al. (2022) take a broader perspective and look into the cultural differences between the CEO and the BOD members. They argue that a larger cultural distance between the CEO and independent directors hinders communication and transmission of information between them; thus, the directors require more solid indicators to evaluate CEO's ability, such as firm performance. Their findings show that BOD increases scrutiny for CEOs from a different culture by increasing the sensitivity of CEO turnover and compensation to firm performance. They also reveal that a wider cultural distance contributes to enhancing the firm's Tobin's Q.

Other studies use national culture dimensions as an indicator of the directors' behaviours. These studies argue that the origin of directors could shape their way of thinking and their attitudes as well as their decision-making processes towards firms' policies. For example, related to CEO decision-making, some studies have examined the impact of national culture on CEO overconfidence. Choi et al. (2013) conduct a cross-country analysis using firms in the Fortune 500 index, representing the largest companies from around the world. They argue that national culture influences CEO behaviour and their overconfidence levels toward decision-making. Accordingly, their results show that the forced turnover of overconfident CEOs is a worldwide phenomenon, and that overconfident CEOs face greater forced turnover than non-overconfident CEOs. In a related study, Ferris et al. (2013) use the same sample as Choi et al. (2013) and show that the global variation of CEO overconfidence also explains merger and acquisition activity within those firms. They propose that Hofstede's (1980; 2001) dimensions of individualism and long-term vs. short-term orientation are determinants of the variation of CEO overconfidence across countries. In

particular, they find that individualistic countries and countries that are less long-term oriented are positively associated with firms having overconfident CEOs. In addition, they find that those overconfident CEOs engage in more M&A investments than non-overconfident CEOs.

In a similar vein, using the board of directors' ancestry, Pan et al. (2017) use national culture dimensions to identify CEOs' and executives' preferences towards risk. Drawing on the uncertainty avoidance dimension, they show that firms with leaders originating from cultures synonymous with high uncertainty avoidance are associated with relatively lower R&D expenditures, fewer acquisition activities, higher levels of cash holdings, and are exposed to less cash-flow sensitivity. They also note that risk culture is persistent across leadership such that successive leaders tend to have similar risk culture preferences. Similarly, Nguyen et al. (2018) use CEO heritage to define firms' risk culture. They exploit the competitive shocks in the banking industry to capture the CEO decisions, in such circumstances, that are driven by their characteristics. Therefore, there is heterogeneity in the decision-making of CEOs from different ancestry. Examining a sample of US banks, they show that banks managed by CEOs who are second and third-generation immigrants of cultures that have higher levels of harmony, restraint, uncertainty avoidance, and long-term orientation, are associated with better performance compared to banks whose CEOs are from other cultural origins. This association is particularly significant in more competitive industry settings.

Despite the evidence that national culture can contribute to explaining firms' policies and outcomes, this analysis has an obvious limitation. National culture represents the values and beliefs of the society as a whole, including its corporations (Hofstede 1984; Guiso et al. 2006). Thus, it would impact all firms operating within this certain society, hampering the ability to detect the role of culture on the variations in corporate outcomes across companies within the same country. Hence, the very latest literature has focussed on studying corporate culture to provide more insights into the influence of culture on firm performance and effectiveness.

2.2.2. Corporate culture

The other stream of research on culture in finance has devoted significant attention to corporate culture. Prajogo and McDermott (2011) posit that culture is an intangible asset that impacts firm performance as holding mutual values and norms within the firm among its employees could be translated into a strong corporate culture that would benefit the overall firm's performance (Sørensen 2002). Guiso et al. (2015b) point toward the importance of having an efficient corporate culture in attracting and retaining employees who hold values that are similar to the values of their firms. In this way, corporate culture is considered an intrinsic motivator that complements the traditional governance system. Thus, it increases the employee's commitment to the firm and eventually reflects positively on the firm value. This view is supported by Hsieh et al. (2018) who highlight the importance of culture for a firm's success. They argue that corporate culture could be an effective facilitator for building firms' strategic planning and thus it would be directly linked to the firm's performance. In addition, the importance of corporate culture can also be observed in the managerial and leadership community. Graham et al. (2022), surveyed senior executives of 1,348 US firms and report that 79% consider corporate culture as an important asset for impacting firm performance, and 92% deem that enhancing their corporate culture would increase their firm value. Accordingly, there has been an increasing number of empirical studies in recent years that incorporate corporate culture in their investigations, given the importance of such a topic.

Extending beyond the use of national cultural values to examine the impact of culture on firm outcomes and decision-making strategies, the research on corporate culture and finance is smaller in size, but has been increasing in recent years. In particular, only a few studies have identified specific social values to establish the theoretical frameworks that underpin the role of corporate culture on firms. According to Guiso et al. (2015a), there are four main reasons why research on corporate culture should be concentrated on the firm's own values. First, corporations are micro societies in which the founders have the authority to set the values of their firms from the start. Second, cultural values are easier to be modified in firms rather than in larger societies like countries. Third, merger and acquisition activities between firms may expose them to different cultural values. Fourth, it is easier to relate corporate culture to firm performance, thus allowing examination of the role of the shared cultural values within a firm while controlling for the traditional economic and financial factors.

Unlike the research linking national culture to finance, the empirical literature on corporate culture is much more diverse in defining and applying a range of cultural dimensions. In fact, corporate culture frameworks may include one or many different dimensions that could reflect a firm's shared values (Jiang et al. 2019). Some studies rely on one dimension to measure corporate culture. For example, integrity is a crucial component of corporate culture that determines R&D and innovation and investment-cash flow sensitivity (Grieser et al. 2017; Jiang et al. 2019). Grieser et al. (2017) measure integrity by calculating the number of employees who use their corporate email accounts to register on a website that encourages extramarital affairs. Thus, a higher number of employees using this website may indicate lower integrity. Their findings suggest that there is a trade-off between integrity and firm innovation, in which creative companies encourage their employees to be innovative, and sometimes creativity might lead to unethical behaviour and looser internal controls. Alternatively, Jiang et al. (2019) employ a textual analysis of Chinese companies' websites, formal reports, and media reports to measure culture according to integrity. Using the Concise Oxford English Dictionary and The Contemporary Chinese Dictionary, they define a set of words that parallels integrity. Their study reveals that firms with a higher integrity score invest more and have lower investment-cash flow sensitivity and, accordingly, better access to capital to finance their investments.

Another dimension used as a corporate culture measure is employee-friendly firms. According to Fauver et al. (2018), an employee-friendly workplace represents an effective corporate culture, as treating employees well would enhance their performance and lead to better overall performance, measured by ROA, ROE, and Tobin's Q, higher sales-to-asset ratios, and more patents and lower costs. Focusing on an international sample covering 3446 firms from 43 countries, Fauver et al. (2018) rely on Thomson Reuters' ASSET4 database (ASSET4) to construct their employee-friendliness measure. This database provides scores on five main categories for how firms treat their employees. Similarly, Chen et al. (2016) suggest that an employee-friendly work environment is a significant factor in achieving greater innovation success, particularly in industries where innovation failure is a greater possibility. Nevertheless, Chen et al. (2016) focus on a smaller sample comprises of 1500 firms and use the KLD database employee relations scores and the '100 Best Companies to Work for in America' list compiled by the Great Place to Work® Institute to construct their measure.

In contrast, when investigating only a single indicator for corporate culture, the literature also studies the 'dark side' of the corporate culture. Referring to 'unethical culture', Biggerstaff et al. (2015) examine the suspicious behaviour of CEOs concerning their stock option holdings. They show that CEOs who are involved in option backdating, are more likely to commit fraudulent activities within their firms than CEOs who do not engage in such action. In particular, those suspicious firms overstate their earnings and make more acquisition deals, especially acquiring private firms. In addition, such firms are subject to at least a 40% reduction in their stock prices during market corrections. In a similar study, Davidson et al. (2015) use executives' personal behaviour as a type of corporate culture. They reveal that firms led by CEOs and CFOs who have prior legal transgressions, such as traffic violations and domestic violence, are more likely to commit fraud.

Rather than examining a single dimension of corporate culture, other studies investigate several indicators. The reason is that companies could have a mix of several dimensions that represent their corporate culture (Quinn and Rohrbaugh 1983; Andreou et al. 2022). Thus, having a conceptual framework that combines several values and norms could be more effective in representing the firm's culture more comprehensively. There are numerous corporate culture frameworks in the management and organisational behaviour fields (Hsieh et al. 2018). One of these frameworks is the Organisational Culture Profile (OCP) presented by O'Reilly et al. (1991) and modified by O'Reilly et al. (2014). Originally, this framework is constructed using a 54-item survey that requests respondents to assess the values and attributes of their organisations. The earlier version of this assessment proposes eight cultural dimensions: innovation and risk-taking; supportiveness; decisiveness; outcome orientation; attention to detail; aggressiveness and competitiveness; collaborative and team orientation; emphasis on growth and rewards. The latter work suggests six main dimensions: adaptability; collaboration; integrity; results orientation; detail orientation; and customer orientation.

The recent work by Graham et al. (2022) identifies seven cultural values after surveying firms' directors. Six of these values are the same as O'Reilly et al. (2014) as listed above, and the seventh is the community orientation value. The addition of the seventh value in Graham et al. (2022) matches the work of Guiso et al. (2015b) that identifies the most advertised values on S&P 500 companies' websites. After the aggregation process of the top 50 values that were found on the websites, Guiso et al (2015b) identify nine core values:

teamwork; innovation; integrity; respect; community; quality; safety; hard work; and communication. Nevertheless, only the integrity value has a significant positive impact on firm performance. A similar approach in detecting the five most common values promoted by the S&P 500 companies on their websites has been adopted by Li et al. (2021). These values include innovation, teamwork, respect, integrity, and product quality. After identifying these values, the study applied a machine learning approach by analysing firms' earnings call transcripts to measure their corporate culture.

A further influential and widely-applied framework is the Organisational Culture Assessment Instrument (OCAI), also known as the Competing Values Framework (CVF), which was founded by Quinn and Rohrbaugh (1983) and developed by Cameron et al. (2006). Surveying academic experts to evaluate Campbell's (1977) 30 organisational effectiveness criteria, Quinn and Rohrbaugh (1983) established the CVF framework representing four competing cultural values divided between two main broader dimensions: focus (internal vs. external) and structure (flexibility vs. control).

So far, considering all the frameworks of corporate culture reviewed above, the empirical work in finance mostly often applies the CVF to measure corporate culture and examine its impact on firm policies and outcomes. Indeed, based on the four dimensions of the CVF, namely *Collaborate*, *Control*, *Create* and *Compete*, there have been a few, yet increasing, number of studies in finance that examines the role of corporate culture on firm outcomes. For example, Fiordelisi and Ricci (2014) study the role of corporate culture on CEO turnover and the association between culture and turnover-performance sensitivity. Using a specific dictionary to capture these four dimensions in firms' 10-K filings, they find that each dimension has a different impact on CEO turnover. More specifically, they argue that firms with competitive, creative, and collaborative cultures have a stronger link to financial effectiveness and therefore, they hypothesise that those firms should have stronger incentives to change the CEO, and such firms would have higher turnover-performance sensitivity, that is, changing the CEO after poor performance. In line with their first proposition, they find that firms with competitive and creative cultures (both of which are external orientations) are associated with higher CEO turnover. More surprisingly, they do not find evidence confirming their second proposition. The inverse relationship between firm performance and CEO turnover is reinforced in firms with a control culture dimension (an internal orientation), but is weakened in firms with a creative culture (an external

orientation). Furthermore, firms with a creative culture are more likely to hire CEOs from outside the firm after the poor performance of the incumbent CEO. This work of Fiordelisi and Ricci (2014) has provided the research design to motivate subsequent projects to adopt the CVF to analyse the influence of these four dimensions of corporate culture on many other firm policies and outcomes.

Nguyen et al. (2019) show that banks with a focus on growth, relating to the competitive culture under the CVF, have higher loan approval rates, lower credit quality of borrowers, and fewer covenant requirements compared to banks with a control culture that has more emphasis on safety. As a result, growth-focused banks experience higher losses and contribute to systemic risk when the industry exhibits distress. Also in the banking industry, Barth and Mansouri (2021) adopt the CVF to show that corporate culture is a 'softer' governance tool to enhance banking stability. In particular, they report that banks with competitive culture have more bonus-based compensation packages, confirming that competitive culture creates a robust link between performance and rewards. In addition, they report that banks with growth-oriented cultures (*Create* and *Compete*) have higher stock returns, whereas banks with focus-oriented cultures (*Collaborate* and *Control*) face less bankruptcy risk.

Fiordelisi et al. (2019) investigate whether firms with a creative culture are positively associated with innovation success, finding a positive result. As the creative dimension encourages employees to be more creative and more willing to take the risk, this approach leads to more R&D activity, a corporate strategy well-known to be risky. Additionally, a creative culture achieves more innovative success, in the form of patent citations, and a higher Tobin's Q than similar firms oriented by the other cultural dimensions under the CFV. Similarly, Wang et al. (2021) reveal the positive association between creative corporate culture and firm innovation in an emerging market context using Chinese firms.

Focusing on audit fees, Chen et al. (2021a) argue that a collaborative cultural dimension enhances communication and harmony between firms' managers and employees. In addition, firms with such a culture give more freedom to employees to report any problems and errors, thus reducing litigation and control risk, and subsequently lowering audit risk premiums. Consistent with their argument, they find that firms with a collaborative culture pay lower audit fees. However, the economic significance is limited with a standard deviation

increase in a firm's collaborative culture being associated with only a 2.2% decrease in audit fees. In addition, the indirect mediation effect of the litigation and control risk lead to only a 1% and 0.1% reduction in audit fees, respectively.

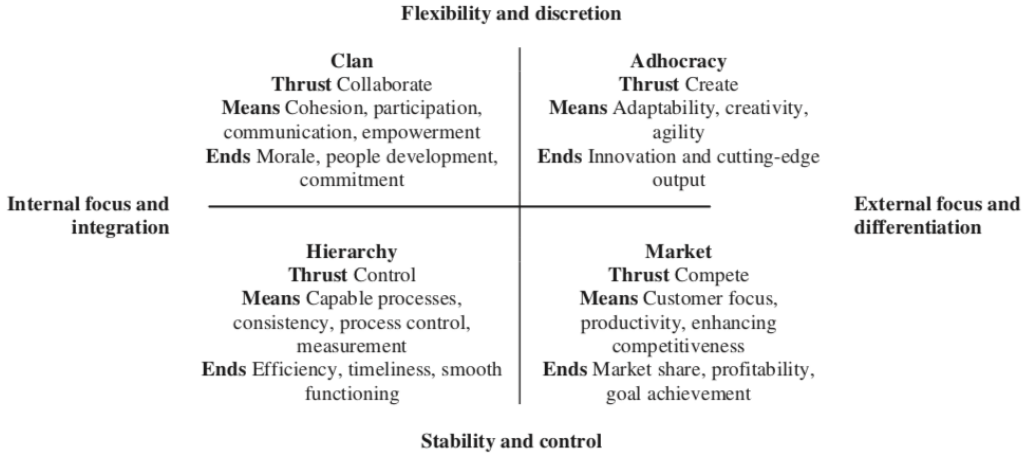
Another recent contribution is by Fang et al. (2023) who shed light on the important role of corporate culture in enhancing firm stability during financial crises. In particular, they provide evidence that among the four cultural dimensions of the CVF, firms with a strong control culture managed the turbulence of the financial crisis of 2008-2009 better than firms adopting other cultural dimensions. Control-oriented firms witnessed 2.3% higher stock returns and $81.8 million larger market value compared to the average market value at the start of the crisis year ($3,502). Furthermore, such firms had lower earnings volatilities, a lower probability of gaining a downgrade on their credit rating, and greater firm profitability.

So far, the studies reviewed above show that various cultural frameworks are important for different firm policies and outcomes. Predominantly, the research on corporate culture remains in its infancy. This thesis aims to contribute to this field by adopting the CVF as the main theoretical corporate culture framework. In the next section I introduce the CVF, highlight the criticisms of it that are raised by the literature, and provide justifications for adopting the CVF as the theoretical background of corporate culture in this thesis.

2.3. The Competing Values Framework (CVF)

The CVF is important because it provides a holistic representation of core corporate culture values as it classifies corporate culture along two axes, as shown in Figure 2.1. Each axis represents two main orientations. The horizontal axis measures internal focus and integration to the left and external focus and differentiation to the right. The vertical axis captures flexibility and discretion at the top and stability and control at the bottom. The four quadrants of the diagram, demonstrating the interactions between these orientations, define the four dimensions of corporate culture under the CVF.

Figure 2.1: The Competing Values Framework (CVF)



Source: (Hartnell et al. 2011, p. 679) figure 1, adapted from (Cameron et al. 2006, p. 32)

The left-hand portions of the diagram show the two cultural dimensions related to the internal orientation. The top left quadrant is the *Collaborate* culture (*Clan* culture), which focuses on human affiliation and attempts to develop a robust communication system among firms' employees. This type of culture promotes teamwork, open communication, employee involvement, and participation. Managers in these firms act as mentors and facilitators and the decision-making is decentralised (Zammuto et al. 2000). The bottom left quadrant represents the *Control* culture (*Hierarchy* culture), which is influenced by control mechanisms, whereby the roles of employees are clearly defined and follow standardised procedures. This type of culture promotes conformity, efficiency, and predictability. In contrast to the *Collaborate* culture, managers in firms that adopt a *Control* culture are more bureaucratic and the decision-making process follows a structure of vertical communications and strict policies (Zammuto et al. 2000).

The two cultures illustrated in the right-hand quadrants are associated with external orientation. The *Create* culture (*Adhocracy* culture) in the top right emphasises firm growth by encouraging employees to be innovative. As such, it promotes creativity, risk-taking, and innovation. In this type of culture, the communications system follows a horizontal structure where managers focus on informal control and coordination policies (Zammuto et al. 2000). Finally, in the bottom right quadrant, the *Compete* culture (*Market* culture) informs the objective of profitability by increasing market share, which is achieved by fostering internal competition allowing employees to be compensated based on their achievements. This type of culture promotes aggressiveness, task and target focus, and planning and determination of

clear goals (Cameron et al. 2006; Hartnell et al. 2011). Managers in these firms are action-initiators and direction-providers toward achieving rational goals, and the decision-making follows a centralised process (Zammuto et al. 2000).

Although the CFV is among the top business models adopted by organizations (Ten Have et al. 2003), and it is widely applied and examined in the literature, it is worth mentioning that this theoretical framework is not without criticism. For example, Hartnell et al. (2011) report mixed evidence for the nomological validity of the CVF. That is, culture dimensions may not accurately represent the same values identified by the CVF's theoretical assumptions for each quadrant. For instance, as hypothesised by Hartnell et al. (2011) and relying on the CVF theory, Compete should have the strongest association with product quality. However, they find that Collaborate has stronger association with product quality than Compete. Therefore, their results fail to support the anticipated relationships between these cultural dimensions and the organizational effectiveness variables used in the analysis.

Chatman and O'Reilly (2016) also question the nomological validity of the OCAI survey that was used to establish the CVF dimensions. They argue that this assessment tool may capture various notions such as organisational leadership, practices, strategy, and structure. Therefore, the construct of the OCAI may have more breadth and ambiguity than the set of values recognised by the CVF, which may influence the identification of corporate culture and create potential mis-measurement. In addition, they highlight that some questions on the OCAI were misplaced or placed in multiple categories. For instance, the item "unique and new products and services" is positioned in the Criteria for Success category, however, it could be positioned in the Strategic Emphasis category. Therefore, as the survey could introduce inconsistencies in its structure, it could be argued that the evaluation of these category items in the assessment is ambiguous and might provide confusing empirical evidence (Chatman and O'Reilly 2016; Gorton et al. 2022).

A second criticism reported by Hartnell et al. (2011) is that they argue that the theoretical assumptions underpinning the CVF internal structure should suggest that these values are competing in reflecting conflicting values. That is, Collaborate should have a negative or insignificant correlation with its opposite quadrant Compete, and the same negative or null correlation should be witnessed between Control and Create. Hartnell et al. (2011) provide meta-analytic evidence to test this theoretical proposition and find that there

are strong, positive correlations among the four cultural types. Thus, Hartnell et al. (2011) assert that this evidence challenges the CVF theory, which claims that the dimensions are paradoxical or competing, and propose instead that they might be complementary. Chatman and O'Reilly (2016) also raise this point and note that there is a difficulty in distinguishing which of the values on the CVF are competing.

In their book, Cameron et al. (2022) attempt to respond to these criticisms. To start, they argue that Hartnell et al. (2011) failed to measure corporate culture adequately in their study. Although Hartnell et al. (2011) used various proxies to measure the four dimensions of corporate culture, Cameron et al. (2022) stress that all these indicators measure corporate climate and not corporate culture.[6] Thus, the analyses and conclusions of the CVF presented by Hartnell et al. (2011) may be subject to scrutiny as corporate culture in their study was not necessarily correctly assessed. Despite this response from Cameron et al. (2022), the criticism of what the CVF is actually measuring remains pertinent in the literature. Chatman and O'Reilly (2016) argue, in addition to their criticism of the validity of the CVF internal structure, that measuring corporate culture using the CVF cannot be easily differentiated from other organizational concepts such as organizational climate because of the complexity of the CVF in capturing different corporate concepts and not just culture.

As a response to the nomological validity criticism of the CVF in Hartnell et al. (2011), Cameron et al. (2022) argue that Hartnell et al. (2011)'s study misclassified some effectiveness criteria that should be representing each dimension adequately. For example, Hartnell et al. (2011) proposed that the effectiveness criteria 'product quality' should have the strongest relation with *Compete* culture, but found the strongest association is between *Collaborate* and product quality. However, Cameron et al. (2022) suggest that product quality is supposed to indicate a Control culture, as *Control* based on the CVF signifies values of low-cost, error-free, timely, and effective products and services. Since Hartnell et al. (2011) excluded *Control* from their analysis, their result on *Collaborate* and product quality may be inaccurate due to this omission. Thus, according to Cameron et al. (2022, p.189) the meta-analysis evidence in Hartnell et al. (2011) suffers from common method bias

[6] "Climate refers to easily changed indicators of relatively temporary attitudes or perceptions. Culture refers to much more enduring, implicit measures of stable organizational characteristics" (Cameron et al. 2022, p.189).

– "that is, not being able to differentiate between the measures of culture and the outcomes being assessed." In other words, imprecisely measuring the cultural dimensions and eliminating the Control culture from their study may have created a biased assessment method that challenges the conclusions of Hartnell et al. (2011) analysis.

In addition, responding to the critique of Chatman and O'Reilly (2016) on the nomological validity of the OCAI, which was used to measure the four dimensions of the CVF, Cameron et al. (2022) provide comprehensive empirical evidence showing that the OCAI is a reliable instrument to measure corporate culture and such sufficient evidence corroborates the accuracy of the CVF nomological validity as well as its internal structure.

Furthermore, regarding the criticism of the CVF internal structure, the analysis of Hartnell et al. (2011) postulates that firms would have only one type of culture, hence, the meta-analysis results that show positive and strong correlations among the four dimensions invalidate the competing presumptions of the framework. In contrast, Cameron et al. (2022) highlight that based on the CVF research, firms could have a mix of all cultural dimensions, and sometimes one or more cultural types dominate. Thus, the meta-analysis results in Hartnell et al. (2011) may not have sufficient weight or grounding to draw such a strong conclusion on the validity of the CVF internal structure. [7]

Identifying these potential limitations of the CVF, the literature proposes an alternative perspective to construct the paradigm of corporate culture. For example, Hartnell et al. (2011) and Chatman and O'Reilly (2016) call for a more holistic approach by incorporating comprehensive theory to accurately conceptualise and measure corporate culture. They debate whether corporate culture comprises more than the four dimensions represented by the CVF. Instead, corporate culture may involve more depth and may include complex norms and values that can be transformed into visible behaviours and attitudes.[8]

[7] For a cohesive critique of the CVF and of the research on corporate culture in general please see Chatman and O'Reilly (2016), and for a detailed response to the criticisms of the CVF internal structure and nomological validity please see Chapter 11: Responding to the criticisms of the Competing Values Framework in (Cameron et al. 2022).

[8] These norms can broadly be divided into two main control systems; formal control systems, such as performance management and financial controls and social control systems, such as accepting the hierarchical position or other leadership status. Most importantly, these control systems are what shape the corporate culture and construct its dynamics (Chatman and O'Reilly 2016).

These norms, therefore, can be used to reflect the psychological mechanisms underlining the corporate culture and can be linked to individuals' and firm's performance.

Taking into consideration the criticisms and the potential alternative approaches to identify corporate culture, and accepting that there is no ideal framework for corporate culture, there are five main reasons for choosing the CVF. First, although there is no consensus in the literature on the precise definition of corporate culture, all potential candidates suggest that values and beliefs are two aspects that represent a reliable measure of corporate culture (Linnenluecke and Griffiths 2010). This is provided by the four cultural values in the Competing Values Framework (CVF), meaning that it meets the minimum requirement that its definitions are consistent with those applied in the very broad literature that spans multiple disciplines (Quinn and Rohrbaugh 1983; Cameron et al. 2006), and especially those definitions that are firmly established and applied in the management and organisational studies literatures (Linnenluecke and Griffiths 2010; Cameron and Quinn 2011; Hartnell et al. 2011).

Second, it is more efficient to study several values that could shape corporate culture more comprehensively, rather than focusing on one dimension. The CVF cultural taxonomy identifies the organisation's four core values in a simple way and organises them in an accessible and communicable framework (Thakor 2016). This is crucially important for this thesis as there is a general lack of theoretical grounding of corporate culture in the finance field, and its literature is still developing. Consequently, taking advantage of a robust, established framework from the organisational studies literature would provide validity and reliability to any study investigating the relations between corporate culture and different aspects of corporate finance.

Third, the CVF incorporates cultural values/dimensions that are predicted to enhance organisation performance and these values are comparatively reflected in other frameworks (Fang et al. 2023). For example, the *Collaborate* dimension in the CVF is similar to the *collaborative* dimension in (O'Reilly et al. 1991; O'Reilly et al. 2014; Graham et al. 2022) and *teamwork* in Guiso et al. (2015b) and Li et al. (2021). The *Create* dimension in the CVF matches the *innovation* of Guiso et al.(2015b) and Li et al. (2021). The *Control* dimension in the CVF is comparable to the *detail orientation* of (O'Reilly et al. 1991). Finally, the CVF's *Compete* dimension illustrates the same values in the *outcome orientation, aggressiveness*

and *competitiveness*, and *emphasis on growth* and *rewards* dimensions of O'Reilly et al. (1991) and product quality of Li et al. (2021).

Fourth, the methodological approach for constructing the four dimensions of the CVF is quite appealing. As demonstrated in the literature, measuring corporate culture in empirical studies has proven to be a difficult issue (O'Reilly et al. 1991; Graham et al. 2022). Nevertheless, the latest research on corporate culture has employed sophisticated textual analysis approaches to measure it (Fiordelisi and Ricci 2014; Li et al. 2021). Using this methodology allows me to measure corporate culture objectively (Fiordelisi and Ricci 2014).

Fifth, the application of the CVF is still in its early stages. The literature has begun to adopt this framework to investigate the role of corporate culture on corporate finance topics including CEO turnover (Fiordelisi and Ricci 2014); innovation (Fiordelisi et al. 2019; Wang et al. 2021); bank risk-taking (Nguyen et al. 2019); banking stability (Barth and Mansouri 2021); audit fees (Chen et al. 2021a), and firm stability during crisis times (Fang et al. 2023). There is uncertainty remaining about the extent of other relationships between corporate culture and the potential breadth of corporate finance issues. Therefore, using the CVF in this thesis allows me to anchor the research design to an existing framework, whilst providing the opportunity to contribute to this young literature. Specifically, I examine the importance of corporate culture dimensions, represented by the CVF, on three issues that have yet to be explored: CEO compensation, firms' cash holdings, and independent directors' connectedness.

Acknowledging the difficulties in measuring corporate culture to provide metrics and variables for use in quantitative finance research, the next chapter explains the methodology used in this thesis for measuring the corporate culture dimensions according to the CVF. Following the recent literature, I overcome the measurement difficulties by adopting a textual analysis methodology to identify and quantify corporate culture. This novel empirical approach is encouraged by the CVF, since it helps to define the dictionaries used to construct the variables for each dimension. An added advantage of the CVF, compared to other frameworks, is its theoretical links to certain topics in corporate finance and governance, which generate convincing motivations for my new applications and contributions to the emerging literature.

Chapter 3: Measuring corporate culture

3.1. Measuring corporate culture

Although there is no consensus in the literature on the precise definition of corporate culture, all potential candidates suggest that values and beliefs are two aspects that represent a reliable measure of corporate culture (Linnenluecke and Griffiths 2010). However, measuring corporate culture in empirical studies has proven to be a difficult issue (O'Reilly et al. 1991; Graham et al. 2022). Initially, the concept of corporate culture was well established and measured in the field of organisational behaviour using qualitative, quantitative, or mixed-methods approaches and based on surveys and questionnaires (O'Reilly et al. 1991; O'Reilly et al. 2014). In contrast, corporate culture has only begun to receive limited attention in recent years in the field of finance, although this has grown as measures of culture appropriate to the type and nature of research in finance have been developed (Zingales 2015).

Recognising that measuring corporate culture is challenging, almost all of the studies reviewed earlier in Chapter 2 rely on quantitative methods to measure and test hypotheses related to corporate culture, which is in line with the dominant deductive-positivistic epistemology in finance (Biggerstaff et al. 2015; Davidson et al. 2015; Chen et al. 2016; Grieser et al. 2017; Fauver et al. 2018). Two exceptions to this measurement approach are the work of Guiso et al. (2015b) and Graham et al. (2022), who use survey responses to measure corporate culture. Guiso et al. (2015b) first identify the main cultural values from S&P 500 companies' websites. After determining integrity as the most advertised value, they use survey responses from the Trust Index© employee survey (TIES) provided by the Great Place to Works Institute (GPTWI) to construct the measure of this integrity culture dimension. According to Graham et al. (2022), the survey-based technique helps to provide more detailed information from firms' leaders on their corporate culture allowing them to describe their firms' values from their personal viewpoint.

In my research, I apply Quantitative Textual Analysis (QTA) to measure corporate culture. QTA is a "research technique for making replicable and valid inferences from texts (or other meaningful matter) to the contexts of their use" (Krippendorff 2004, p. 18). It is an objective tool that allows researchers to follow a systematic procedure to create their

framework of inquiry to extract rich information from their data (Krippendorff 1989). As such, it assists the researcher to measure the semantic content of companies' official documents exclusive of any subjectivity that may bias the results (Fiordelisi and Ricci 2014). Another advantage is that QTA using computing software and power can be applied to large and comprehensive samples covering many firms (Loughran and McDonald 2016). QTA has already been applied in the finance literature to construct measures for sentiment analysis (Loughran and McDonald 2011), with a broader review of the use of QTA in finance provided by Loughran and McDonald (2016). However, this technique has only relatively recently been applied in corporate finance and governance to measure corporate culture (e.g., Fiordelisi and Ricci 2014; Jiang et al. 2019; Li et al. 2021). Thus, applying QTA in this study provides a small contribution to this growing stream of literature.

This research adopts the Competing Values Framework (CVF) founded by Quinn and Rohrbaugh (1983) and developed by Cameron et al. (2006) to provide the theoretical background to the research design and to inform the measurement of corporate culture variables. As such, this research follows a few studies that have already adopted the CVF to measure corporate culture (Fiordelisi and Ricci 2014; Fiordelisi et al. 2019; Nguyen et al. 2019; Barth and Mansouri 2021; Chen et al. 2021a; Wang et al. 2021; Andreou et al. 2022; Fang et al. 2023). These works applying Quantitative Textual Analysis (QTA) on companies' annual reports, 10-K filings, or any other publicly available official statements or announcements to measure the four dimensions of the CVF.

More specifically, I use the dictionary developed initially by Fiordelisi and Ricci (2014) and then updated by Fiordelisi and Ricci (2021) to measure the corporate culture dimensions defined by the CVF using US firms' 10-K filings extracted from the SEC's Edgar database. This dictionary is established using the two-step process of obtaining the set of synonyms identified by Cameron et al. (2006) describing each cultural dimension of the CFV, then detecting additional variations of these synonyms of keywords from the Harvard IV-4 Psychosocial Dictionary. Depending on this dictionary helps to lessen any subjectivity in the chosen synonyms because it isolates the researcher's judgment of word categorisation (Loughran and McDonald 2011). Accordingly, it allows researchers to measure firms' corporate culture dimensions in an objective manner, as reflected in the text of their annual reports (Fiordelisi and Ricci 2014; Nguyen et al. 2019). Two further advantages of the 10-K filings are: (1) the language used in these documents are accurately reflecting different

characteristics of firms' operational and financial situations and the language-related information is directly linked to firm value; and (2) these pieces of information are presented and provided in detail in these filings to analysts, investors, institutions, regulators, and other parties of interest (Fang et al. 2023). Hence, using the same techniques and dictionary in this thesis ensures consistency and comparability with the previous studies in measuring corporate culture, and offers better replicability for future work.

Table 3.1 shows the full list of synonyms for each dimension of the CVF according to the updated version of Fiordelisi and Ricci (2021). Each cultural dimension has a specific set of words that are synonyms related to these dimensions. For instance, words like 'boss, chief, monitor' are associated with the *Control* dimension. Words such as 'achieve, target, customer' reflect *Compete* dimension. *Collaborate* can be echoed in words like 'commitment, cooperate, facilitate'. Lastly, the *Create* dimension can be denoted in words such as 'innovate, new, adapt'.

Table 3.1: The CVF dictionary

Culture type	Bag of words
Control	Boss*, bureauc*, cautio*, chief*, conflict*, conservat*, control*, detail*, document*, efficien*, error*, expectat*, fail*, inform*, logic*, method*, monit*, norm*, outcom*, procedur*, regular*, solv*, standard*, uniform*
Compete	Achiev*, acqui*, aggress*, agreem*, attack*, budget*, challeng*, charg*, client*, compet*, customer*, deliver*, direct*, driv*, excellen*, expand*, fast*, goal*, hard*, invest*, market*, mov*, outsourc*, performanc*, position*, pressur*, profit*, rapid*, reputation*, result*, revenue*, satisf*, , scan*, signal*, speed*, strong*, success*, superior*, target*, win*
Collaborate	Capab*, certain*, cohes*, collab*, collectiv*, commit*, consens*, cooperat*, coordin*, cultur*, decentr*, employ*, empower*, engag*, facilitator*, help*, hir*, human*, interper*, involv*, life*, loyal*, mentor*, mutual*, parent*, particip*, partner*, people*, relation*, retain*, reten*, skill* , social*, team*, train*, workgroup*
Create	Adapt*, begin*, chang*, creat*, discontin*, dream*, elabor*, entrepre*, envis*, experim*, fantas*, freedom*, futur*, idea*, init*, innovat*, intellect*, learn*, new*, origin*, pioneer*, radic*, risk*, start*, thought*, trend*, unafra*, ventur*, vision*

This table shows the full list of words used to construct corporate culture variables for each cultural dimension of the CVF, following Fiordelisi and Ricci (2021).

To begin to measure corporate culture, I download the 10-K filings from the Securities and Exchange Commission SEC's Edgar database for all US listed firms during the period 1999-2019. Each filing represents a specific company in a specific year. After parsing

the textual parts of the filings into vectors of words (excluding the cover pages, figures, tables, and annexes), I apply QTA to capture the frequency of each corporate culture keyword in the dictionary.[9] Each cultural score is the frequency ratio calculated as the sum of its keywords divided by the total count of words in the 10-K report. For instance, if the frequency of *Collaborate* culture keywords is 750 in a 10-K filing containing 28,330 words, the *Collaborate* ratio would be 2.65%. For each firm, I have four scores that measure the four dimensions of corporate culture each year. For example, Skyworks Solutions, INC culture scores in 2015 are: 0.66% for *Control*, 2.85% for *Compete*, 0.71% for *Collaborate*, and 1.09% for *Create*. These ratios can be affected by shocks within a certain industry or market, therefore, they tend to fluctuate over time (Nguyen et al. 2019). As the three empirical chapters in this thesis consist of samples covering firms from all industries, excluding financials and utility firms, I use the time-varying ratios.

To give a general illustration of these scores, Table 3.2 reports the summary statistics and correlation matrix of each dimension of the CVF for the initial sample. The sample consists of all publicly US firms listed in the NYSE, AMEX, and NASDAQ stock exchanges, with 187,895 firm-year observations (35,715 firms) covering the period between 1999 to 2019 (around 9,000 observations per year). The number of observations is comparable to previous studies, such as Fiordelisi and Ricci (2014) who obtain 128,489 10-K filings from 1994 to 2011 (roughly 7,500 observations per year), and Andreou et al. (2020) who report a sample consisting of 214,910 firm-year observations over the period 1994-2017 (9,000 observations per year). As can be seen in Panel A, there is a variation across the scores of the four corporate culture dimensions, which is consistent with (Fiordelisi and Ricci 2014; Barth and Mansouri 2021). On average, 0.60%, 2.1%, 0.70% and 0.72% of the whole 10-K filing signify a *Control, Compete* and *Collaborate* and *Create* culture, respectively. This indicates that *Compete* is the most advertised cultural value, while *Control* is the least promoted cultural value based on the 10-K filings. According to the maximum scores of these dimensions, *Control* has the highest score of 17.24% in a certain firm followed by *Compete, Collaborate,* and *Create.*

[9] A full description of the corporate culture measurement steps is outlined in the Appendix.

Table 3.2: Summary statistics

Panel A. Summary statistics of corporate culture for the full sample

	Mean	Std. Dev.	Median	Max	Min
Control	0.582	0.238	0.582	17.241	0.173
Compete	2.145	0.516	2.239	5.179	0
Collaborate	0.691	0.243	0.658	3.542	0
Create	0.716	0.192	0.746	3.448	0

Panel B. Summary statistics of corporate culture for each industry (Fama-French 12)

Industry	*Control*		*Compete*		*Collaborate*		*Create*		
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Obs.
1 Consumer Nondurables	0.551	0.272	2.068	0.377	0.666	0.217	0.682	0.231	8,280
2 Consumer Durables	0.579	0.229	2.089	0.374	0.633	0.150	0.704	0.190	4,137
3 Manufacturing	0.582	0.255	2.063	0.392	0.625	0.156	0.665	0.183	15,772
4 Energy	0.560	0.160	1.775	0.327	0.626	0.293	0.725	0.156	7,751
5 Chemicals and Allied Products	0.563	0.182	1.998	0.328	0.639	0.201	0.689	0.207	4,134
6 Business Equipment	0.643	0.221	2.644	0.517	0.712	0.180	0.752	0.178	32,564
7 Telephone and Television Transmission	0.504	0.249	2.395	0.413	0.654	0.182	0.706	0.186	5,225
8 Utilities	0.554	0.245	1.954	0.305	0.625	0.276	0.709	0.175	7,196
9 Wholesale, Retail, and Some Services (Laundries, Repair Shops)	0.576	0.215	2.105	0.428	0.701	0.258	0.688	0.188	16,471
10 Healthcare, Medical Equipment, and Drugs	0.613	0.253	2.126	0.322	0.745	0.192	0.704	0.152	22,428
11 Finance	0.555	0.251	1.890	0.515	0.694	0.291	0.765	0.213	39,047
12 Other	0.573	0.226	2.165	0.494	0.721	0.295	0.680	0.196	24,890
Total	0.582	0.238	2.145	0.516	0.691	0.243	0.716	0.192	187,895

Panel C. Correlation matrix

Variables	*Control*	*Compete*	*Collaborate*	*Create*
Control	1			
Compete	-0.104***	1		
Collaborate	-0.126***	0.073***	1	
Create	-0.013***	0.364***	0.036***	1

This tables reports the summary statistics and correlation matrix for the four dimensions of corporate culture proposed by the CVF. The data were extracted from the 10-K reports in the SEC's Edgar database. Panel A reports the summary statistics for the full sample which consists of 187,895 firm-year observations from 1999 to 2019, and Panel B shows the summary statistics for the corporate culture dimensions by dividing the sample by Fama and French 12 industry classification. Panel C shows the Pairwise correlation coefficient of the four cultural dimensions. *** indicates significance at the 1% level.

Panel B shows the summary statistics for the corporate culture dimensions by dividing the sample by Fama and French 12 industry classification (financial and utility firms are excluded). As shown, the *Compete* dimension continues to represent larger percentages of firms' cultural dimensions compared to the three others in all industries.

Lastly, Panel C reveals the pairwise correlation coefficients of the four cultural dimensions. The largest correlation is 0.36 between *Create* and *Compete*, while the smallest correlation is -0.01 between *Create* and *Control*, both are significant at the 1% significance level. As the correlations among the four dimensions are weak, I deviate from most recent studies by studying the joint effects of all four cultural dimensions on various firms' business and financial positions and firm performance. This can proceed without concerns over multicollinearity.

Before proceeding to the empirical chapters, it is important to note a caveat to my study relating to the technical application of textual analysis to measure the dimensions of the CVF, which exists in addition to the debate in the literature surrounding the validity of the CVF discussed above. While the CVF dictionary employed in this thesis is used in the prior literature (Fiordelisi and Ricci 2014; Fiordelisi et al. 2019; Nguyen et al. 2019; Barth and Mansouri 2021; Fiordelisi and Ricci 2021; Wang et al. 2021), there are a few limitations that I have encountered while using this dictionary. First, some keywords do not appear within the disclosures of 10-K filings, such as bureauc*, dream*, fantas*, unfra*, workgroup*, and interper*. This suggests that the choice of words in the CVF dictionary could be arbitrary and may not be sufficient enough for detecting corporate culture. Furthermore, textual analysis has its constraints as it primarily captures corporate culture through written content, and it may not fully encompass cultural traits that are challenging to convey in text. Consequently, the cultural variables could be prone to measurement errors and might never completely encapsulate the essence of corporate culture (Fang et al. 2023). In addition, using the 10-K filings to detect this dictionary might have limitations. According to Guiso et al. (2015b), the synonyms associated with corporate culture in the 10-K reports might reflect the values firms promote, irrespective of whether those values genuinely exist.

Lastly, although this bag-of-words is the conventional dictionary implemented by the previous studies, none of them empirically validate the measures of the CVF. Thus, as the

research on corporate culture in corporate finance is developing, a more definitive and empirically validated dictionary would help or even be necessary to inform future studies.

In terms of the most recent finance research using the CVF, Andreou et al. (2020) re-consider the importance of selecting a more relevant dictionary to define the bag-of-words, from which the CVF dimensions can be measured. They exploit the OCAI survey itself to create a new bag-of-words containing keywords that are more appropriate for measuring corporate culture as defined by the CVF. Another advantage of their methodology is that it improves the dictionary by evaluating the context in which each word is utilised across the 10-K filings. Furthermore, Andreou et al. (2020) also carry out four validity tests: content validity; external validity; dimensionality validity; and predictive validity to corroborate the construct validity of their dictionary.

Chapter 4: Corporate culture and CEO compensation

4.1. Introduction

This chapter investigates the impact of corporate culture on CEO compensation. CEO compensation is a topic of great importance that has always captured the attention of finance scholars, practitioners, and legislation policymakers. With the consistent increase in these compensation plans over the years, a massive number of studies has proposed theories and examined a wide range of firm and governance-level factors that could determine CEO pay levels and structure (e.g., Jensen and Meckling 1976; Jensen and Murphy 1990; Mehran 1995; Core et al. 1999; Bebchuk et al. 2002; Bebchuk and Fried 2003; Van Essen et al. 2015; Chen et al. 2019a). Yet, there is still limited empirical evidence on the role of unconventional factors, such as social or cultural factors, that may impact CEO compensation. Meanwhile, the importance of corporate culture has become increasingly apparent in the recent literature. There is a growing interest in the role of corporate culture in influencing various firm outcomes (e.g., Fiordelisi and Ricci 2014; Guiso et al. 2015b; Grieser et al. 2017; Fiordelisi et al. 2019; Jiang et al. 2019; Nguyen et al. 2019; Li et al. 2021; Andreou et al. 2022; Graham et al. 2022; Fang et al. 2023), but, so far, the literature has not examined the relationship between corporate culture and CEO compensation. I fill this gap by linking dimensions of corporate culture under the CVF to theories explaining CEO compensation and risk-taking preferences and exploring whether there is empirical evidence to support such relationships.

Agency theory is the dominant theoretical framework that scholars adopt to explain CEO compensation and investigate various issues linked with it. Under the agency theory established by Jensen and Meckling (1976), a firm's shareholders (principals) assign the firm's managers (agents) and authorise them to have a full responsibility for their firm's decision-making processes. According to this theory, conflicts of interest may arise between risk-neutral shareholders and risk-averse CEOs, which need to be controlled by incentivising CEOs with valuable compensation plans that link their wealth to those of shareholders (Eisenhardt 1989; Wiseman and Gomez-Mejia 1998). Rau (2017) points out that firms would align the interest of their executives with those of shareholders by optimally setting the structure of compensation plans between equity- and cash-based compensations. For example, to incentivise the CEO to be more risk-taking and to enhance shareholder wealth, equity-based compensation would be more efficient.

The empirical evidence on CEO compensation implements the agency approach to explain the effectiveness of optimal contracting on the design of CEO compensation packages in mitigating conflicts resulting from dissimilarities in risk preferences between the firms' directors and shareholders (e.g., Smith and Watts 1992; Mehran 1995; Ryan and Wiggins 2002; Alessandri and Pattit 2014). However, thus far, very little attention has been paid to how culture might impact CEO compensation. Linking the agency theory and risk-taking aspect of CEO pay to cultural factors, Bryan et al. (2015) show that companies in societies that are less tolerant of risk and conflict and prefer stability, design their compensation to have more cash (fixed) compensation than equity. Their study focuses on national culture and examines how cultural differences contribute to the variations in the compensation structure across countries. More related to corporate culture, Barth and Mansouri (2021) report that banks with a culture that is competition-oriented would design their compensation plans in a way that fits their needs. Therefore, such firms will provide more bonus (variable) compensation instead of fixed salary, to attract CEOs who share the same competitive values. Similarly, Li et al. (2021) show that firms with a strong corporate culture that promotes risk-taking, have a positive and significant association with CEO pay-performance sensitivity. My investigation aims to extend these findings by examining this research question: *Does a firm with a specific type of corporate culture optimally design the structure of CEO compensation to meet the risk-taking values reflected in its culture?*

Corporate culture can reflect the firm's behaviour towards risk-taking (Nguyen et al. 2019). In particular, the risk-taking perspective is related to the Competing Values Framework CVF (Quinn and Rohrbaugh 1983; Cameron et al. 2006), the adopted theoretical framework in this research. The identification of corporate culture in the CVF distinguishes four dimensions of culture that represent the internal or external emphasis of firms. Collaborative and control cultures are internally oriented, and they share a safety focus, with these firms promoting compliance, certainty, and safety. Alternatively, creative and competitive dimensions share a growth focus, whereby such firms promote risk-taking, creativity, and competitiveness (Nguyen et al. 2019). Thus, the relationship between corporate culture dimensions and their associated attitudes towards risk matters when the firm sets its CEO's compensation and whether this is done to induce risk-taking. As demonstrated in the compensation literature, equity-based compensation is more efficient in

inducing the CEO to take more risky decisions and to link their wealth to those of shareholders.

Accordingly, to answer the research question, I propose that firms with a safety-focus culture that promotes lower risk-taking (*Collaborate and Control*) prefer to provide their CEO with more cash incentives, a less risky form of compensation, and less equity compensation to maintain their stability and safety. On the other hand, firms with a growth-focus culture that tolerates more risk-taking (*Create and Compete)* design compensation packages to have more equity incentives compared to cash to motivate the risk-taking behaviour of the CEO and to align the interests of the CEO and shareholders to achieve growth. Thus, I hypothesise that safety-focus cultures are negatively (positively) associated with equity (cash) incentives; and growth-focus cultures are positively (negatively) associated with equity (cash) incentives.

To test these hypotheses, I apply Quantitative Textual Analysis (QTA) on firms' 10-K filings to measure corporate culture based on the CVF dimensions. The QTA, initially introduced to finance by Loughran and McDonald (2011; 2016), is a method that has been recently applied in studies of culture in finance (e.g., Loughran and McDonald 2011; Fiordelisi and Ricci 2014; Nguyen et al. 2019; Li et al. 2021). The premise of this method is to have four scores of corporate culture, each of which represents one of the dimensions of the CVF: *Collaborate, Control, Create,* and *Compete*.[10] I measure CEO compensation using two proxies: CEO *Equity incentives* and CEO *Cash incentives*. These are ratios of the equity (including restricted stock and stock options) and cash (including salary and bonus) compensations relative to total compensation.

I construct a sample consisting of 11,475 firm-year observations, with 1,511 unique non-financial non-utility firms in the Standard and Poor's (S&P) 1500 index, ranging from 1999 to 2018. The empirical analysis reveals results consistent with my hypotheses for the *Compete* culture. In particular, the estimations of the baseline regression find that firms with a competitive culture include higher equity and lower cash incentives in their CEO pay. More precisely, firms with a competitive culture provide roughly 1% higher (lower) equity (cash) incentives to their CEOs. The baseline results confirm my proposition that firms with growth-focused cultures are more likely to make riskier decisions than firms with more safety-

[10] A full explanation of measuring corporate culture under the CVF is presented in Chapter 3.

focused cultures (Nguyen et al. 2019). Thus, firms with corporate culture promoting risk-taking design their compensation plans with more equity-based and less cash-based compensation to motivate risk-taking behaviour and link these rewards with shareholders' wealth. As equity compensation incentivises the CEO risk-taking, equity-based incentives are more important than cash-based incentives in firms with competitive cultures.

Extending my analysis beyond the baseline regressions, I perform a range of robustness, endogeneity, and further tests. I test the robustness of the baseline results to alternative measures of corporate culture dimensions: the dominant corporate culture, which is an indicator variable of the main cultural scores and an alternative cultural framework and its sub-components, provided by Li et al. (2021), that might parallel the dimensions of the CVF. The main findings are robust to these two alternative measures of corporate culture. In particular, the results for the alternative dominant culture measures are consistent with the baseline estimations. A *Compete-dominant* culture is significantly associated with both equity and cash incentives at the 1% level of statistical significance and with opposing signs. When using the Li et al. (2021) corporate culture measures, the results show less significant coefficient estimates compared to the CVF. In other words, the associations between these alternative measures of corporate culture and CEO compensation are lower than and different to those of the CVF. For example, *Innovation* and *Quality* have the correct direction of the association with CEO incentives as anticipated by the research hypotheses. Conversely, *Teamwork* is not in the predicted direction for equity and cash, which should be similar to *Collaborate*. The significance level of these associations may appear or disappear according to the regression model specification. This suggests that the Li et al. (2021) cultural dimensions are indeed different from the CVF dimensions. However, to provide a more stringent test of the CVF cultural dimensions, I add the Li et al. (2021) cultural variables as controls in the baseline regression model. My original findings remain significant in explaining the relationship between corporate culture and CEO compensation, particularly *Compete*.

To investigate the impact of endogeneity concerns from omitted variables and reverse causality, I employ several endogeneity tests. First, I re-run the baseline regression using independent variables whose values are lagged by one year. Second, I perform two matching techniques: propensity score matching and entropy balancing. In these analyses, I compare CEO incentives in a treatment group against a control group, where treatments are firms with

a particular dominant corporate culture, and the controls are firms without that dominant corporate culture. Lastly, I estimate a two-stage least squares (2SLS) regression using the industry mean culture score as an Instrumental Variable (IV). The results of the competitive culture remain significant and unchanged. These are in line with the research hypotheses for equity and cash incentives. The results also are consistent with the findings of Li et al. (2021) on how a strong corporate culture that promotes risk-taking has higher equity-based compensation linked to performance. The results also add to Barth and Mansouri (2021) study on the banking industry on how a competitive culture optimally designs CEO compensation to have more variable incentives to match their cultural values. Results for the other dimensions, such as *Collaborate*, and *Control* are not significant. The results on *Create* show few significant coefficients in line with the risk-taking hypothesis, but their significance depends on the specifications employed.

In further analysis, to understand the relationship between corporate culture and CEO compensation more thoroughly, I examine the impact of corporate culture on CEO incentives and pay-performance sensitivity (PPS). In particular, I test whether compensation plans determined by corporate culture are sensitive to firm performance and so better align the interests between the firm's CEO and shareholders. I measure firm performance by Return on Assets (ROA) or annualised stock return. As growth-focused cultures (*Create* and *Compete*) are more risk-taking than safety-focused cultures (*Collaborate* and *Control*), I propose that CEO incentives would be more sensitive to firm performance in *Create* and *Compete* than in *Collaborate* and *Control*. In general, the tests corroborate my proposition. In terms of, accounting performance (ROA), the analysis reveals that *Create* and *Compete* improve the sensitivity of CEO cash incentive to firm performance. Alternatively, *Compete* has lower sensitivity to firm accounting performance when designing CEO equity-based incentives. Nevertheless, this evidence adds more support to the argument that firms with a competitive culture design CEO equity compensation plans to motivate them to take more risks, regardless of the short-term accounting performance. When using stock return as market performance, the results show that CEO equity incentives are more sensitive to performance in firms with a competitive culture. Overall, the PPS tests add to the theoretical arguments and empirical evidence by demonstrating that *Compete* (and *Create* in a few model specifications) as a growth-focused culture is more risk-taking and therefore firms with such a culture optimally structure CEO incentives to match these risk-taking preferences and ensure that they are directly linked and sensitive to firm performance.

In this chapter, my work contributes to the nascent literature investigating the implications of corporate culture on firm policies. A small number of studies examine the effects of corporate culture on different firms' outcomes, such as CEO turnover (Fiordelisi and Ricci 2014); R&D and innovation development (Grieser et al. 2017; Fiordelisi et al. 2019; Wang et al. 2021); investments-cash flow sensitivity (Jiang et al. 2019); stock options backdating (Biggerstaff et al. 2015) and financial reporting and fraud (Davidson et al. 2015); audit pricing (Chen et al. 2021a); and firm value (Li et al. 2021; Fang et al. 2023). I extend these studies by highlighting the role of corporate culture in shaping CEO compensation.

Furthermore, my study adds to the literature on the determinants of CEO compensation. While the previous studies focus on firm- and governance-level determinants, only two studies have examined corporate culture (Barth and Mansouri 2021; Li et al. 2021). My work differs from Li et al. (2021) in five ways. First, they use S&P 500 companies' websites to determine the five most mentioned cultural values, whereas I adopt the CVF that theoretically establishes and defines the four cultural values that would lead to increased firm value. Second, they implement a machine-learning model to identify words related to their cultural values, whereas I use a predetermined dictionary that was introduced by Cameron et al. (2006) and extended by Fiordelisi and Ricci (2014,2021).

Third, Li et al. (2021) use the Q&A section in earning calls to measure corporate culture dimensions, while I use 10-K filings. Their measure attempts to capture the corporate culture from the CEO's engagement in the more spontaneous discussion on earnings calls, which may also capture the CEO's feelings rather than the corporate's culture. Alternatively, the 10-K documents are written by top directors and must be agreed upon and signed by most of the directors on the board, reflecting the type of culture that the majority of the directors share (Fiordelisi and Ricci 2014). Also, 10-K filings present detailed information to analysts, investors, institutions, regulators, and other parties of interest, and the related information reflect different characteristics of firms' operational and financial situations and is directly linked to firm value (Fang et al. 2023). Fourth, Li et al. (2021) use a total measure for the corporate culture that aggregates the five values covered in their analysis, namely *Strong Culture*. However, I focus on the four values of the CVF individually. This approach enables me to analyse and better understand whether the distinct values promoted by each dimension have a different effect on CEO compensation structure, and so providing new evidence to the

theoretical and empirical literature. Fifth and more directly related to CEO compensation, Li et al. (2021) focus on the pay-performance sensitivity using equity incentives Delta and Vega, whereas I focus on the CEO compensation structure, including both equity and cash compensation, in addition to testing the pay-for-performance sensitivity.[11]

Furthermore, my study extends the work of Barth and Mansouri (2021), which focuses on a sample from the banking industry, by including all industries in the S&P, excluding utilities and financial firms, and so generalising the results to a greater variety of firms. Barth and Mansouri (2021) debate that corporate culture is a signalling tool, and specifically *Compete* is a signal that allows banks to attract employees with similar competitive values. In my study, I argue that cultural dimensions represent the innate risk-taking behaviour of firms, and according to agency theory, firms would optimally design CEO compensation structures in a way that aligns CEO interests with those of shareholders and the firm's cultural values towards risk-taking behaviour.

The remainder of this chapter is organised as follows: Section 4.2 provides the theoretical and empirical background of CEO compensation, the link between culture and CEO compensation, and the development of hypotheses; Section 4.3 describes the data; Section 4.4 reports empirical results, robustness tests, and endogeneity tests; Section 4.5 offers further analyses; and Section 4.6 concludes the chapter.

4.2. Literature review and hypotheses

4.2.1. CEO compensation: Theoretical and empirical background

Under the agency theory established by Jensen and Meckling (1976), a firm's shareholders (principals) assign the firm's managers (agents) and authorise them to have full responsibility for their firm's decision-making processes. Yet, an agency conflict may arise between firms' shareholders and managers following this delegation. Primarily, the essence

[11] Delta is the change in the dollar value of a CEO's stock and option portfolio with respect to a 1% change in stock price, and Vega is the the change in the dollar value of a CEO's stock and option portfolio with respect to a 1% change in the annualised standard deviation of stock return (Coles et al. 2006). Compensation structure is the ratio of equity or cash compensation to total compensation, this is explained thoroughly in section 4.3.2.2.

of agency conflict is built upon the logic that the shareholders may own shares in many firms, this enables them to diversify the risk in their portfolios. However, the directors may have their wealth concentrated in their companies, and thus they are less likely to diversify their risk (Eisenhardt 1989). This risk-positioning is what influences the behaviour of managers and shareholders and may lead to amplifying the conflict of interests. Particularly, it is assumed that shareholders are risk-neutral and would tolerate risky investment decisions to gain higher return and maximise their wealth, whereas managers are risk-averse with respect to a specific firm and their investment decisions in that firm (Mehran 1995; Wiseman and Gomez-Mejia 1998; Gomez-Mejia et al. 2019).

Thus, to overcome this agency issue and to moderate the conflict of interest between the shareholders and executive team in terms of risk-taking preferences, firms set a contract persuading the risk-averse managers to be more risk-taking (Jensen and Murphy 1990; Gomez-Mejia et al. 2019). The compensation contract's goal is to influence managers' decision-making and ensure that their interests and rewards are aligned with those of shareholders, specifically, to incentivise managers to strive to achieve certain outcomes, such as profitability, that are desirable for shareholders, but that managers' would not otherwise aim for because of their risk aversion (Jensen and Meckling 1976; Tosi et al. 2000; Bebchuk et al. 2002).

Hirshleifer and Suh (1992) propose a theoretical model using the principal-agent theory and show how risk-neutral shareholders motivate the risk-averse CEO to make more risky decisions. Generally, and using multiple scenarios, they document that when there is a desirable risky project, shareholders would offer the CEO more performance-based compensation, such as stock options or any other performance-related compensation, to moderate the CEO's risk aversion.

Alternatively, Edmans et al. (2009) provide a theoretical model, under competitive market equilibrium, in which they suggest that the CEO may be risk-neutral, and thus he would maximise his effort to increase firm value regardless of the risk involved. Considering a multiplicative setting for the CEO's utility function (derived from his wage and other private benefits) and production function (his effort), they argue that "the benefits of effort (proportional to firm value) vastly exceed the costs (proportional to the CEO's wage), and so maximum effort is always optimal, regardless of risk" (Edmans et al. 2009, p.4885). The key

insight is that other types of incentives such as perks, referred to as additive issues, cannot effectively solve the agency conflict as these are fixed costs and independent of firm value. Thus, these types of incentives cannot be manipulated through compensation contracts, but can be controlled by effective monitoring.

In a later paper, Edmans and Gabaix (2011) extend the work of Edmans et al. (2009) to include CEO risk aversion in their model. Similar to Hirshleifer and Suh (1992), Edmans and Gabaix (2011) show that a risk-averse CEO might act in a way that exacerbates the agency issues, and thus risk-induced incentives are necessary to motivate him to take value-increasing risky investments.

Although there has been debate in the literature alluded to above, the consensus is that incentives can be managed by compensation. Collectively the studies suggest that, irrespective of the conceptualisation in previous work on the behaviour of CEO toward risk, compensation plans are designed and offered to attenuate the agency costs between the firm's shareholders and the CEO and to help maximise firm value.

However, it is ambiguous whether companies provide higher compensation simply to moderate the agency problem. Accordingly, a more complicated stream of literature that is built on the agency theory assumptions, distinguishes two contrasting approaches to the relationship between agency problems and executives' compensation: optimal contracting and managerial power (Bebchuk and Fried 2003). The optimal contracting approach considers compensation plans as a *remedy* for the agency problem. According to Jensen and Murphy (1990), CEO compensation would be an effective instrument for alleviating the principal-agent problem between firms' CEOs and shareholders, as it is designed to provide the CEOs with valuable incentives aligned with those of shareholders so that they take decisions that increase shareholder wealth. This view is consistent with Mehran (1995, p. 179) who declares that "one way to mitigate the conflict of interest between managers and shareholders in the corporate form of organisation might be through compensation contracts". On the other hand, the managerial power approach considers compensation plans to be a *part* of the agency problem as executives may exploit their position to gain higher compensation (Bertrand and Mullainathan 2001; Bebchuk et al. 2002). This is in line with Jensen et al.

(2004) who argue that executive compensation might be a component of and sometimes a source of the agency problem.[12]

To date, many studies examine the directors-shareholders agency conflicts to explain CEO compensation level and structure. Particularly, most of the published work on compensation examines the effectiveness of optimal contracting in the design of CEO compensation packages and in explaining the alignment of risk-taking preferences between the CEO and shareholders. The empirical investigations by Smith and Watts (1992) and Mehran (1995) conclude that the optimal contracting approach is effective in explaining the design and the changes in compensation contracts among different US firms. For example, A fixed compensation (salary) bares less uncertainty than a variable compensation (stocks and stock options) that depends on firm performance and outcomes. Therefore, to incentivise the CEO to enhance shareholder wealth, equity-based compensation would be more efficient (Rau 2017). These studies contend that this theory justifies such differences in pay as a method to mitigate any conflicts resulting from dissimilarities in risk preferences between the firms' directors and shareholders.

This is consistent with Guay (1999), who documents that increasing the riskiness of the CEO's stock option holdings induces them to take risky investment decisions that eventually could reflect positively on the share price, thereby aligning the interests of their shareholders with those of the CEOs. Coles et al. (2006), Low (2009) and Dittmann et al. (2017) also confirm the effectiveness of structuring CEO compensation to include more equity-based compensation to encourage CEO risk-taking and to increase shareholders' value.

More recent literature confirms this evidence. For example, using constituents of the Standard and Poor's 1500 index, Ryan and Wiggins (2002) find that firms' R&D investments are positively associated with CEO equity-based compensation. As such, the efficient design

[12] More broadly, the optimal contracting approach may also be referred to as the shareholder value view, whereas the managerial power approach is known as managerial rent extraction. From the shareholder value view, companies set sufficient compensation packages to retain and attract executives who would play a crucial role in maximising shareholders' wealth in competitive market settings. In contrast, for the managerial rent-extraction view, the executives set their compensation packages to maximise their wealth (Edmans et al. 2017).

of CEO compensation balances the risk-taking and incentive alignment between the CEO and shareholders. Building on the previous study, Alessandri and Pattit (2014) explore the joint impact of agency theory and the risk-taking by testing the indirect relationship between CEO incentives and firms' R&D investments. In particular, the authors use equity-based incentives as they link an executive's wealth to a firm's performance and stock price. Thus, equity-based incentives involve higher risks to CEO wealth than cash incentives and, therefore, would motivate them to make more risky investment decisions on R&D. Analysing a sample of 573 publicly traded US firms in the manufacturing industry between 2001 and 2007, they shed light on the role of CEO option grants and stock ownership as drivers of risk-taking on two organisational practices that impact positively on R&D activities: organisational slack and distance from bankruptcy. Their findings suggest higher equity-based compensation is a motivator for executives' risk-taking behaviour.

In a related vein, Cheng et al. (2015) reveal that risky firms, with firm risk measured by higher stock return volatility and stock market beta, optimally provide their risk-averse CEO more compensation, compared to less risky firms, to incentivise them to make more risky value-increasing decisions and to compensate them for tolerating the additional risk that comes from working in an environment with uncertain future payoffs. Focusing on a sample covering 1373 US companies between 1996-2014, Chen et al. (2019b) examine the association between dividend policy and the new CEO's initial compensation. They argue that new CEOs require more compensation to face the pressure of maintaining the firm's goals of increased performance and retaining dividend payments. Thus, for the firm to guarantee to achieve such objectives, they link CEO compensation with the firm performance by paying more compensation to the newly appointed CEO. Supporting the optimal contracting view, they show that well-governed firms play an effective role in setting dividend-induced compensation premium.

Despite the studies that corroborate the effectiveness of optimally designing CEO compensation to include more risk-taking incentives, a stream of literatures provides results that are in contradiction with this notion. For example, Yermack (1995) challenges the previous evidence and reports that the use of equity-based compensation in US publicly traded firms is inconsistent with the optimal contracting theory. In more recent studies, Edmans et al. (2009) and Edmans et al. (2017) report mixed results concerning the link between CEO risk-induced incentives and firm risk.

Consequently, and in contrast to the optimal contracting view, fewer studies find support to the managerial power viewpoint of CEO compensation. For example, Bertrand and Mullainathan (2001) document that luck played a significant role in determining CEOs' compensations. In their study of the oil industry, they conclude that compensation is positively associated with the increased firm revenues caused by external reasons, i.e., positive shocks in the oil price, rather than by directors' efforts. However, these luck-based compensation arrangements do not decrease following negative shocks. In addition, they report that well-governed firms pay less for luck than poorly governed firms. Nevertheless, they posit that governance plays a small role when linking CEO compensation to a firm's performance. These results point toward the role of executives in determining their compensation, which challenges the optimal contracting view. In a similar vein, Chen et al. (2011) and Van Essen et al. (2015) state that CEOs with stronger power over the board of directors can engage in rent extraction and receive higher compensation packages, which is consistent with the managerial power theory.

In line with this view, Core et al. (1999) examine a sample of 205 publicly traded US companies. Although board independence should be a monitoring governance mechanism in limiting the level of compensation, the study reports a positive and significant association between independent directors and CEO total compensation. Their study concludes that CEOs are able to receive higher compensation even when their firm performance is low, particularly when their company has a weak governance system. In a more recent study, Van Essen et al. (2015) also point toward the positive association between CEO total and cash compensation and two CEO power indicators including CEO duality and board size, which supports the managerial power theory. Conversely, when the board is more powerful in setting compensation than the CEO, through concentration of ownership and institutional ownership, such managerial power diminishes, and CEO receives less cash and total compensation. Nevertheless, the managerial power theory does not provide strong evidence when testing Pay-for-Performance Sensitivity. In particular, Van Essen et al. (2015) show that PPS is stronger with board size, independence and institutional ownership, and insignificant with CEO duality, suggesting that CEO might not have the power to alleviating the pay-performance link.

Overall, both optimal contracting and managerial power views are possible explanations for executive compensation under the agency theory. Yet, there seems to be more empirical evidence supporting the optimal contracting rather than the managerial power to align the risk-preferences of managers and shareholders to reduce agency conflict. Nevertheless, most of the previous work rely on firm and governance-related factors to explain compensation structure. There is still limited empirical evidence on the role of unconventional factors, such as social or cultural factors, that may influence CEO compensation and the alignment of incentives between managers and shareholders. In this research, I attempt to extend this literature by examining whether corporate culture can influence CEO compensation structure via the agency conflict and its risk-taking perspective. This study is important because it seeks new evidence concerning the determinants of CEO compensation that operate in addition to the main, traditional mechanisms of corporate governance examined in the literature. The next two sections review the related literature on culture and CEO compensation and develop the research hypotheses.

4.2.2. Culture and executive compensation

The previous empirical work on CEO compensation adopting the agency perspective to motivate their investigations is extensive, yet only a few studies have attempted to investigate the role of culture in this matter. These investigations also advocated the agency theory as the common approach to explain their results. For example, Tosi and Greckhamer (2004) use the national cultural dimensions of Hofstede (1980; 2001) to investigate its role in the structure of CEO compensation. They argue that an agency bias arises across cultures, which may subsequently feed into the design and content of compensation packages. Studying various industrial countries during the period 1997-2001, they find that two cultural dimensions (power distance and individualism) are positively related to CEO compensation, both variable and total compensation. Their study reveals that national cultural dimensions contribute to explaining the differences in CEO compensation across countries.

In a similar vein, Bryan et al. (2015) document that Hofstede's (1980) cultural dimensions of individualism and uncertainty-avoidance are most likely to be environments influencing agency conflicts and risk-taking between companies' executives and shareholders. In support of their views, they find that differences in these two cultural dimensions across countries are significantly related to the variations in CEO compensation

structures. Comparing differences in cultural scores between US and non-US firms, they demonstrate that individualism differences are positively associated with CEO equity compensation. The reason is that CEOs in societies with a high level of individualism are more inclined to serve their interests over those of shareholders. Thus, in an individualistic society, an agency conflict might be more likely to arise. Consequently, firms provide more equity-based compensation in countries with high individualism to align the interests of executives with those of shareholders. This result is in line with the agency theory and adds evidence on the role of national culture to the empirical literature on the determinants of CEO compensation. Furthermore, uncertainty-avoidance differences are negatively associated with CEO equity compensation. According to Bryan et al. (2015), societies with a higher level of uncertainty avoidance are less tolerant of risk, conflict, and competition. Accordingly, shareholders in such societies would be less willing to take risks and correspondingly, companies prefer stability and would optimally design their compensation to have more cash compensation than equity to avoid risks and uncertainty for the firm, and to reduce the severity of agency conflicts between shareholders and the CEO.

Apart from these two studies that examine national culture, only two others have investigated the direct role of corporate culture on CEO compensation. Li et al. (2021) show that firms with a strong culture have a positive and significant association with CEO pay-performance sensitivity.[13] Firms with a strong culture promote risk-taking behaviour and long-term orientations, thereby linking CEO equity compensation to firms' performance and stock volatility. In the only application of culture under the Competing Values Framework CVF in the literature, Barth and Mansouri (2021) investigate the impact of corporate culture on CEO compensation, but only in a sample comprising 89 banks. Related to the optimal contracting perspective of CEO compensation, Barth and Mansouri (2021) argue that banks with a culture that is competition-oriented would design their compensation plans consistent with their culture and objectives. Therefore, banks with a *Compete* culture provide more bonus compensation instead of fixed salary, so as to attract CEOs who share the same competitive values. Their findings are supportive. CEOs working in banks with a competitive culture have larger bonus-based compensation. However, they do not report any other

[13] Li et al. (2021) define strong culture as an indicator variable that takes the value of one if the sum of the five most mentioned cultural values on companies' websites is in the top quartile across all Compustat firms in a year, and zero otherwise. The values are *Quality, Innovation, Teamwork, Respect, and Integrity*.

significant relationships between CEO compensation and *Create*, *Collaborate,* and *Control* oriented cultures, and they do not investigate CEO equity compensation in their analysis.

Hence, apart from these two studies, there remains more to discover on the links between corporate culture and CEO compensation. This study aims to fill this gap. I extend the previous literature by investigating how a firm with a specific type of corporate culture would optimally design the structure of CEO compensation to meet the risk-taking values reflected in its culture.

4.2.3. The relationships between the CVF and CEO compensation and hypothesis development

This section relates the four dimensions of the CVF to the theoretical underpinnings of CEO compensation and derives the related hypotheses to be tested. The main objective of compensation, according to agency theory, is to align the interests between the firm's CEO and shareholders (Jensen and Meckling 1976; Tosi et al. 2000). According to this theory, conflicts of interest may arise between risk-neutral shareholders and risk-averse CEOs, which need to be controlled by incentivising CEOs with valuable compensation plans that link their wealth to those of shareholders (Eisenhardt 1989; Wiseman and Gomez-Mejia 1998). Especially, firms with a more risk-taking approach might need to incentivise the CEO with larger compensation plans than firms that are less risky to achieve the desired growth (Cheng et al. 2015). Rau (2017) points out that firms would align the interest of their executives with those of shareholders by designing compensation plans optimally to include more equity-based compensations and less cash. This risk-preferences perspective is related to the CVF, as the identification of corporate culture along the horizontal axis (Figure 2.1 in Chapter 2) distinguishes the internal or external emphasis of firms.

More specifically, the horizontal axis differentiates a firm with an inward orientation concerning its internal environment from a firm with an outward orientation emphasising its external environment (Zammuto et al. 2000). Nguyen et al. (2019) consider these two orientations from a risk-taking perspective and apply their propositions specifically to the banking industry. They indicate that *Collaborate* and *Control* characteristics in the left-hand quadrants, and to the left-hand side of the horizontal axis, share a safety-focus with firms promoting compliance, certainty, and safety within these cultural dimensions. On the other

hand, *Create* and *Compete* dimensions in the right-hand quadrants, so to the right-hand side of the horizontal axis, share a growth-focus, whereby firms adopting such cultures promote risk-taking, creativity, and competitiveness. Consequently, the right-hand quadrants that address external growth ambitions, *Create* and *Compete*, involve more risk-taking than the two left-hand quadrants, *Collaborate* and *Control*, which depict internal focus and safety. Fang et al. (2023) support these theoretic views with empirical evidence on a sample comprising all US publicly traded firms using two firm risk proxies. They document that *Collaborate* and *Control* are associated with a greater modified Z-score, that is lower distress risk, and lower cash flow volatility, thus indicating lower risk-taking. Alternatively, *Create* and *Compete* are associated with lower Z-score and higher cash flow volatility, indicating higher risk-taking.[14] Thus, emulating these two studies, I postulate that the relationship between corporate culture dimensions and their associated attitudes towards risk matters when the firm sets its CEO's compensation and whether this is done to induce risk-taking.

The *Collaborate* culture (top left quadrant) emphasises human relation values, and thus focuses on strengthening cooperation and constructing consensus between firms' employees (Linnenluecke and Griffiths 2010; Fiordelisi and Ricci 2014). Holding such mutual norms suggests that firms' employees would have a role in the decision-making process (Zammuto et al. 2000). Most importantly, this type of culture emphasises safety and stability rather than growth and risk-taking (Nguyen et al. 2019). In contrast, the *Control* culture (bottom left) emphasises the hierarchical system and thus the employees follow standardised procedures implemented by their managers. This bureaucratic type of culture would foster formal regulations and discourage employees' inputs into instigating change, participation in decision-making processes, and collaboration (Linnenluecke and Griffiths 2010). Yet, similar to the *Collaborate* culture above, firms displaying the characteristics of a *Control* culture also place more emphasis on safety and stability rather than growth and risk-taking (Nguyen et al. 2019). As Fang et al. (2023) point out, firms with a *Collaborate* culture would benefit from employees engagement; firms with a *Control* culture would benefit from the internal control and effective risk management to avoid firm distress, thereby reducing

[14] It is worth mentioning that I use the CVF dictionary developed by Fiordelisi and Ricci (2014;2021) to measure corporate culture, whereas Fang et al. (2023) use a slightly amended version of the same dictionary. Nevertheless, these two dictionaries are largely comparable.

risk-taking. Hence, these two cultural dimensions would have the same implications on CEO compensation.

According to the compensation literature, Jensen and Meckling (1976) argue that a firm's risk exposure can influence the design of CEO compensation. In particular, one way to address agency conflicts resulting from managers' risk aversion is to decrease their exposure to firm risk, which can be achieved by lowering their compensation in the form of equity. As *Collaborate* and *Control* place less emphasis on risk-taking, firms with such cultures would choose to match CEO compensation with their risk exposure. In the scenario of corporate culture within the banking industry specifically, Barth and Mansouri (2021) reveal that firms use their culture as a signalling tool to attract CEO with similar values. I aim to incorporate this signalling view with optimal contracting to match risk preferences on a sample outside the banking industry. Since there is a lower level of risk-taking associated with collaborative and control cultural dimensions, they may attract CEOs who are risk averse. Thus, *Collaborate* and *Control* cultures should predict a relatively lower adoption of equity-based compensation. Furthermore, firms demonstrating such cultural values would compensate their CEO in the form of cash as this type of compensation involves less risk and uncertainty. Thus, cash compensation would not persuade the CEO to take excessive risks to increase their wealth and threaten the firms' stability and safety, and would not fit in with their collaborative or control cultures. Collectively, both *Collaborative* and *Control* lead to the same conclusions on the relationship with CEO compensation as they both represent a safety-focus orientation. Therefore, I predict that the empirical sign would also be the same and I propose the following hypotheses:

$H1_a$: *CEO equity incentives are negatively associated with Collaborate and Control cultures (safety-focus cultures);*
$H1_b$: *CEO cash incentives are positively associated with Collaborate and Control cultures (safety-focus cultures).*

The top right quadrant in the CVF diagram shows the interaction of externally oriented firms with those that foster flexibility and discretion, which manifest as the *Create* culture dimension. Such firms encourage creativity and innovation to achieve growth objectives. These innovative activities require risk-taking to reach desired outcomes, given their opaqueness and ambiguous payoffs (Anderson et al. 2014; Fang et al. 2023).

Emphasising the importance of achieving growth and resource acquisition, creative firms encourage aggression, agility, and individuality (Zammuto et al. 2000; Thakor 2016). To this extent, *Create* firms provide freedom to their employees to be more innovative and take risks to contribute to delivering on the firms' external opportunities (Fiordelisi and Ricci 2014). As revealed by Fiordelisi et al. (2019), creative corporate culture increases firms' innovative outcomes and as a result, increases firm value.

The final CVF quadrant (bottom right) represents the *Compete* dimension of corporate culture. The focus of firms in this dimension is primarily on their outward success by competing with their peers and achieving higher profitability and growth rates (Andreou et al. 2022). Thus, *Compete* culture firms give the highest priority to their shareholders and customers, and they base their success on several indicators including revenues, market share and profitable growth opportunities (Fiordelisi and Ricci 2014). Competitive firms focus on enhancing profitability and growth through competitiveness, which can be achieved by taking more risk (Shapira 1995; Fang et al. 2023). As such, firms adopting this type of culture would increase their competitiveness by rewarding their employees for reaching the firms' goals (Hartnell et al. 2011). Collectively, the *Create* and *Compete* cultures are similar in their external growth focus and the pursuit of these cultures priorities' and metrics is associated with risk-taking to achieve growth (Nguyen et al. 2019; Fang et al. 2023).

Therefore, under the *Create* and *Compete* culture dimensions, equity-based compensation is more likely to be adopted as an optimal contracting resolution to agency problems that would encourage risk-taking behaviour and align the interests of CEOs and shareholders (Mehran 1995; Dittmann et al. 2017). As Bryan et al. (2015) assert, equity-based compensation is more frequent when risk-taking is more tolerated. As well, this argument matches the signalling view of Barth and Mansouri (2021) on culture-compensation matching. That is, corporate culture emphasising higher risk-taking would attract CEOs with similar risk-taking attitude by including more variable pay in the compensation plan. This is also consistent with the empirical findings of Li et al. (2021) who report that firms with corporate culture promoting risk-taking have higher pay-performance sensitivity, meaning higher equity-based compensation that is linked to firm performance. Intuitively, this also might indicate that cash compensation is lower in such cultures, as it involves lower uncertainty and might not provide the CEO with the necessary rewards to motivate risk taking behaviour. Thus, both *Create* and *Compete* cultures lead to the same conclusions for

their relationship with CEO compensation as they both represent a growth-focus and more risk-taking orientation. Therefore, I predict that the sign would also be the same and propose the following joint hypotheses for *Create* and *Compete* cultures:

H2$_a$: *CEO equity incentives are positively associated with Create and Compete cultures (growth-focus cultures);*
H2$_b$: *CEO cash incentives are negatively associated with Create and Compete culture (growth-focus cultures).*

Even though the hypotheses rely on previous literature to develop the association between the four cultural dimensions and CEO compensation from a risk-taking perspective, there are alternative perceptions that could be maintained to justify the theoretical link between corporate culture and compensation. For example, one could discuss that *Compete* as a growth focussed culture may offer equity incentives, potentially motivating CEOs to prioritise profits. Andreou et al. (2022) argue that *Compete* firms emphasise short-term performance by increasingly fostering competitiveness, success, and the immediate realisation of results. Supporting their debate, they show that competitive firms appeal to transient (short-term) investors who exert pressure on those firms to intensify the firms' competitive culture to convey short-term profits. Thus, the pursuit of achieving growth is through customer focus, efficiency and enhancing competitiveness rather than taking more risks to attain returns. This is an alternative mechanism that might challenge my propositions on corporate culture and CEO compensation. However, based on this evidence, I argue that *Compete* firms focus on short-term performance and might achieve this goal by taking more risk (Shapira 1995; Fang et al. 2023).

4.3. Data, variables, and descriptive statistics

4.3.1. Data and sample

The associated data are extracted from multiple databases including: (1) data on executive compensation and other CEO information from Execucomp; (2) corporate culture proxies calculated using companies' annual reports (10-K filings) from the US Securities and Exchange Commission's (SEC) Electronic Data Gathering, Analysis and Retrieval (EDGAR) database; (3) companies' accounting and financial data are from Compustat; (4) corporate governance variables are from BoardEx; (5) institutional ownership data is from Thomson Reuters Ownership database. These databases have been used in the prior corporate culture

and compensation literature, such as Fiordelisi and Ricci (2014), Bryan et al. (2015), Hoi et al. (2019), Chen et al. (2019b), and Fiordelisi et al. (2019). The sample contains all firms in the Standard and Poor's (S&P) 1500 index as Execucomp provides data on compensation for senior executives for firms in the S&P 500, S&P Midcap 400, and S&P Smallcap 600. The sample starts in the year 1999, as it is the first year for which BoardEx provided comprehensive and stable data for the BOD members. The sample ends in the year 2018. Following the literature, financial and utility firms, and firms with missing data are excluded. The final sample consists of 11,475 firm-year observations, with 1,511 unique firms. Table 4.1 shows the process of filtering the data to reach the final sample required for the analysis.

Table 4.1: Construction criteria of the sample

Step	**Number of observations**
When downloading Executive data	294,684
After keeping CEO information only	44,294
After merging CEO compensation with corporate governance variables	22,514
After merging CEO compensation with Compustat data	21,931
After merging CEO compensation with corporate culture variables	20,276
After deleting financial firms (3,820 obs.)	16,456
After deleting regulated utilities firms (1,114 obs.)	15,342
After deleting firms which are not traded in NYSE/AMEX/NASDAQ (52 obs.)	15,290
After deleting non-US companies (262 obs.)	15,028
After deleting firms with missing information	11,475 (final sample)

This table shows the process of filtering the data to reach the final sample required for the analysis.

4.3.2. Variables definition

4.3.2.1. Corporate culture

The measurement of corporate culture dimensions: *Compete; Create; Collaborate; and Control* are explained in detail in **Chapter 3**.

4.3.2.2. CEO compensation

The structure of CEO compensation is divided into three types: cash; equity; and other perks and benefits. Cash compensation is considered a short-term remuneration and includes the base salary and any bonuses awarded after achieving a specific level of firm performance. The base salary is usually determined by the role specifications, CEO experience, and seniority, and by benchmarking against the salaries earned by peers in the same industry. Equity compensation is long-term remuneration involving restricted stock and

stock options. The primary goal of this type of compensation is to incentivise risk-averse executives to take more risky investment decisions to increase shareholders' wealth by following risky strategies that they otherwise would avoid. The third type of compensation includes retirement, severance pay, and golden parachutes. This type does not include any financial incentives related to firm performance (Goergen and Renneboog 2011).

Following the compensation literature, I divide the CEO compensation structure into two components: equity incentives and cash incentives. More importantly, this separation of CEO incentives encourages deeper analysis and insight when examining the theoretical background of the chapter. In particular, relative to cash compensation, equity-based compensation is better at aligning the interests between CEOs and shareholders (Jensen and Meckling 1976; Rau 2017). Therefore, the differing risk properties can be used to assess how corporate cultures with a safety-focus (*Collaborate and Control*) or with a growth-focus (*Create and Compete*) design their compensation plans with respect to their risk-taking approach. Accordingly, I include two measures of CEO incentives, as is convention in the literature (Mehran 1995; Murphy 1999; Bryan et al. 2015; Dai et al. 2020). CEO *Equity incentives* and CEO *Cash incentives* are ratios of equity (including restricted stock and stock options) and cash (including salary and bonus) compensations relative to total compensation respectively.

4.3.2.3. Control variables

The previous literature has documented a list of several factors that could impact executive compensation. These are categorised as firm, corporate governance, or CEO characteristics. These variables serve as controls in my empirical models. With regard to firm characteristics, many studies have reported a significant association between firm performance measures and CEO compensation. For example, several studies posit that firm performance reflects the agency alignment between the firm's CEO and shareholders (Core et al. 1999; Brick et al. 2006; Hoi et al. 2019). I include two variables that measure firm performance. *Stock return* is an indicator of a firm's market performance and is measured using annualised stock market returns. The second is the return on assets (*ROA*), which is an indicator of the firm's accounting or financial performance. *ROA* is calculated as the earnings before interest, taxes, depreciation, and amortisation (*EBITDA*) divided by total assets (*TA*).

According to Jensen and Meckling (1976) and Yermack (1995), conflict of interest between managers and shareholders prevails more in larger firms, making it harder to monitor the CEO. Furthermore, Core et al. (1999) report that firm size is positively related to CEO compensation, in which larger firms pay high remuneration to retain, attract, and motivate their executives. Conversely, Frydman and Saks (2010) discover that there is only a weak correlation between aggregate firm size and CEO compensation, particularly in the period before the mid-1970s. Hence, I use the natural logarithm of the book value of the total asset to control for *Firm size.*

Gabaix and Landier (2008) contend that growth opportunities are positively related to CEO compensation, meaning that firms with higher growth opportunities pay higher remuneration. In addition, Bryan et al. (2000) assert that companies with more growth opportunities have a higher potential for information asymmetry between firm's executives and shareholders, which could also lead to managerial opportunism. As a result, these firms provide their CEO with more equity-based compensation. Thus, to measure firms' growth opportunities, I use *Tobin's Q*, calculated as follows: the book value of assets plus the market value of common equity minus the book value of common equity, all of which is divided by the book value of total assets.

Firm age is measured as the number of years since the firm appeared in CRSP. It captures the phase of the company and its riskiness in its lifecycle (Ferris et al. 2017; Chen et al. 2019b), which could influence CEO compensation. The sign of the relationship between *Firm age* and *Equity* and *Cash incentives* is not determined.

Other studies report that firms' *Leverage* is significantly related to executive compensation (Yermack 1995; Bryan et al. 2000; Ryan and Wiggins 2001; Brick et al. 2006). Highly leveraged firms are more subject to agency conflicts particularly between firms' shareholders and bondholders, thus giving rise to agency cost of debt. Firms providing more equity compensation would exacerbate this conflict in highly leveraged companies (Bryan et al. 2015). Hence, leverage could be negatively associated with CEO compensation, particularly equity-based compensation. On the other hand, Chemmanur et al. (2013) and Chen et al. (2019a) argue that highly leveraged firms are more exposed to financial distress and risk, increasing the riskiness of equity-based compensation. As a consequence, firms should compensate their CEOs for the additional risk, indicating that leverage would be

positively associated with CEO equity compensation. Firm *Leverage* is calculated as the sum of short-term debt and long-term debt divided by the firm's total assets.

To control further for firm risk, I add *Return volatility,* which is the annualized standard deviation of daily stock returns for the past year. CEOs who are managing firms in riskier industries and environments demand more compensation as a premium for the risks involved (Fernandes et al. 2013; Chen et al. 2019a).

I also include firm *Cash holdings* as a control variable since firms' cash constraints could have implications on CEO compensation. If firms have excess cash, they may prefer to pay cash-based compensation rather than equity, whereas, if there are liquidity constraints, firms may prefer to use equity-based compensation to retain their cash holdings (Chen et al. 2019b). Prior studies report a negative association between companies' cash holdings and CEO equity compensation (Yermack 1995; Bryan et al. 2000; Bryan et al. 2015). *Cash holdings* ratio is calculated as cash and short-term investments divided by total assets.

The second category of controls includes several corporate governance factors that relate to the board of directors and are well-known to influence CEO compensation. These include *Board size, Board independence, CEO duality, Female ratio,* and *Board busyness*, which, the literature contends, help to solve the agency problems prevailing within organisations (Hermalin and Weisbach 2003). For example, Core et al. (1999), Van Essen et al. (2015), and many others show that large boards are positively associated with CEO total and cash compensation. Larger boards require extra effort to build a robust communication system and internal monitoring, in addition to building consensus (Bebchuk and Fried 2009; Van Essen et al. 2015). Such difficulties of larger board size may lead to increasing CEO power and allowing them to set their compensation. *Board size* is the total number of director members on the board.

Board independence is argued to be an effective governance mechanism that increases the monitoring of CEO actions and consequently contributes to positive overall firm performance (Fama and Jensen 1983; Eisenhardt 1989). Having more independent directors on the board helps to increase and enhance the accountability of the firms' governance system (Roberts et al. 2005). A few studies have focused on the role of independent directors in controlling CEO-related issues such as overconfidence and irrational decisions (Brown and Sarma 2007; Malmendier and Tate 2008; Dowling and Aribi 2013;

Kolasinski and Li 2013). More related to this research, Core et al. (1999), Van Essen et al. (2015), and more recently Chen et al. (2019b) have documented mixed results on the relationship between board independence and CEO compensation. The first two studies report a positive and significant association between board independence and CEO total compensation, while the latter reports an insignificant relationship. Mehran (1995) finds that firms with more independent directors pay more compensation in the form of equity rather than cash to their CEOs. Independent directors are better at representing shareholders' interests than insider executives. Thus, they could be more effective in monitoring CEO and board actions and so decreasing agency conflicts. I calculate *Board independence* as the number of independent directors divided by the total number of directors on the board.

CEO duality is included in the empirical model as the literature suggests that a CEO who also serves as the chairman may weaken the governance system within the firms because this dual role would motivate them to exploit their power for their personal goals (Core et al. 1999). Additionally, CEO duality might increase their entrenchment, providing them greater control over the firm and the board. As such, decreasing the efficiency of board monitoring and the firms' governance system (Brick et al. 2006), and allowing the CEO to grant higher cash and total compensation (Core et al. 1999; Song and Wan 2019) and less equity-based compensation (Vo and Canil 2019). *CEO duality* is an indicator variable that takes the value of one if the CEO is also the chairman of the firm and zero otherwise.

The *Female ratio* is the number of female directors on the board divided by the total number of directors on the board. I include this control variable, as several papers argue the effectiveness of female directors in playing a monitoring role on the board and thus a better governance system. In addition, those firms with higher female board representation provide their CEO with more equity-based compensation (Adams and Ferreira 2009).

I control for the busyness of the board. Busy boards are associated with lower monitoring, and consequently higher cash compensation (Chen et al. 2019a). *Board busyness* is the number of busy directors scaled by board size, where busy directors are those who hold three or more directorships.

I further control for institutional ownership. McConnell and Servaes (1990) contend that increasing institutional holdings could improve board monitoring and overall firm

performance. Hartzell and Starks (2003) find that ownership by institutional investors plays an effective role in lowering cash-based compensation (salary) and increasing pay-performance sensitivity. Hoi et al. (2019) also report the efficiency of institutional ownership in increasing the CEO's equity-based pay confirming their monitoring role. I calculate *Institutional ownership* as the proportion of equity owned by institutional investors.

The last set of control variables concern CEO characteristics. *CEO age* is the age of the CEO in years. CEO compensation structure might differ with regard to their age. For example, older CEOs would prefer cash compensation over equity due to their shorter career horizon (Bryan et al. 2000).

CEO *tenure* is the number of years that the CEO has served in this role. According to Ryan and Wiggins (2001), the relationship between CEO tenure and compensation is somewhat indefinite. Longer tenures may indicate CEO entrenchment, and thus greater power to grant higher cash compensation. Alternatively, longer CEO tenure may suggest larger stock ownership from previous grants, thus aligning their interests with those of the shareholders and consequently, reducing equity compensation.

The literature reports inconsistent results regarding the differences in compensation between male and female executives in general. However, the vast majority of papers do not examine female CEOs (Rau 2017). Consequently, I further control for *CEO gender*, an indicator variable that takes the value of one when the CEO is male. A summary of all the variables included in the regression model is presented in Table A in the Appendix.

4.3.3. Descriptive statistics and correlation matrix

Table 4.2 reports the summary statistics of the main variables. Panel A shows the statistics for the dependent variables that include CEO *Equity* and *Cash incentives*. Equity incentives constitute approximately 50% of the structure of CEO compensation plans, and cash incentives represent around 32%.[15] Hence, equity compensation forms a higher portion than cash compensation of a CEO's total compensation as documented in the literature (Frydman and Saks 2010).

[15] The remaining 18% is other forms of compensation such as retirement, severance pay, and golden parachutes.

Table 4.2: Summary statistics

Variable	Mean	Standard Deviation	Median	Max	Min
Panel A. CEO compensation					
Equity incentives	0.489	0.261	0.535	1	0
Cash incentives	0.317	0.249	0.228	1	0
Panel B. Corporate culture					
Collaborate	0.666	0.167	0.640	2.809	0.254
Control	0.618	0.168	0.588	1.911	0.216
Create	0.766	0.160	0.765	2.220	0
Compete	2.295	0.493	2.238	5.179	0.728
Panel C. Control variables					
Firm characteristics					
Firm size (in $M)	9571.902	35672.229	1860.137	797769	42.624
Tobin's Q	2.099	1.3865	1.714	39.1188	0.401
Leverage	0.206	0.176	0.192	1.8894	0
ROA	0.146	0.098	0.139	1.1834	-2.598
Cash holdings	0.163	0.163	0.108	0.949	0
Firm age	29.111	17.103	24	87	2
Stock return	0.156	0.455	0.114	7.0745	-0.976
Return volatility	0.025	0.015	0.022	0.594	0.006
Corporate governance characteristics					
Board size	9.077	2.159	9	23	3
Board independence	0.760	0.135	0.778	1	0
Board busyness	0.081	0.101	0	0.750	0
Female ratio	0.121	0.100	0.111	0.75	0
Institutional ownership	0.795	0.139	0.830	1	0.161
CEO duality	0.092	0.289	0	1	0
CEO characteristics					
CEO age	56.1285	7.155	56	95	29
CEO tenure	13.6275	8.659	12	61	0
CEO gender	0.971	0.169	1	1	0

This tables reports the summary statistics for the main variables of the study. The sample consists of 1,511 firms with 11,475 firm-year observations covering the period 1999-2018. Definitions of each of the variables are included in Appendix Table A.

Panel B reports the summary statistics for the corporate culture variables. As can be seen, there is a variation in the scores of the four corporate culture dimensions, which is consistent with (Fiordelisi and Ricci 2014; Barth and Mansouri 2021). On average, 0.66%, 0.62%, and 0.77% of the whole 10-K filing signify a *Collaborate, Control,* and *Create* cultures, respectively. Alternatively, a *Compete* culture represents roughly 2.3% of the whole 10-K filing with a median of 2.2% and a standard deviation of 0.5%. This dimension has the highest scores among the four corporate cultures examined in this research. Nevertheless, this

high propensity towards promoting the competitive culture against other cultures in the firm's 10-K is in line with the statistics reported in (Fiordelisi and Ricci 2014).

Panel C summarises the additional control variables related to the firm, governance, and CEO characteristics. These statistics are in line with recent studies (Chen et al. 2019b; Hoi et al. 2019; Song and Wan 2019). A notable difference in my sample is the mean of firm stock return volatility (2.5%), which is relatively lower than Hoi et al. (2019), who report a mean of stock return volatility of 11.10% in their sample coving the years 1994-2014. In terms of governance variables, the average board size is 9, and the fraction of independent directors on the board is approximately 76%. The high representation of independent directors on the board is consistent with the legislation regulations, and the arguments in the literature that posit having a more independent BOD is an efficient monitoring tool that mirrors a robust governance system (Fama and Jensen 1983; Roberts et al. 2005). In addition, the average board comprises 8% of busy directors. The average percentage of female directors on the board is 12%. This low level of female board representation matches Adams and Ferreira's (2009) assertion that female directors are in the minority on firms' BOD. The average institutional ownership is around 80%. Interestingly, and contrary to previous literature (Vo and Canil 2019), CEO duality is relatively low in my sample, where on average only 9% of CEOs have the dual role of the board's chair. The closest finding to my finding is that reported by Hoi et al. (2019), who state an average of 26% for CEO duality in their sample. Finally, regarding CEO characteristics, the average CEO age is 56 years, the average tenure is 13 years, and nearly 97% of CEOs are male, which corroborates that females continue to be a minority.

Furthermore, Table 4.3 shows the summary statistics for the corporate culture dimensions by dividing the sample by Fama and French 12 industry classification (financial and utility firms are excluded). As shown, the competitive dimension continues to represent larger percentages of firms' cultural dimensions compared to the three others in all industries. Also, the statistics for the other dimensions continue to show that they are similar across industries. Nonetheless, I show in Table 4.4 (in the following discussion) that such slight similarities are not problematic due to the small correlation between these dimensions.

Table 4.3: Summary statistics of corporate culture for each industry (Fama-French 12)

	Collaborate		*Control*		*Create*		*Compete*			
Industry	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	No. of firms	%
1 Consumer Nondurables	0.618	0.120	0.584	0.197	0.764	0.220	2.104	0.343	118	8.42
2 Consumer Durables	0.603	0.103	0.592	0.151	0.773	0.156	2.100	0.317	44	2.94
3 Manufacturing	0.603	0.118	0.619	0.228	0.747	0.155	2.115	0.366	202	16.06
4 Energy	0.535	0.103	0.547	0.144	0.780	0.143	1.707	0.328	71	4.88
5 Chemicals and Allied Products	0.604	0.101	0.595	0.171	0.775	0.162	2.070	0.279	58	4.26
6 Business Equipment	0.701	0.141	0.657	0.179	0.805	0.143	2.769	0.447	388	23.80
7 Telephone and Television Transmission	0.671	0.145	0.544	0.136	0.820	0.205	2.566	0.437	39	2.03
8 Utilities	Excluded									
9 Wholesale, Retail, and Some Services (Laundries, Repair Shops)	0.673	0.154	0.648	0.211	0.759	0.157	2.150	0.379	200	13.97
10 Healthcare, Medical Equipment, and Drugs	0.739	0.194	0.641	0.169	0.739	0.139	2.205	0.338	188	10.35
11 Finance	Excluded									
12 Other	0.740	0.234	0.603	0.183	0.754	0.175	2.344	0.462	203	13.29
Total	0.667	0.168	0.622	0.193	0.770	0.163	2.298	0.491	1511	100

This shows the summary statistics for the corporate culture dimensions by dividing the sample by Fama and French 12 industry classification.

Table 4.4 shows the pairwise correlation coefficients of the main regression variables. *Equity incentives* have a positive and statistically significant correlation with *Collaborate, Create* and *Compete* corporate cultures. *Cash incentives*, on the other hand, have a negative and statistically significant correlation at the 1% level with the *Create* and *Compete* corporate culture dimensions.

In general, these findings are in line with research propositions that safety- or growth-focused cultures have different preferences for risk-taking and thus, would impact the design of CEO compensation. Precisely, the correlation matrix reveals a correlation coefficient between collaborative culture and equity incentives that is inconsistent with the research hypothesis $H1_a$ on the safety-focused cultures (*CEO equity incentives are negatively associated with Collaborate and Control cultures).*

Table 4.4: Correlation matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) Equity incentives	1.000										
(2) Cash incentives	-0.728***	1.000									
(3) Collaborate	0.048***	-0.001	1.000								
(4) Control	-0.010	0.007	0.049***	1.000							
(5) Create	0.100***	-0.174***	0.077***	-0.077***	1.000						
(6) Compete	0.091***	-0.053***	0.316***	0.079***	0.209***	1.000					
(7) Firm size	0.243***	-0.377***	-0.099***	-0.047***	0.053***	-0.206***	1.000				
(8) Tobin's q	0.086***	-0.050***	0.108***	0.110***	0.022***	0.147***	-0.113***	1.000			
(9) Leverage	0.068***	-0.135***	-0.117***	-0.126***	-0.027***	-0.198***	0.341***	-0.142***	1.000		
(10) ROA	-0.038***	0.000	-0.026***	0.106***	-0.037***	-0.085***	0.011	0.411***	-0.072***	1.000	
(11) Cash holdings	0.062***	0.003	0.152***	0.045***	0.123***	0.340***	-0.298***	0.339***	-0.356***	-0.048***	1.000
(12) Firm age	0.033***	-0.156***	-0.209***	0.045***	0.008	-0.264***	0.433***	-0.129***	0.136***	0.007	-0.246***
(13) Stock return	-0.042***	-0.009	0.002	-0.011	-0.014*	-0.001	-0.037***	0.318***	-0.060***	0.094***	0.094***
(14) Return volatility	-0.020**	0.101***	0.035***	-0.091***	-0.027***	0.068***	-0.203***	-0.006	-0.031***	-0.150***	0.110***
(15) Board size	0.106***	-0.192***	-0.065***	-0.009	0.025***	-0.226***	0.589***	-0.099***	0.235***	0.040***	-0.283***
(16) Board independence	0.215***	-0.367***	-0.032***	0.051***	0.161***	-0.014*	0.225***	-0.047***	0.114***	-0.023***	-0.019**
(17) Board busyness	0.104***	-0.107***	0.021**	-0.040***	-0.029***	-0.052***	0.274***	-0.010	0.110***	-0.009	-0.067***
(18) Female ratio	0.104***	-0.207***	0.050***	0.015*	0.172***	-0.072***	0.319***	0.018**	0.163***	0.067***	-0.128***
(19) Institutional ownership	0.201***	-0.199***	0.050***	-0.080***	0.037***	-0.006	0.069***	-0.027***	0.072***	0.018*	-0.018*
(20) CEO duality	-0.010	0.027***	0.007	-0.011	-0.046***	-0.047***	0.020**	0.006	0.010	-0.001	-0.007
(21) CEO age	-0.124***	0.060***	-0.103***	0.004	-0.016*	-0.139***	0.074***	-0.055***	0.041***	0.018**	-0.090***
(22) CEO tenure	-0.165***	0.238***	0.023***	-0.023***	-0.122***	0.033***	-0.192***	0.040***	-0.126***	-0.005	0.104***
(23) CEO gender	-0.029***	0.036***	-0.015*	-0.001	-0.077***	-0.018**	0.001	-0.009	0.022***	-0.026***	-0.018**

Table 4.4: Correlation matrix (continue)

Variables	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
(12) Firm age	1.000										
(13) Stock return	-0.034***	1.000									
(14) Return volatility	-0.190***	-0.026***	1.000								
(15) Board size	0.421***	-0.038***	-0.166***	1.000							
(16) Board independence	0.239***	-0.024***	-0.114***	0.139***	1.000						
(17) Board busyness	0.120***	-0.012	-0.012	0.216***	0.115***	1.000					
(18) Female ratio	0.235***	-0.047***	-0.144***	0.308***	0.258***	0.107***	1.000				
(19) Institutional ownership	-0.072***	0.010	-0.029***	-0.064***	0.208***	0.057***	0.001	1.000			
(20) CEO duality	0.021**	0.006	0.015*	-0.007	-0.010	0.050***	-0.014*	0.009	1.000		
(21) CEO age	0.123***	-0.001	-0.078***	0.060***	-0.013	-0.044***	0.001	-0.077***	0.023***	1.000	
(22) CEO tenure	-0.145***	0.016*	0.063***	-0.164***	-0.256***	-0.087***	-0.242***	-0.114***	0.072***	0.277***	1.000
(23) CEO gender	-0.026***	0.008	0.014*	-0.006	-0.040***	0.007	-0.249***	0.019**	0.028***	0.046***	0.068***

Table 4.4 shows the Pairwise correlation coefficient of the main regression variables. ***, **, and * indicate significance at the 1%, 5%, and 10% level respectively.

Alternatively, as hypothesised in $H2_{a,b}$, the correlation matrix illustrates that growth-focused cultures (*Create* and *Compete*) are more risk-taking and therefore, firms with such cultures would design their compensation packages with a large share of the riskier equity incentives relative to the less risky cash incentives. This analysis provides indicative evidence and further tests are required to study the relationship between corporate culture and CEO compensation.

Concerning the correlations between CEO compensation and the control variables, these variables are generally significantly correlated. The correlations between equity and cash incentives and the firm and governance variables are mostly in line with the empirical literature on CEO compensation (e.g., Mehran 1995; Core et al. 1999; Ryan and Wiggins 2001; Adams and Ferreira 2009; Hoi et al. 2019). However, and more importantly, the correlation matrix does not identify any concern between the main corporate culture variables, as the largest correlation coefficient is 0.32 between *Collaborate* and *Compete*. These small correlations dispel any concerns that might arise from the slightly low variations in corporate culture dimensions exhibited in the 10-K filings and reported in Tables 4.2 and 4.3. The control variables are also, in general, significantly correlated. However, despite this statistical significance, the correlations are low in economic terms. Thus, including them all in a regression model would not likely create any multicollinearity problems.

4.4. Empirical results

To test whether corporate culture dimensions influence CEO compensation, I estimate the following baseline regression model:

$$CEO\ incentives_{i,t} = \alpha + \beta_1\ Corporate\ culture_{i,t} + \gamma Z_{i,t} + Industry_i + Year_t + \varepsilon_{i,t} \quad (4.1)$$

The subscript *i* denotes firms, and *t* denotes years. The dependent variable is CEO compensation, which is measured by two alternatives: *Equity incentives* and *Cash incentives.* The independent variables of most importance are those relating to the four corporate culture dimensions extracted from 10-Ks based on the CVF: *Collaborate; Control; Create;* and *Compete*. Z is a vector of control variables representing firm, governance, and CEO characteristics that may influence CEO compensation. $Industry_i$ and $Year_t$ are industry and year fixed effects, respectively. $Industry_i$ is constructed using the Fama and French 48 industry classifications and is used to control for unobserved omitted variables that may

influence CEO compensation between industries. $Year_t$ captures the time-invariant year effects. The standard errors are clustered at the firm level, and firms' continuous variables are winsorised at the 1% and 99% levels to reduce the impact of any outliers. This regression estimation is consistent with the previous literature (e.g., Bryan et al. 2015; Chen et al. 2019b; Hoi et al. 2019).[16]

4.4.1. Corporate culture and CEO compensation

Table 4.5 presents the results of the estimation of the baseline regression described in model (4.1), which investigates the relationship between corporate culture and CEO compensation. Columns (1) to (4) report estimated coefficients when regressing CEO equity incentives on the four cultural dimensions *Collaborate*, *Control*, *Create*, and *Compete*. Columns (6) to (9) show the same results when CEO cash incentives are the dependent variable. Columns (5) and (10) include all corporate culture dimensions in the same regression. In all columns, the regression model also includes a set of firm, governance, and CEO characteristics as controls.

Hypothesis $H1_a$ states that CEO *Equity incentives* are negatively associated with *Collaborate* and *Control* cultures (safety-focused cultures), whereas hypothesis $H1_b$ states that CEO *Cash incentives* should be positively related to *Collaborate* and *Control* cultures. In contrast, hypothesis $H2_a$ states that CEO *Equity incentives* are positively associated with *Create* and *Compete* cultures (growth-focused cultures), whereas hypothesis $H2_b$ states that CEO *Cash incentives* should be negatively related to *Create* and *Compete* cultures. The findings in Table 4.5 confirm the predictions of $H2_{a, b}$ that growth-focused firms with a more risk-taking cultures are positively (negatively) related to CEO equity (cash) incentives.

[16] I do not include firm fixed effects in the baseline regression because corporate culture might be slowly changing over time (Nguyen et al. 2019; Fang et al. 2023). Thus, a model including firm fixed effects that depends on within-firm variations might not capture the influence of the test variable (i.e., corporate culture), even if its effect is indeed present due to the relatively low within-firm variations of the test variable (Wintoki et al. 2012).

Table 4.5: Corporate culture and CEO compensation

Variables	Dependent variable: *Equity incentives*					Dependent variable: *Cash incentives*				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Collaborate	0.012				.0039	-0.009				-0.003
	(0.026)				(.0266)	(0.023)				(0.024)
Control		-0.009			-.013		0.014			0.019
		(0.024)			(.0246)		(0.019)			(0.020)
Create			0.035		.0249			-0.012		-0.002
			(0.028)		(.0284)			(0.025)		(0.025)
Compete				0.024**	.0231*				-0.021**	-0.022**
				(0.012)	(.0123)				(0.011)	(0.011)
Firm size	0.048***	0.049***	0.049***	0.049***	0.0489***	-0.053***	-0.053***	-0.053***	-0.053***	-0.053***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.005)	(0.005)	(0.005)	(0.006)	(0.005)
Leverage	-0.000	-0.003	-0.001	0.002	0.001	-0.024	-0.021	-0.023	-0.026	-0.024
	(0.028)	(0.028)	(0.027)	(0.027)	(0.028)	(0.022)	(0.022)	(0.022)	(0.021)	(0.022)
Tobin's Q	0.031***	0.031***	0.031***	0.030***	0.030***	-0.022***	-0.022***	-0.022***	-0.021***	-0.022***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
ROA	-0.239***	-0.24***	-0.237***	-0.233***	-0.229***	0.089*	0.088*	0.089*	0.084	0.080
	(0.062)	(0.061)	(0.061)	(0.061)	(0.062)	(0.053)	(0.053)	(0.053)	(0.053)	(0.054)
Cash holdings	0.082**	0.082**	0.078**	0.076**	0.073**	-0.091***	-0.090***	-0.089***	-0.085***	-0.084***
	(0.035)	(0.035)	(0.035)	(0.035)	(0.035)	(0.031)	(0.031)	(0.031)	(0.031)	(0.031)
Firm age	-0.001***	-0.001***	-0.001***	-0.001***	-0.001**	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Stock return	-0.047***	-0.047***	-0.046***	-0.046***	-0.046***	-0.009	-0.009	-0.009	-0.009	-0.009
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Return volatility	0.846**	0.837**	0.820**	0.831**	0.787**	-0.829**	-0.811**	-0.821**	-0.814**	-0.781**
	(0.375)	(0.375)	(0.374)	(0.376)	(0.371)	(0.339)	(0.338)	(0.339)	(0.339)	(0.336)
Board size	0.003	0.003	0.002	0.003	0.003	-0.004	-0.004	-0.004	-0.004*	-0.004*
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Board independence	0.002***	0.002***	0.002***	0.002***	0.002***	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***

	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Female ratio	-0.052	-0.050	-0.055	-0.049	-0.053	0.004	0.003	0.004	0.001	0.002
	(0.044)	(0.044)	(0.044)	(0.044)	(0.044)	(0.035)	(0.035)	(0.035)	(0.035)	(0.035)
Board busyness	0.000	0.000	0.000	0.000	0.000	-0.000*	-0.001*	-0.001*	-0.001*	-0.001*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Institutional ownership	0.276***	0.275***	0.276***	0.277***	0.275***	-0.266***	-0.264***	-0.266***	-0.267***	-0.265***
	(0.039)	(0.039)	(0.039)	(0.039)	(0.039)	(0.035)	(0.035)	(0.035)	(0.035)	(0.035)
CEO duality	-0.004	-0.003	-0.003	-0.003	-0.003	-0.008	-0.008	-0.008	-0.009	-0.009
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
CEO age	-0.003***	-0.003***	-0.003***	-0.003***	-0.003***	0.002***	0.002***	0.002***	0.002***	0.002***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
CEO tenure	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***	0.002***	0.002***	0.002***	0.002***	0.002***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
CEO gender	-0.044***	-0.043***	-0.043**	-0.043**	-0.042**	0.014	0.014	0.014	0.014	0.013
	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)	(0.02)	(0.016)	(0.016)	(0.016)	(0.016)
Constant	-0.139	-0.126	-0.145*	-0.192**	-0.193**	1.297***	1.283***	1.296***	1.344***	1.337***
	(0.087)	(0.088)	(0.087)	(0.086)	(0.087)	(0.087)	(0.087)	(0.087)	(0.086)	(0.087)
Observations	11475	11475	11475	11475	11475	11475	11475	11475	11475	11475
R-squared	0.209	0.209	0.209	0.210	0.211	0.353	0.353	0.353	0.353	0.353
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

This table reports the results of the baseline OLS regression model described in model (4.1). The dependent variable is CEO compensation measured by *Equity incentives* and *Cash incentives*. The main independent variables are the four dimensions of the corporate culture based on the CFV: *Collaborate*; *Control*; *Create*; and *Compete*. The control variables include firm, governance, and CEO characteristics. Definitions of all variables are included in Appendix Table A. All models include year and industry fixed effects, where industry fixed effects are based on Fama-French 48 industry classification. Firm continuous variables are winsorised at the 1st and 99th percentiles. Robust standard errors are in parentheses and are clustered at the firm level. ***, **, and * indicates significance at the 1%, 5%, and 10% level, respectively.

The impact is concentrated on the competitive culture as the results for competitive corporate culture are stronger in a statistical and economic sense. As shown in columns (4) and (5), there is a positive and significant association between *Compete* and CEO *Equity incentives* at the 5% and 10% levels respectively. Hypothesis $H2_b$ is confirmed for *Cash incentives* as well, which is consistent with the results for equity incentives. The negative coefficients on *Compete* in the *Cash incentives* regressions are statistically significant at the 5% level in columns (9) and (10). In terms of economic significance, the results in column (4) suggest that a one-standard-deviation increase (approximately 0.49%) in a firm's competitive culture is associated with an approximate 1.18% (0.024× 0.493) increase in CEO equity incentives. Analogously, in column (9) a one-standard-deviation increase in a firm's competitive culture leads to an approximately 1% reduction in cash-based incentives.

These results provide support to my earlier theoretical arguments that competitive dimension of corporate culture is growth-focused and so firms are more likely to make riskier decisions than firms with more safety-focused cultures (Nguyen et al. 2019). In addition, the results confirm the optimal contracting viewpoint of CEO compensation in which firms would provide more equity-based compensation to encourage risk-taking behaviour and thus mitigating agency problems between CEOs and shareholders (Jensen and Meckling 1976). As such, firms with corporate culture promoting risk-taking would optimally design their compensation plans with more equity-based compensation to link these rewards with firm performance and to align risk taking between the CEO and the firm (Li et al. 2021). Consequently, equity-based incentives are more used in firms with competitive cultures relative to cash incentives.

Overall, the results provide support for the proposition that the variation of corporate culture between firms, as determined by the CVF, can contribute to explaining the differences in CEO compensation plans. The importance of corporate culture for CEO compensation supports the other findings in the literature documenting the broader role of the corporate culture. Specifically, Fiordelisi and Ricci (2014) report that cultural differences across firms can explain CEO turnover; Nguyen et al. (2019) find that heterogeneity in bank lending decisions is influenced by the cultural differences between banks; and Barth and Mansouri (2021) document that different cultural dimensions have different implications on banks stability.

Many of the control variables have significant coefficients and hence associations with CEO incentives. These are very stable across the separate regressions for each dependent variable and take signs that confirm the previous literature. As displayed by the firm-level control variables, the coefficient on *Firm size* is positive and statistically significant at the 1% significance level with equity incentives and negative and statistically significant at the 1% with cash incentives. This is in line with the argument that larger firms design compensation plans to retain, attract and motivate their executives, particularly CEOs (Core et al. 1999). There is no significant association between the firm's *Leverage* and CEO incentives in my sample. In addition, firms with more growth opportunities, measured by *Tobin's Q*, and those with more *Cash holdings* are positively (negatively) associated with equity (cash) compensation. *Firm age* has negative association with CEO *Equity incentives*. Concerning firm performance measures, the firm's *Stock return* and *ROA* are both negatively associated with CEO *Equity incentives, while ROA* has a positive and statistically significant association at the 10% level with *Cash incentives* only in columns (6), (7), and (8). Lastly, the coefficient on firm stock *Return volatility* is positive (negative) and statistically significant at the 10% level for CEO equity (cash) incentives. This last finding confirms that firms with more exposure to risk compensate their CEO with more equity-based incentives.

In terms of governance control variables, larger boards and boards with more female directors mostly do not impact CEO compensation in my sample. Nevertheless, boards with more independent directors are positively and significantly associated with equity incentives, and negatively and significantly associated with cash incentives. The results on independent directors are in line with the debate that the independence of the board should be an effective monitoring tool (Fama and Jensen 1983). *Board busyness* is negatively associated with CEO cash incentives, albeit at the 10% level only. *Institutional ownership* shows a significantly positive (negative) association with CEO *Equity (Cash) incentives*, which supports the monitoring role of institutional investors as documented in the previous literature. *CEO duality* does not provide any significant results. This might be because the CEO with dual roles only represents a small portion of the sample (9%).

The final set of controls is related to CEO characteristics. *CEO age* and *CEO tenure* are negatively associated with *Equity incentives* and positively associated with *Cash incentives*. Consistent with the literature, these results suggest that the older CEOs prefer more cash than equity compensation due to their shorter career horizon, and longer tenure

indicates higher stock ownership and thus better alignment of interests between the CEO and the shareholders and hence less need for equity compensation (Bryan et al. 2000; Ryan and Wiggins 2001). *CEO gender* is negatively associated with *Equity incentives*, suggesting that male CEOs might have the power the determine their equity-based compensation.

The R-squared is relatively higher in models including cash-based incentives, suggesting that the models might be a better fit for the cash compensation. Overall, the R-squared is similar to the previous literature on CEO compensation (Daily et al. 1998; Van Essen et al. 2015).

4.4.2. Robustness checks: Other ways of measuring corporate culture

In the baseline regressions, the results show that the corporate culture of firms could impact their CEO compensation structure. In particular, the results show stronger evidence for the relationship between corporate competitive culture and CEO compensation. In this section, I re-estimate the baseline regression using two alternative measures for corporate culture and report their results in Table 4.6. In Panel A, I use an alternative measure for corporate culture, namely the dominant corporate culture. Dominant corporate culture is a dummy variable that equals one for a firm whose corporate culture score is in the top quartile across all firms in a certain year, and zero otherwise. Since cultural dimensions are treated separately, a firm could have a dominant culture in more than one dimension at the same time. This dominant culture measure is similar to the measure used by Nguyen et al. (2019) and the strong culture measure used by Li et al. (2021).[17]

[17] In line with Li et al. (2021), I let the dummy dominant culture measure vary over time, unlike Nguyen et al. (2019) who use a time-invariant dummy measure to classify the bank with a dominant culture if its raw culture scores in the top quartile across all banks in at least half of the sample period. I follow Li et al. (2021) as the firms in my sample are from different industries and, therefore, their corporate culture might fluctuate over time due to market or industry shocks. However, Nguyen et al.'s (2019) sample consists of banks only and these institutions are classified as mature firms and are likely to have a stable corporate culture over time. For a robustness test, Nguyen et al. (2019) also used the time-varying measure, and their results hold.

Table 4.6: Other ways of measuring corporate culture

Panel A. Alternative measure of corporate culture (dominant culture)

Variables	Dependent variable: *Equity incentives*					Dependent variable: *Cash incentives*				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Collaborate-dominant	0.006				0.003	-0.006				-0.005
	(0.009)				(0.009)	(0.008)				(0.008)
Control-dominant		-0.001			-0.003		0.003			0.005
		(0.009)			(0.009)		(0.008)			(0.008)
Create-dominant			-0.001		-0.004			0.003		0.004
			(0.009)		(0.009)			(0.008)		(0.008)
Compete-dominant				0.041***	0.042***				-0.025***	-0.025***
				(0.011)	(0.010)				(.009)	(0.009)
Observations	11475	11475	11475	11475	11475	11475	11475	11475	11475	11475
R-squared	0.209	0.209	0.209	0.212	0.212	0.353	0.353	0.353	0.354	0.354

Panel B. Correlation matrix of the CVF and Li et al. (2021) corporate culture dimensions

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) *Collaborate*	1.000							
(2) *Control*	0.049***	1.000						
(3) *Create*	0.077***	-0.077***	1.000					
(4) *Compete*	0.316***	0.079***	0.209***	1.000				
(5) *Teamwork*	0.246***	0.033***	0.081***	0.286***	1.000			
(6) *Respect*	0.299***	0.064***	0.022**	0.161***	0.274***	1.000		
(7) *Innovation*	0.115***	0.044***	0.213***	0.254***	0.382***	0.295***	1.000	
(8) *Quality*	0.190***	0.099***	0.066***	0.438***	0.341***	0.281***	0.407***	1.000

Panel C. Regression results

Variables	Dependent variable: *Equity incentives*					Dependent variable: *Cash incentives*				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Teamwork	0.019**				0.015**	-0.018**				-0.014**
	(0.007)				(0.007)	(0.006)				(0.006)
Respect		-0.006			-0.009*		0.006			0.010**
		(0.005)			(0.005)		(0.005)			(0.005)
Innovation			0.007*		0.004			-0.008***		-0.006**

			(0.004)		(0.004)			(0.003)		(0.003)
Quality				0.010*	0.007				-0.009**	-0.007
				(0.005)	(0.006)				(0.005)	(0.005)
Observations	9784	9784	9784	9784	9784	9784	9784	9784	9784	9784
R-squared	0.193	0.192	0.192	0.192	.1938	0.343	0.342	0.343	0.342	0.344
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

This table shows further robustness test using other ways for measuring corporate culture including dominant corporate culture and Li et al.'s (2021) corporate culture dimensions measures. In Panels A and C, the dependent variable is CEO compensation measured by *Equity incentives* and *Cash incentives.* Panel A reports the results for the OLS regression model, where the independent variables are the dominant corporate culture measures based on the CVF: *Collaborate-dominant*; *Control-dominant; Create-dominant*; and *Compete-dominant*. Dominant corporate culture is a dummy variable that equals one for a firm whose corporate culture score is in the top quartile across all firms in a certain year, and zero otherwise. Panel B shows the Pearson correlation coefficient between the CVF corporate culture dimensions and Li et al. (2021) corporate culture dimensions. Panel C reports the results of the baseline OLS regression model, where the independent variables are the four dimensions of the corporate culture based on Li et al. (2021): *Teamwork*, *Respect*, *Innovation*, and *Quality*. The same set of controls as in Table 4.5 is included in Panels A and C. Definitions of all variables are included in Appendix Table A. All models include year and industry fixed effects, where industry fixed effects are based on Fama-French 48 industry classification. Firm continuous variables are winsorised at the 1st and 99th percentiles. Robust standard errors are in parentheses and are clustered at the firm level. ***, **, and * indicates significance at the 1%, 5%, and 10% level, respectively.

Each firm has four dummy variables, one for each dimension of the corporate culture[18]. The results when replacing the original corporate culture measures with the dominant culture dummies are reported in Panel A of Table 4.6.

Consistent with Table 4.5 for the baseline results, a compete-dominant culture is significantly associated with both equity and cash incentives at the 1% level of statistical significance with opposing signs. As expected, *Compete-dominant* has a positive coefficient for *Equity incentives* in columns (4) and (5) and a negative coefficient for *Cash incentives* in columns (9) and (10). This confirms that firms with greater adoption of competitive culture include more equity-based incentives in the CEO compensation structure compared to firms with lower competitive culture. Furthermore, the test does not report any significant results for the other cultural dimensions. These results for the alternative dominant culture measures are in line with both the hypotheses and with the main results from the baseline estimation.

Table 4.6 also presents the analysis when using Li et al.'s (2021) corporate culture dimensions as substitute measures. The difference between my work and Li et al.'s (2021) data for corporate culture is that I use 10-K filings, whereas they use earning calls transcripts to capture corporate culture. Both documents capture firm culture. The 10-Ks are a formal annual document that is usually written by top directors and must be agreed upon and signed by most of the directors on the board. Thus, this would reflect the type of culture that the majority of the directors share (Fiordelisi and Ricci 2014). On the other hand, Li et al. (2021) use the Q&A section in earnings calls transcripts. These types of documents also capture the corporate culture, but from a different angle as the CEOs engage in more spontaneous discussion on earnings calls, which reduces the chance of 'formal language' that might be in the 10-K documents but may also capture CEO feelings rather than the corporate's culture.[19] It is noteworthy to mention that this extra test aims to compare and see if there are any differences in the link between corporate culture and CEO compensation using this alternative corporate culture measure.

[18] Similar to Nguyen et al. (2019), there are rare cases where a firm does not have a dominant culture or has more than two dominant cultures.

[19] Additional advantages of using 10-K filings to measure corporate culture in previously presented in Chapter 3.

As their corporate culture measure is empirically driven and the CVF is theoretically driven, there are no expectations on the theoretical position between corporate culture and CEO compensation when using Li et al. (2021) data. However, the dimensions in each of the two measures could be related, according to the bag of words used in both approaches. This makes it easier to predict the direction of the relationship between corporate culture and CEO incentives. For example, *Collaborate* in the CVF is similar to *Teamwork* in Li et al. (2021)*; Control* is similar to *Respect*; *Create* is similar to *Innovation,* and *Compete* is similar to *Quality*. The only extra dimension in Li et al. (2021) that does not have a parallel value in the CVF is *Integrity*. This dimension is reflecting a more sentimental value (Guiso et al. 2015) and so has no equivalent in the CVF that includes practical values. I thank Li et al. (2021) for providing their corporate culture data. They provide a file that includes information on the firms' gvkey, year, the five cultural dimensions scores, and the length of the earning call document. I use the gvkey and year variables to merge their variables with my dataset.

Although there are similarities in the bag of words of each framework, it does not necessarily mean that the dimensions are measuring corporate culture similarly. To check the correlation between the two corporate culture measures, Panel B in Table 4.6 presents the correlation matrix between the CVF and Li et al. (2021) dimensions. There is a positive and statistically significant correlation between the CVF dimensions and the parallel dimensions of Li et al. (2021). The lowest correlation coefficient is (0.064) between *Control* and *Respect*, whereas the highest correlation coefficient is between *Compete* and *Quality* (0.438). This evidence suggests that *Compete* might promote the same values fostered by *Quality* as anticipated when comparing the bag of words. Nevertheless, The low correlation values between the two frameworks might indicate that the Li et al. (2021) and CVF dimensions are capturing different measures, which is expected as the two frameworks use different documents to detect corporate culture.

Panel C in Table 4.6 presents the OLS regression results when using Li et al. (2021) as an alternative methodology to measure corporate culture. The test shows that *Teamwork, Innovation* and *Quality* are positively (negatively) associated with CEO *Equity* (*Cash) incentives*, whereas *Respect* has a negative (positive) coefficient for *Equity (Cash) incentives* at the 10% level or better. Initially, *Innovation* and *Quality* have the correct direction of the relationship with the CEO incentives as proposed by the research hypotheses on their parallel dimensions of the CVF *Create* and *Compete*. However, *Teamwork* is not in the expected

direction for equity and cash incentives as for *Collaborate*. Remarkably, the significance level of these associations may appear or disappear when including all dimensions in the regression model, as shown in columns (5) and (10). A possible interpretation for the inconsistency in results, when all dimensions are included in one model, is the high correlation between Li et al. (2021) dimensions. As can be seen in Panel B of Table 4.6, there are strong positive correlations between Li et al. (2021) dimensions, making it challenging to discover which dimension may be providing more influence on CEO compensation.

In addition, this inconsistency in results could suggest that Li et al.'s (2021) dimensions are sufficiently different from the CVF in reflecting corporate culture. Accordingly, to provide a more rigorous assessment of the CVF, I re-estimate the baseline regression including all eight dimensions: *Collaborate; Control; Create; and Compete* from the CVF and *Teamwork; Respect; Innovation;* and *Quality* from Li et al. (2021) in the regression model (4.1). The results, presented in Table A4.1 in the Appendix, continue to confirm that the *Compete* culture of the CVF has a positive (negative) association with CEO *Equity (Cash) incentives* and this association is at the 5% significance level. Consistent with Table 4.5, the other dimensions of the CVF do not report any statistically significant coefficients.

Collectively, this section continues to demonstrate evidence for the relationship between corporate competitive culture and CEO compensation, which is stronger than other cultural dimensions, and continues to hold when using the dominant corporate culture alternative under the CVF framework and when using the alternative dimensions of Li et al. (2021).

4.4.3. Endogeneity

While the results thus far are consistent with the hypotheses, especially for competitive culture, potential endogeneity issues could bias the results. Endogeneity is an econometric phenomenon that can lead to problems with the coefficient estimates of the empirical model. For example, one of the essential assumptions of OLS is that the error term should not be correlated with the independent variables, however, failing to include important explanatory variables in the regression may lead to biased coefficient estimates as the error term would be correlated with the independent variables (omitted variable bias).

Alternatively, endogeneity may also appear when the dependent variable is influenced by the explanatory variable(s) and at the same time the explanatory variable(s) is(are) also influenced by the dependent variable (reverse causality) (Abdallah et al. 2015). While I include year and industry in the regression model (4.1) to help control for omitted variables bias, endogeneity may still exist to undermine the findings from the baseline regressions and robustness tests.[20] I tackle these issues by applying a range of empirical and estimation strategies. The following sub-sections provide the findings of these applied tests. To begin, in Section 4.4.3.1 I re-estimate model (4.1) using lagged variables. In Sections 4.4.3.2 and 4.4.3.3, I employ two alternative matching estimation techniques namely, Propensity Score Matching (PSM) and entropy balancing. Lastly, in Section 4.4.3.4 I perform Two-stage Least Squares (2SLS) estimation with an Instrumental Variable (IV).

4.4.3.1. Lag regression

To alleviate the concern of reverse causality I perform lag regression analysis, where all corporate culture variables and control variables in model (4.1) are lagged by one year with respect to the dependent variable (CEO incentives). This method has been widely used in the literature related to CEO compensation as some independent variables may be determined by CEO compensation itself (Hartzell and Starks 2003; Chen et al. 2019a; Conyon et al. 2019b). Table 4.7 shows the results. Consistent with Table 4.5 for the baseline results, a *Compete* culture is significantly associated with both equity and cash incentives at the 5% level of statistical significance with opposing signs (columns (4) and (9)).

[20] I attempt to reduce omitted variable bias by including two additional control variables in the regression model (4.1). The compensation literature shows that firms with R&D investments include more equity-based compensation to promote CEO risk-taking (e.g., Ryan and Wiggins 2002; Alessandri and Pattit 2014). The literature on corporate culture suggests that R&D expenditure is correlated with corporate culture, particularly the *Create* dimension (Fiordelisi et al. 2019). In addition, I show in Chapter 6 that *Independent directors' connectedness* is also correlated with corporate culture. Thus, controlling for these two variables is important to reduce potential endogeneity issues. By omitting variables that are known to be correlated with culture, I would be inducing an omitted variable bias. When adding *R&D investments* and *Independent directors' connectedness* as controls, the results are presented in Table A4.2 in the Appendix. While *Independent directors' connectedness* does not show any significant association with CEO compensation, *R&D investments* reveals a positive and statistically significant coefficient for *Equity incentives*, which is in line with the previous literature linking R&D and CEO compensation structure via risk-taking. Most importantly, and consistent with the findings reported in Table 4.5, the results show that *Compete* remains positively (negatively) associated with CEO *Equity (Cash) incentives*. Other cultural dimensions do not have significant coefficients.

Table 4.7: Endogeneity: Lag regression

Variables	Dependent variable: *Equity incentives*					Dependent variable: *Cash incentives*				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
$Collaborate_{t-1}$	0.024				0.014	-0.021				-0.015
	(0.028)				(0.029)	(0.024)				(0.025)
$Control_{t-1}$		-0.011			-0.014		0.008			0.012
		(0.025)			(0.025)		(0.020)			(0.021)
$Create_{t-1}$			0.059**		0.047			-0.028		-0.019
			(0.028)		(0.028)			(0.026)		(0.026)
$Compete_{t-1}$				0.029**	0.026**				-0.021**	-0.019*
				(0.012)	(0.013)				(0.011)	(0.011)
All controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	10505	10505	10505	10505	10505	10505	10505	10505	10505	10505
R-squared	0.196	0.195	0.196	0.1967	0.197	0.359	0.359	0.359	0.360	0.360
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

This table reports the results of the lag regression analysis. The dependent variable is CEO compensation measured by *Equity incentives* and *Cash incentives*. The main independent variables of interest are the four dimensions of the corporate culture based on the CFV: *Collaborate*; *Control*; *Create*; and *Compete*. The same set of controls as in Table 4.5 is included in each regression. All independent variables are lagged by one year with respect to CEO incentives. Definitions of all variables are included in Appendix Table A. For brevity, I only report the results for the corporate culture variables. All models include year and industry fixed effects, where industry fixed effects are based on Fama-French 48 industry classification. Firm continuous variables are winsorised at the 1st and 99th percentiles. Robust standard errors are in parentheses and are clustered at the firm level. ***, **, and * indicates significance at the 1%, 5%, and 10% level, respectively.

A new finding emerged in this table, in column (3) *Create* has a positive and significant association at the 5% significance level with equity incentives, but not with cash incentives. Nevertheless, the significance level of this association drops when including all dimensions in the regressions (columns (5) and (10)).

Overall, the lag tests lend support to the main findings in Table 4.5 and to the hypothesised relationship that growth-focused competitive culture increases (decreases) the CEO equity (cash) compensation that incentivises CEO risk-taking to reflect the risk appetite of the competitive culture.[21]

4.4.3.2. Propensity Score Matching (PSM)

It could be argued that the relationship between corporate culture and CEO compensation may be spurious due to omitted variables that are not controlled for in the baseline regression model. To mitigate such an issue, I perform a propensity score matching analysis. The purpose of this analysis is to compare CEO incentives in a treatment group against a control group, where the treatment group contains firms with a particular dominant corporate culture and the control group includes firms without dominant corporate culture scores since they are in the lower three quartiles across all firms. Apart from the treatment effect, firms in both groups should be matched as closely as possible based on other characteristics. Following the literature (Chen et al. 2019b; Hoi et al. 2019), propensity score matching is a two-step process. The first step is to use a logit model to determine the propensity score for a firm to be part of the treatment group. The dependent variable in this logit model is the dominant corporate culture dummy variable measure, as the PSM requires a binary (dummy) variable to distinguish between the two groups. The independent variables are the same controls used in model (4.1) with year and industry fixed effects included. Columns (1a), (2a), (3a), and (4a) in Table 4.8 show the estimation results of the pre-matched logit regressions in which different firm, governance, and CEO characteristics determine the dominance of a specific corporate culture.

[21] As a further robustness test, I perform the lag regression for the other measures of corporate culture that are introduced in Section 4.4.2. The results are presented in Table A4.3 in the Appendix, and they continue to show similar results to Table 4.6, which are consistent with the baseline findings on competitive culture and CEO compensation.

Table 4.8: Endogeneity: Propensity score matching estimates (logit model)

Variables	*Collaborate-dominant*		*Control-dominant*		*Create-dominant*		*Compete-dominant*	
	Pre-match (1a)	Post-match (1b)	Pre-match (2a)	Post-match (2b)	Pre-match (3a)	Post-match (3b)	Pre-match (4a)	Post-match (4b)
Firm size	0.064***	-0.001	-0.121***	-0.025	0.017	0.007	-0.026	0.033
	(0.024)	(0.029)	(0.023)	(0.027)	(0.022)	(0.026)	(0.027)	(0.033)
Leverage	-2.023***	0.197	-2.061***	0.113	-0.281*	-0.037	-1.433***	-0.088
	(0.183)	(0.220)	(0.188)	(0.224)	(0.168)	(0.193)	(0.212)	(0.222)
Tobin's Q	0.029	0.015	0.211***	-0.001	0.105***	0.009	0.115***	-0.019
	(0.027)	(0.032)	(0.027)	(0.033)	(0.027)	(0.033)	(0.032)	(0.041)
ROA	-1.743***	-0.191	1.141***	-0.377	-1.222***	0.023	-2.385***	0.166
	(0.367)	(0.449)	(0.377)	(0.462)	(0.357)	(0.434)	(0.426)	(0.533)
Cash holdings	-0.271	0.115	-0.548***	0.037	1.359***	-0.062	1.133***	-0.085
	(0.188)	(0.233)	(0.193)	(0.228)	(0.188)	(0.221)	(0.209)	(0.254)
Firm age	-0.017***	0.001	0.011***	-0.001	-0.002	0.001	-0.017***	-0.000
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)
Stock return	-0.047	-0.012	-0.265***	0.050	-0.093	-0.056	-0.128	0.051
	(0.069)	(0.082)	(0.069)	(0.087)	(0.068)	(0.079)	(0.079)	(0.097)
Return volatility	2.093	-3.352	-31.556***	-1.604	6.421**	1.270	0.766	-2.033
	(3.219)	(3.731)	(3.517)	(3.996)	(2.953)	(3.628)	(3.486)	(4.595)
Board size	0.057***	-0.007	0.037**	0.019	0.049***	-0.002	-0.052***	-0.021
	(0.015)	(0.019)	(0.015)	(0.018)	(0.015)	(0.018)	(0.018)	(0.022)
Board independence	-0.003	0.003	0.003	-0.002	-0.001	0.002	0.005*	0.001
	(0.002)	(0.003)	(0.002)	(0.003)	(0.002)	(0.003)	(0.002)	(0.003)
Female ratio	1.743***	0.005	-0.786***	0.085	2.043***	-0.364	-0.775**	0.155
	(0.285)	(0.354)	(0.292)	(0.348)	(0.275)	(0.325)	(0.338)	(0.411)
Board busyness	-0.003	-0.002	0.001	-0.000	0.002	-0.001	0.0004	-0.000
	(0.002)	(0.003)	(0.002)	(0.003)	(0.002)	(0.003)	(0.003)	(0.003)

Institutional ownership	0.089	-0.247	-1.802***	0.275	-0.395**	0.191	-0.391*	-0.030
	(0.185)	(0.233)	(0.176)	(0.214)	(0.187)	(0.224)	(0.215)	(0.262)
CEO duality	0.107	-0.085	-0.002	-0.063	-0.042	0.051	-0.254**	0.127
	(0.085)	(0.102)	(0.083)	(0.095)	(0.083)	(0.106)	(0.108)	(0.133)
CEO age	-0.000	-0.003	0.005	0.001	0.005	0.000	-0.016***	0.002
	(0.004)	(0.005)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)
CEO tenure	-0.007**	0.001	0.008**	-0.000	-0.019***	-0.006	-0.011***	0.003
	(0.003)	(0.004)	(0.003)	(0.004)	(0.003)	(0.004)	(0.004)	(0.005)
CEO gender	-0.024	-0.157	0.015	-0.120	0.031	-0.170	-0.350**	-0.235
	(0.139)	(0.177)	(0.145)	(0.181)	(0.129)	(0.159)	(0.153)	(0.210)
Observations	11418	4639	11411	5215	11317	5176	10454	3464
Pseudo R^2	0.177	0.005	0.120	0.003	0.087	0.004	0.351	0.005
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES

This table reports the results of the propensity score matching logit analysis. The dependent variable is dominant corporate culture dimension: *Collaborate-dominant*; *Control-dominant; Create-dominant*; and *Compete-dominant*, measured as a dummy variable that takes the value of 1 if a firm's corporate cultural dimension score is in the top quartile across all firms in a particular year, and zero otherwise. The main independent variables are the same set of controls as in Table 4.5. Definitions of all variables are included in Appendix Table A. All models include year and industry fixed effects, where industry fixed effects are based on Fama-French 48 industry classification. Firm continuous variables are winsorised at the 1st and 99th percentiles. Robust standard errors are in parentheses. ***, **, and * indicates significance at the 1%, 5%, and 10% level, respectively.

In the second step, I use the results of the pre-match models and use the nearest-neighbour algorithm with no replacement and a calliper of 1% to create a matched sample. Precisely, each firm-year with a corporate culture score in the top quartile (the treatment group) is matched with a firm-year with a corporate culture score in the bottom three quartiles (the control group) with the nearest propensity score. I re-estimate the logit model of the first step for the post-matched sample to verify that there are no distinguishable differences between the treatment and the control groups across the observable characteristics.

The post-match estimation outputs are shown in columns (1b), (2b), (3b), and (4b) in Table 4.8 and show no statistically significant results for any of the coefficients, confirming that there are no significant differences between the two groups. Furthermore, the magnitudes of the coefficients in the post-match columns are lower than those in the pre-match columns, as is the pseudo-R-squared. Therefore, the results indicate that the propensity score matching eliminates any distinguishable differences other than the differences related to corporate culture.[22]

Table 4.9 reports the results of the propensity score matching analysis for the average CEO incentive for the treatment group (firms with a dominant corporate culture dimension) and the control group (firms with no dominant culture). Panel D for the *Compete-dominant* culture has significant differences for both equity and cash incentives at the 1% significance level.

CEOs at firms with a dominant competitive culture receive roughly 4% higher equity incentives and 2% lower cash incentives than CEOs at matched firms with no dominant competitive culture. This is perhaps not surprising given the consistent finding in prior tables of the significant role played by the *Compete* cultural dimension in determining both equity and cash incentives in CEO compensation. In Panels B and C of Table 4.9, there are no

[22] For a robustness test, I rerun the PSM analysis using an alternative measure for dominant corporate culture treatment groups and their control groups. Precisely, each firm-year with a corporate culture score in the top quartile Q4 (the treatment group) is matched with a firm-year with a corporate culture score in the bottom quartile Q1 (the control group) with the nearest propensity score. The results are qualitatively similar to those when using the main measure for dominant corporate culture.

significant differences between the mean equity or cash incentives of the treatment and control groups for control and creative cultures.

Table 4.9: Endogeneity: Propensity score matching estimator

Panel A. *Collaborate-dominant*

	Firm-year obs. with dominant culture	Firm-year obs. With no dominant culture	Firm-year obs. with dominant culture	Firm-year obs. With no dominant culture			
	Obs1	Obs2	Mean1	Mean2	Diff	S.E.	T-stat
Equity incentives	2320	2320	0.499	0.481	0.018**	0.008	-2.25
Cash incentives	2320	2320	0.313	0.326	-0.014*	0.008	1.80

Panel B. *Control-dominant*

	Firm-year obs. with dominant culture	Firm-year obs. With no dominant culture	Firm-year obs. with dominant culture	Firm-year obs. With no dominant culture			
	Obs1	Obs2	Mean1	Mean2	Diff	S.E.	T-stat
Equity incentives	2609	2609	0.472	0.473	-0.001	0.008	0.10
Cash incentives	2609	2609	0.338	0.333	0.005	0.007	-0.70

Panel C. *Create-dominant*

	Firm-year obs. with dominant culture	Firm-year obs. With no dominant culture	Firm-year obs. with dominant culture	Firm-year obs. With no dominant culture			
	Obs1	Obs2	Mean1	Mean2	Diff	S.E.	T-stat
Equity incentives	2588	2588	0.499	0.493	0.006	0.007	-0.90
Cash incentives	2588	2588	0.291	0.287	0.004	0.007	-0.50

Panel D. *Compete-dominant*

	Firm-year obs. with dominant culture	Firm-year obs. With no dominant culture	Firm-year obs. with dominant culture	Firm-year obs. With no dominant culture			
	Obs1	Obs2	Mean1	Mean2	Diff	S.E.	T-stat
Equity incentives	1732	1732	0.516	0.473	0.044***	0.009	-4.90
Cash incentives	1732	1732	0.301	0.324	-0.023***	0.009	2.70

This table presents the differences in mean CEO compensation between two propensity score matched samples based on dominant cultural dimensions. The dominant corporate culture is measured as a dummy variable that takes the value of 1 if the firm's score is in the top quartile across all firms in a particular year, and zero otherwise.

Remarkably, In Panel A, on average, CEOs at firms with a dominant collaborative culture receive approximately 1.8% higher equity incentives and 1.4% lower cash incentives than CEOs at firms with no dominant collaborative culture. This result is contrary to what is proposed by hypotheses $H1_{a, b}$ (*Collaborate* culture should have a negative (positive)

association with *Equity (Cash) incentives*). Yet this relationship disappears in the subsequent test reported in Table 4.10, which indicates that this result might be due to model specification rather than a solid conclusion between collaborative culture and CEO compensation.

As a final test, I re-estimate model (4.1) to examine the main measures of corporate culture on CEO incentives for the newly matched sample. Consistent with the findings reported in all earlier sub-sections, the results in Table 4.10 show that *Compete-dominant* is positively associated with CEO equity incentives in column (4) and negatively associated with cash incentives in column (8). Both coefficient estimates are statistically significant at the 5% level or better. Other cultures do not have a significant association with CEO incentives. The findings imply that once endogeneity issues are mitigated by employing the PSM analysis, the magnitudes of coefficients detecting the relation between a competitive culture and CEO incentives confirm my theoretical arguments and corroborate the hypothesised association.[23]

4.4.3.3. Entropy balancing

The third approach I employ to tackle the endogeneity issue, and the second matching technique is the relatively novel entropy balancing. It is a matching technique that is quite new to the literature, and is argued to be a more advantageous matching methodology compared to the more commonly applied propensity score matching or other techniques.[24] According to Hainmueller (2012), this technique has several advantages.[25]

[23] There could be cases where firms end up with more than one dominant culture in a specific year. As a further robustness test, for the newly matched sample, I remove those firms that have more than one dominant culture in each year and rerun the baseline regression. The results are reported in Table A4.4 in the Appendix. Revealing the same direction of the association between competitive culture and CEO equity and cash incentives, this extra test corroborates the previous sections, albeit the significance level of these associations is reduced to 10%. Hence, doing this robustness test appears to have no material effect on the coefficient estimates and the relationships between corporate culture and CEO compensation, particularly *Compete*.

[24] Examples of Accounting and Finance studies that implement entropy balancing are (Wilde 2017; Quinn 2018; McMullin and Schonberger 2020; Billings et al. 2022; Cumming et al. 2022).

[25] For a full description of entropy balancing, see (Hainmueller 2012).

Table 4.10: Endogeneity: Corporate culture and CEO compensation (PSM matched sample)

Variables	Dependent variable: *Equity incentives*				Dependent variable: *Cash incentives*			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Collaborate-dominant	0.017				-0.010			
	(0.011)				(0.009)			
Control-dominant		-0.001				0.005		
		(0.010)				(0.009)		
Create-dominant			0.006				0.002	
			(0.009)				(0.008)	
Compete-dominant				0.043***				-0.024**
				(0.012)				(0.011)
All controls	YES	YES	YES	YES	YES	YES	YES	YES
Observations	4640	5218	5176	3464	4640	5218	5176	3464
R-squared	0.189	0.217	0.207	0.189	0.302	0.356	0.335	0.313
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES

This table reports the results of the baseline OLS estimation of model (4.1) for the new matched sample. The dependent variable is CEO compensation measured by *Equity incentives* or *Cash incentives*. The main independent variables of interest are the dominant corporate culture measures based on the CVF: *Collaborate-dominant*; *Control-dominant; Create-dominant*; and *Compete-dominant*. The control variables include firm, governance, and CEO characteristics as in Table 4.5. Definitions of all variables are included in Appendix Table A. All models include year and industry fixed effects, where industry fixed effects are based on Fama-French 48 industry classification. Firm continuous variables are winsorised at the 1st and 99th percentiles. Robust standard errors are in parentheses and are clustered at the firm level. ***, **, and * indicates significance at the 1%, 5%, and 10% level, respectively.

In this study, entropy balancing achieves a higher degree of covariate balance between the treatment and control groups compared to traditional matching methods. That is, entropy balancing achieves balanced covariate distributions along the first, second, and third moments of all observable covariates between the two groups. On the other hand, the PSM approach matches between covariates using the propensity score, without considering balancing the moments of each covariate (Hainmueller 2012; McMullin and Schonberger 2020). Thus, a higher covariate balance increases the likelihood that any differences in CEO incentives are due to differences in corporate culture and not driven by the differences in the determinants of CEO incentives.

In contrast to PSM that either matches or discards information based on predetermined settings and algorithms (such as nearest neighbour, a specific calliper distance, or selecting to match with or without replacement), entropy balancing retains valuable information as it is flexible and allows less discretion. Thus, entropy matching allows observation weights to fluctuate smoothly to reach the covariate balance, keeping larger samples that increase the efficiency in the following analyses (Hainmueller 2012). Due to these two main advantages, entropy balancing is a more suitable matching technique for my sample, as it should provide more robust results in terms of enhancing the covariate balancing and in retaining more information and observations for the analyses.

Similar to the PSM described above, entropy balancing requires a binary variable to identify the treatment effect. I use the dominant corporate culture dummy variable measure as the indicator variable. I balance the sample by including the same set of controls that I use in the baseline regression as covariates. To demonstrate the success of entropy balancing, I report its results in Tables 4.11a, 4.11b, 4.11c, and 4.11d, for the dominant collaborative, control, creative and competitive cultures, respectively. Panel A in each table reports the distribution of covariates between the treatment and control groups before the entropy balancing. Panel B in each table reveals that the entropy balancing successfully weights the observations and removes the differences between the two groups as documented in the almost identical values of the mean, variance, and skewness of the covariates.[26]

[26] Following the robustness test for the PSM, I perform entropy balancing using the alternative measures for treatment and control groups in the methodology. Precisely, the treatment group is firms with a corporate culture score in the top quartile Q4, and the control group is firms with a corporate culture

Table 4.11a: Endogeneity: Entropy balancing matching (Dominant collaborative culture)

Panel A. Before entropy balancing

	Treatment group *Collaborate-dominant* = 1 (N= 2796)			Control group *Collaborate-dominant* = 0 (N= 8679)		
Variables	Mean	Variance	Skewness	Mean	Variance	Skewness
Firm size	7.542	2.458	0.656	7.734	2.280	0.450
Leverage	0.169	0.027	0.898	0.217	0.030	0.686
Tobin's Q	2.277	1.870	1.921	2.015	1.256	2.223
ROA	0.144	0.008	0.153	0.148	0.007	0.281
Cash holdings	0.190	0.031	1.165	0.154	0.024	1.431
Firm age	24.260	255.100	1.036	30.670	293.200	0.457
Stock return	0.137	0.164	0.879	0.150	0.157	0.873
Return volatility	0.025	0.000	1.398	0.025	0.000	1.401
Board size	8.933	4.309	0.504	9.123	4.764	0.491
Board independence	0.747	2.016	-1.192	0.761	1.761	-1.014
Female ratio	0.128	0.010	0.522	0.118	0.010	0.624
Board busyness	0.0814	1.065	1.332	0.081	1.134	1.534
Institutional ownership	0.801	0.019	-0.973	0.793	0.020	-0.945
CEO duality	0.097	0.088	2.718	0.091	0.082	2.853
CEO age	55.350	53.920	0.499	56.380	50.060	0.316
CEO tenure	13.820	80.530	1.479	13.560	73.180	1.379
CEO gender	0.964	0.035	-4.972	0.973	0.027	-5.801

Panel B. After entropy balancing

	Treatment group *Collaborate-dominant* = 1 (N= 2796)			Control group *Collaborate-dominant* = 0 (N= 8679)		
Variables	Mean	Variance	Skewness	Mean	Variance	Skewness
Firm size	7.542	2.458	0.656	7.542	2.458	0.656
Leverage	0.169	0.027	0.898	0.169	0.027	0.898
Tobin's Q	2.277	1.870	1.921	2.277	1.870	1.921
ROA	0.144	0.008	0.153	0.144	0.008	0.153
Cash holdings	0.190	0.031	1.165	0.190	0.031	1.165
Firm age	24.260	255.100	1.036	24.260	255.200	1.036
Stock return	0.137	0.164	0.879	0.137	0.164	0.880
Return volatility	0.025	0.000	1.398	0.025	0.000	1.398
Board size	8.933	4.309	0.504	8.933	4.309	0.505
Board independence	0.747	2.016	-1.192	0.747	2.016	-1.191
Female ratio	0.128	0.010	0.522	0.128	0.010	0.522
Board busyness	0.0814	1.065	1.332	0.0814	1.065	1.332
Institutional ownership	0.801	0.019	-0.973	0.801	0.019	-0.973
CEO duality	0.097	0.088	2.718	0.097	0.088	2.718
CEO age	55.350	53.920	0.499	55.350	53.910	0.499
CEO tenure	13.820	80.530	1.479	13.820	80.520	1.479
CEO gender	0.964	0.035	-4.972	0.964	0.035	-4.971

This table reports the covariate balance for entropy balancing. Panel A reports the mean, variance, and skewness for the covariates for the treatment and the control groups before balancing, while Panel B reports the same information after the balancing. The treatment variable is based on the dominant cultural dimension. The dominant corporate culture is measured as a dummy variable that takes the value of 1 if the firm's score is in the top quartile across all firms in a particular year, and zero otherwise. The same set of controls as in Table 4.5 are used as covariates. Definitions of all variables are included in Appendix Table A.

score in the bottom quartile Q1. The results are qualitatively similar to those when using the main measure for dominant corporate culture.

Table 4.11b: Endogeneity: Entropy balancing matching (Dominant control culture)

Panel A. Before entropy balancing

	Treatment group *Control-dominant* = 1 (N= 2778)			Control group *Control-dominant* = 0 (N= 8697)		
Variables	Mean	Variance	Skewness	Mean	Variance	Skewness
Firm size	7.454	2.676	0.670	7.761	2.196	0.463
Leverage	0.153	0.023	0.971	0.222	0.030	0.659
Tobin's Q	2.380	1.791	1.749	1.983	1.261	2.345
ROA	0.164	0.008	0.437	0.141	0.007	0.149
Cash holdings	0.181	0.032	1.193	0.157	0.024	1.417
Firm age	29.560	282.800	0.511	28.960	294.200	0.599
Stock return	0.144	0.128	0.817	0.148	0.169	0.879
Return volatility	0.023	0.000	1.451	0.025	0.000	1.372
Board size	8.959	5.302	0.579	9.114	4.449	0.474
Board independence	0.748	1.683	-0.823	0.760	1.870	-1.146
Female ratio	0.114	0.010	0.586	0.123	0.010	0.602
Board busyness	0.076	1.136	1.728	0.082	1.111	1.412
Institutional ownership	0.770	0.023	-0.872	0.803	0.018	-0.950
CEO duality	0.096	0.087	2.748	0.091	0.083	2.843
CEO age	56.380	52.710	0.219	56.050	50.680	0.401
CEO tenure	14.530	85.220	1.266	13.340	71.370	1.453
CEO gender	0.969	0.030	-5.451	0.971	0.028	-5.604

Panel B. After entropy balancing

	Treatment group *Control-dominant* = 1 (N= 2778)			Control group *Control-dominant* = 0 (N= 8697)		
Variables	Mean	Variance	Skewness	Mean	Variance	Skewness
Firm size	7.454	2.676	0.670	7.454	2.676	0.670
Leverage	0.153	0.023	0.971	0.153	0.023	0.971
Tobin's Q	2.380	1.791	1.749	2.380	1.791	1.749
ROA	0.164	0.008	0.437	0.164	0.008	0.437
Cash holdings	0.181	0.032	1.193	0.181	0.032	1.193
Firm age	29.560	282.800	0.511	29.560	282.800	0.511
Stock return	0.144	0.128	0.817	0.144	0.128	0.817
Return volatility	0.023	0.000	1.451	0.023	0.000	1.451
Board size	8.959	5.302	0.579	8.959	5.302	0.579
Board independence	0.748	1.683	-0.823	0.748	1.683	-0.823
Female ratio	0.114	0.010	0.586	0.114	0.010	0.586
Board busyness	0.076	1.136	1.728	0.076	1.136	1.728
Institutional ownership	0.770	0.023	-0.872	0.770	0.023	-0.872
CEO duality	0.096	0.087	2.748	0.096	0.087	2.747
CEO age	56.380	52.710	0.219	56.370	52.710	0.220
CEO tenure	14.530	85.220	1.266	14.530	85.210	1.266
CEO gender	0.969	0.030	-5.451	0.969	0.030	-5.450

This table reports the covariate balance for entropy balancing. Panel A reports the mean, variance, and skewness for the covariates for the treatment and the control groups before balancing, while Panel B reports the same information after the balancing. The treatment variable is based on the dominant cultural dimension. The dominant corporate culture is measured as a dummy variable that takes the value of 1 if the firm's score is in the top quartile across all firms in a particular year, and zero otherwise. The same set of controls as in Table 4.5 are used as covariates. Definitions of all variables are included in Appendix Table A.

Table 4.11c: Endogeneity: Entropy balancing matching (Dominant creative culture)

Panel A. Before entropy balancing

	Treatment group *Create-dominant* = 1 (N= 2698)			Control group *Create-dominant* = 0 (N= 8777)		
Variables	Mean	Variance	Skewness	Mean	Variance	Skewness
Firm size	7.735	2.511	0.546	7.672	2.273	0.476
Leverage	0.196	0.032	0.801	0.208	0.028	0.710
Tobin's Q	2.127	1.546	2.040	2.064	1.378	2.203
ROA	0.143	0.008	0.324	0.148	0.007	0.217
Cash holdings	0.189	0.031	1.122	0.155	0.024	1.451
Firm age	29.160	312.000	0.600	29.090	285.200	0.569
Stock return	0.138	0.167	0.965	0.150	0.157	0.844
Return volatility	0.025	0.000	1.479	0.025	0.000	1.374
Board size	9.206	4.971	0.571	9.037	4.557	0.468
Board independence	0.771	1.522	-0.903	0.753	1.913	-1.091
Female ratio	0.140	0.011	0.593	0.115	0.010	0.580
Board busyness	0.082	1.078	1.464	0.081	1.130	1.495
Institutional ownership	0.792	0.019	-0.890	0.796	0.020	-0.970
CEO duality	0.081	0.075	3.067	0.096	0.086	2.751
CEO age	55.970	50.410	0.541	56.180	51.430	0.300
CEO tenure	12.540	66.990	1.664	13.960	76.960	1.341
CEO gender	0.959	0.039	-4.621	0.974	0.025	-5.974

Panel B. After entropy balancing

	Treatment group *Create-dominant* = 1 (N= 2698)			Control group *Create-dominant* = 0 (N= 8777)		
Variables	Mean	Variance	Skewness	Mean	Variance	Skewness
Firm size	7.735	2.511	0.546	7.735	2.511	0.547
Leverage	0.196	0.032	0.801	0.196	0.032	0.801
Tobin's Q	2.127	1.546	2.040	2.127	1.546	2.040
ROA	0.143	0.008	0.324	0.143	0.008	0.325
Cash holdings	0.189	0.031	1.122	0.189	0.031	1.123
Firm age	29.160	312.000	0.600	29.160	312.000	0.600
Stock return	0.138	0.167	0.965	0.138	0.167	0.965
Return volatility	0.025	0.000	1.479	0.025	0.000	1.480
Board size	9.206	4.971	0.571	9.206	4.971	0.571
Board independence	0.771	1.522	-0.903	0.771	1.522	-0.903
Female ratio	0.140	0.011	0.593	0.140	0.011	0.593
Board busyness	0.082	1.078	1.464	0.082	1.078	1.464
Institutional ownership	0.792	0.019	-0.890	0.792	0.019	-0.890
CEO duality	0.081	0.075	3.067	0.081	0.075	3.067
CEO age	55.970	50.410	0.541	55.970	50.400	0.542
CEO tenure	12.540	66.990	1.664	12.540	66.990	1.664
CEO gender	0.959	0.039	-4.621	0.959	0.039	-4.620

This table reports the covariate balance for entropy balancing. Panel A reports the mean, variance, and skewness for the covariates for the treatment and the control groups before balancing, while Panel B reports the same information after the balancing. The treatment variable is based on the dominant cultural dimension. The dominant corporate culture is measured as a dummy variable that takes the value of 1 if the firm's score is in the top quartile across all firms in a particular year, and zero otherwise. The same set of controls as in Table 4.5 are used as covariates. Definitions of all variables are included in Appendix Table A.

Table 4.11d: Endogeneity: Entropy balancing matching (Dominant competitive culture)

Panel A. Before entropy balancing

	Treatment group *Compete-dominant* = 1 (N= 2859)			Control group *Compete-dominant* = 0 (N= 8616)		
Variables	Mean	Variance	Skewness	Mean	Variance	Skewness
Firm size	7.262	2.404	0.865	7.828	2.225	0.416
Leverage	0.145	0.028	1.256	0.225	0.028	0.634
Tobin's Q	2.328	1.846	1.827	1.996	1.249	2.288
ROA	0.133	0.008	0.323	0.151	0.007	0.231
Cash holdings	0.246	0.034	0.660	0.135	0.020	1.706
Firm age	22.640	200.500	1.244	31.250	303.200	0.394
Stock return	0.138	0.180	0.900	0.150	0.152	0.864
Return volatility	0.026	0.000	1.399	0.024	0.000	1.382
Board size	8.364	4.232	0.716	9.313	4.577	0.456
Board independence	0.752	1.610	-1.018	0.758	1.899	-1.088
Female ratio	0.106	0.011	0.715	0.126	0.010	0.577
Board busyness	0.077	1.062	1.511	0.082	1.135	1.479
Institutional ownership	0.796	0.019	-0.824	0.795	0.020	-0.991
CEO duality	0.072	0.067	3.320	0.099	0.089	2.685
CEO age	54.620	55.220	0.286	56.630	48.850	0.425
CEO tenure	13.950	75.780	1.070	13.520	74.670	1.524
CEO gender	0.965	0.034	-5.034	0.973	0.027	-5.778

Panel B. After entropy balancing

	Treatment group *Compete-dominant* = 1 (N= 2859)			Control group *Compete-dominant* = 0 (N= 8616)		
Variables	Mean	Variance	Skewness	Mean	Variance	Skewness
Firm size	7.262	2.404	0.865	7.263	2.405	0.865
Leverage	0.145	0.028	1.256	0.145	0.028	1.255
Tobin's Q	2.328	1.846	1.827	2.328	1.846	1.827
ROA	0.133	0.008	0.323	0.133	0.008	0.323
Cash holdings	0.246	0.034	0.660	0.246	0.034	0.661
Firm age	22.640	200.500	1.244	22.640	200.600	1.244
Stock return	0.138	0.180	0.900	0.138	0.180	0.900
Return volatility	0.026	0.000	1.399	0.026	0.000	1.399
Board size	8.364	4.232	0.716	8.364	4.233	0.717
Board independence	0.752	1.610	-1.018	0.752	1.610	-1.017
Female ratio	0.106	0.011	0.715	0.106	0.011	0.715
Board busyness	0.077	1.062	1.511	0.077	1.062	1.511
Institutional ownership	0.796	0.019	-0.824	0.796	0.019	-0.824
CEO duality	0.072	0.067	3.320	0.072	0.067	3.320
CEO age	54.620	55.220	0.286	54.620	55.210	0.286
CEO tenure	13.950	75.780	1.070	13.940	75.770	1.070
CEO gender	0.965	0.034	-5.034	0.965	0.034	-5.034

This table reports the covariate balance for entropy balancing. Panel A reports the mean, variance, and skewness for the covariates for the treatment and the control groups before balancing, while Panel B reports the same information after the balancing. The treatment variable is based on the dominant cultural dimension. The dominant corporate culture is measured as a dummy variable that takes the value of 1 if the firm's score is in the top quartile across all firms in a particular year, and zero otherwise. The same set of controls as in Table 4.5 are used as covariates. Definitions of all variables are included in Appendix Table A.

I then re-estimate the baseline regression model (4.1) for the entropy balanced weighted sample and report the results in Table 4.12. The findings of the Competitive dominant culture are consistent with Table 4.5 and the following tables. As displayed in columns (4) and (8) the coefficient on *Compete-dominant* is positive (negative) and statistically significant at the 1% significance level with *CEO Equity (Cash) incentives*. Consistent with my earlier findings, the entropy balancing technique continues to show evidence in support of the hypotheses. Furthermore, this analysis reports stronger results, in terms of statistical significance level, compared to the PSM approach. Given the advantages of applying entropy balancing, these results add more support to my theoretical arguments for the influence of the competitive growth-focused culture on designing CEO incentives to optimally align CEO interests with the firms' shareholders and to align risk-taking preferences.

4.4.3.4. Two-stage Least Squares (2SLS)

A CEO might influence their firm's corporate culture through their managerial style (Nguyen et al. 2016). Thus, there might be reverse causality between corporate culture and CEO-related issues. To resolve this potential endogeneity concern, I apply 2SLS regression using the industry's mean culture score as an instrumental variable (IV). This IV is particularly relevant because corporate culture could be determined by a broader environmental context to which those firms belong. These environmental contexts are industry and national culture (Hartnell et al. 2011). This is supported by Gordon (1991), Sadri and Lees (2001), and Jiang et al. (2019) who assert that corporate culture is strongly influenced by the characteristics of the industry in which they operate. My sample focuses on the US, and so excludes any national influences or differences. Therefore, an instrumental variable based on the industry is more appropriate. Most importantly, the industry's mean culture score satisfies the inclusion and exclusion criteria of the IV. That is, the industry average culture (instrument) does not affect CEO compensation (dependent variable) other than through its correlation with the corporate culture (the assumed endogenous independent variable), thus satisfying the relevance criteria of the IV (correlated with corporate culture). The exclusion criteria are likely satisfied by this IV as it is less likely that the industry culture would have a direct impact on CEO compensation or via other mechanisms other than the firm's corporate culture.

Table 4.12: Endogeneity: Entropy balancing: regressions for the weighted samples

Variables	Dependent variable: *Equity incentives*				Dependent variable: *Cash incentives*			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Collaborate-dominant	-0.001				-0.002			
	(0.007)				(0.006)			
Control-dominant		0.007				0.003		
		(0.008)				(0.007)		
Create-dominant			-0.002				0.002	
			(0.005)				(0.005)	
Compete-dominant				0.060***				-0.033***
				(0.010)				(0.009)
All controls	YES	YES	YES	YES	YES	YES	YES	YES
Observations	11475	11475	11475	11475	11475	11475	11475	11475
R-squared	0.189	0.209	0.206	0.174	0.301	0.339	0.324	0.282
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES

This table reports the results of regressions estimating the relations between corporate culture dimensions and CEO compensation using the entropy balancing weighted sample. The dependent variable is CEO compensation measured by *Equity incentives* (columns (1) to (4)) or *Cash incentives* (columns (5) to (9)). The main independent variables of are the dominant corporate culture measures based on the CVF: *Collaborate-dominant*; *Control-dominant; Create-dominant*; and *Compete-dominant*. The control variables include firm, governance, and CEO characteristics as in Table 4.5. Definitions of all variables are included in Appendix Table A. All models include year and industry fixed effects, where industry fixed effects are based on Fama-French 48 industry classification. Firm continuous variables are winsorised at the 1st and 99th percentiles. Robust standard errors are in parentheses. ***, **, and * indicates significance at the 1%, 5%, and 10% level, respectively.

Table 4.13 shows the 2SLS regression results. As there are no within-industry differences in the IVs, I do not use industry fixed effects, so only include year fixed effects dummies. Panel A shows the results for CEO equity incentives and Panel B shows the results for the cash incentives.

The first-stage regressions are reported in columns (1), (3), (5), and (7) in each panel, where corporate culture dimensions are dependent variables regressed on industry average culture as the IV, including the same set of control variables that are specified in the baseline model (4.1) and Table 4.5. The coefficient estimates on the instruments for all four corporate culture dimensions are positive and statistically significant at the 1% level, implying that the instruments are valid. This is the case in both panels A and B. Furthermore, the Kleibergen–Paap Wald F-statistic for weak instruments exceeds the threshold value of 16.38 proposed by Stock and Yogo (2005), thus rejecting the null hypothesis that the instrument is weak. Accordingly, these findings provide evidence that confirms that the industry's mean corporate culture is a valid instrument for all dimensions.

The results of the second stage regressions are reported in columns (2), (4), (6), and (8) for *Collaborate*, *Control*, *Create*, and *Compete* corporate culture dimensions respectively, with Panels A and B separating equity from cash incentives. In the second stage, the fitted value of each culture dimension is retained from the first stage and adopted as the independent variables representing corporate culture. The two dimensions *Collaborate* and *Control* do not present any significant association with CEO incentives, which is line with the previous sub-sections.

Confirming my strongest result in this chapter, the coefficients on *Fitted Compete* are positive (negative) for *Equity (Cash) incentives* and are statistically significant at the 5% level or better. Consistent with the hypotheses, this reinforces the view that competitive culture is growth-focused, whereby firms adopting such culture are more likely to make riskier decisions than firms with safety-focused cultures (Nguyen et al. 2019). Thus, they link CEO compensation with the firm performance by optimally designing these plans with more equity-based compensation and less cash-based to align CEO-shareholders' interests and to incentivise risk-taking.

Table 4.13: Endogeneity: Two-Stage Least Squares (2SLS)

Panel A. Equity incentives

	Dependent variables							
Variables	First stage *Collaborative*	Second stage *Equity incentives*	First stage *Control*	Second stage *Equity incentives*	First stage *Creative*	Second stage *Equity incentives*	First stage *Competitive*	Second stage *Equity incentives*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Industry mean (Collaborate)	0.940***							
	(0.051)							
Fitted Collaborate		0.091						
		(0.057)						
Industry mean (Control)			0.943***					
			(0.078)					
Fitted Control				0.076				
				(0.075)				
Industry mean (Create)					0.958***			
					(0.063)			
Fitted Create						0.188***		
						(0.065)		
Industry mean (Compete)							0.900***	
							(0.032)	
Fitted Compete								0.054***
								(0.016)
All controls	YES	YES	YES	YES	YES	YES	YES	YES
Year FE		YES		YES		YES		YES
Observations	11475	11475	11475	11475	11475	11475	11475	11475
R-squared	0.294	.1844	0.209	.1836	0.280	.1805	0.540	.1878
Kleibergen-Paap rk Wald F-stat.	309.491		191.002		205.982		789.666	

Panel B. Cash incentives

	Dependent variables							
	First stage	Second stage	First stage	Second stage	First stage	Second stage	First stage	Second stage

	Collaborative	*Cash incentives*	*Control*	*Cash incentives*	*Creative*	*Cash incentives*	*Competitive*	*Cash incentives*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Industry mean (Collaborate)	0.940***							
	(0.051)							
Fitted Collaborate		-0.007						
		(0.047)						
Industry mean (Control)			0.950***					
			(0.078)					
Fitted Control				0.017				
				(0.059)				
Industry mean (Create)					0.958***			
					(0.063)			
Fitted Create						-0.151**		
						(0.064)		
Industry mean (Compete)							0.900***	
							(0.030)	
Fitted Compete								-0.031**
								(0.012)
All controls	YES	YES	YES	YES	YES	YES	YES	YES
Year FE		YES		YES		YES		YES
Observations	11475	11475	11475	11475	11475	11475	11475	11475
R-squared	0.294	0.338	0.209	0.338	0.280	0.332	0.540	0.339
Kleibergen-Paap rk Wald F-stat.	309.491		191.002		205.982		789.666	

This table reports the estimates from the 2SLS framework. Panel A (B) presents the results for CEO *Equity (Cash) incentives*. Columns (1), (3), (5), and (7) show the first stage regressions where each corporate culture dimension is regressed on the industry mean cultural dimension score (instrumental variable), and control variables. Columns (2), (4), (6), and (8) report the results of the second stage regressions, in which CEO incentives is regressed on the stage one fitted value and the same controls. The main independent variables of interest are the four dimensions of the corporate culture based on the CFV: *Collaborate*; *Control*; *Create*; and *Compete*. I include the same set of controls as in Table 4.5. These variables are not tabulated to conserve space. Definitions of all variables are included in Appendix Table A. For brevity, I only report the coefficients on the IV and fitted corporate culture variables. All models include year fixed effects. Firm continuous variables are winsorised at the 1st and 99th percentiles. Robust standard errors are in parentheses and are clustered at the firm level. ***, **, and * indicates significance at the 1%, 5%, and 10% level, respectively.

A finding emerging in Table 4.13, but consistent with my argument, is the significant coefficient estimates on *Fitted Create*, which are also positive (negative) for *Equity (Cash) incentives*, and both are large in magnitude and significant at the 1% level. The coefficient on *Equity incentives* corroborates the result appearing in Table 4.7 for the lagged regression. Thus, the findings on *Create* culture confirm the proposed hypotheses that corporate cultures synonymous with more risk-taking are more likely to provide equity-based incentives for CEOs to encourage them to more risk and to align the CEO risk-taking with shareholders' risk preferences. As a creative culture is also a growth-focused culture and therefore shares the same risk-taking approach as the competitive culture, the design of CEO incentives would correspond.

4.5. Further analyses: Pay-for-Performance Sensitivity

Thus far, the results show that corporate culture plays a significant role in determining CEO compensation. Among the four dimensions, the findings for the competitive culture provide the most significant and consistent results showing that firms with such a culture tend to increase equity incentives and reduce cash incentives for their CEOs. These findings support the agency theory, in which firms would optimally design compensation plans in a way that fits the firm's risk-taking approach and consequently would serve the shareholders' interests. In this final section, I present further analysis to explore the importance of my findings on pay-for-performance sensitivity (PPS). Based on the literature on CEO compensation, a higher pay-for-performance is crucial for reducing the conflict of interest between the firm's directors and shareholders (Jensen and Murphy 1990; Aggarwal and Samwick 1999; John et al. 2010). Jensen and Murphy (1990) document that for every $1000 rise in shareholders' wealth, the CEO compensation increases by only $3.25. They debate that this low pay-for-performance sensitivity challenges the optimal contracting perspective of CEO pay. In contrast, subsequent empirical evidence by Hartzell and Starks (2003), Frydman and Saks (2010), Nyberg et al. (2010) and Van Essen et al. (2015) confirm the effectiveness of linking pay to firm performance. Thus, I test whether compensation plans determined by corporate culture are sensitive to the firm's performance and so better align the interests of the firm's CEO and shareholders. As growth-focused cultures (*Create* and *Compete*) are more risk-taking than safety-focused cultures (*Collaborate* and *Control*), and the findings so far confirms this view and show that culture matters in optimally structuring CEO incentives to match these risk-taking preferences, I further propose that CEO incentives

would be more sensitive to firm performance in *Create* and *Compete* than in *Collaborate* and *Control*.

Following the previous empirical work on pay-for-performance sensitivity (e.g., Murphy 1985; Aggarwal and Samwick 1999; Chhaochharia and Grinstein 2009; John et al. 2010; Gao and Li 2015; Conyon et al. 2019a) I estimate the following regression:

$$CEO\ incentives_{i,t} = \alpha + \beta_1\ Firm\ performance_{i,t-1} + \beta_2\ Corporate\ culture_{i,t-1} + \beta_3\ Firm\ performance_{i,t-1} \times Corporate\ culture_{i,t-1} + \gamma Z_{i,t-1} + Year_t + Industry_i + \varepsilon_{i,t} \quad (4.2)$$

The subscript *i* denotes firms, and *t* denotes years. The dependent variable is CEO compensation in levels, which is measured by two alternatives: *Equity incentives* and *Cash incentives*. As an alternative test for the pay-for-performance sensitivity, in model (4.2) I define CEO compensation as the changes in incentives instead of levels (Jensen and Murphy 1990; Zhang et al. 2005). That is, the dependent variable *CEO incentives* from model (4.2) takes the form Δ *Equity* or Δ *Cash incentives.* Δ is the changes in CEO incentives from year t-1 to t. The independent variable *Firm performance* is measured by two measures: accounting performance (*ROA)* and market performance *(Stock return)* following the literature (Core et al. 1999; Brick et al. 2006; Chen et al. 2019b; Conyon et al. 2019a; Hoi et al. 2019). I employ these alternative performance proxies for the following reasons. ROA refers to the firm operating performance, whereas stock return relates to the market performance and thus, it is more linked to shareholders wealth. Furthermore, as stock return is influenced by the stock market, it might be more associated to the risk-taking mechanism. Thus, on the pay-for-performance sensitivity analysis, I test whether there are any differences on the relationship between corporate culture and CEO incentives when incorporating these two performance variables. Other independent variables are those relating to the four corporate culture dimensions extracted from 10-Ks based on the CVF: *Collaborate; Control; Create;* and *Compete*. The key variable of interest is the interaction term $Firm\ performance_{i,t-1} \times Corporate\ culture_{i,t-1}$ which captures pay-for-performance sensitivity. Z is a vector of control variables representing firm, governance, and CEO characteristics that may influence CEO compensation, as defined in model (4.1). I use the one-year lagged values for the independent and control variables to mitigate endogeneity concerns. $Industry_i$ and $Year_t$ are industry and year fixed effects, respectively. $Industry_i$ is constructed using the Fama and French 48

industry classifications and is used to control for the unobserved omitted variables that may influence CEO compensation between industries. $Year_t$ captures the time-invariant year effects. The standard errors are clustered at the firm level, and firms' continuous variables are winsorised at the 1% and 99% levels to reduce the impact of any outliers.

Tables 4.14 and 4.15 show the results of the analysis of pay-performance sensitivity for the levels of CEO compensation, whereas Tables 4.16 and 4.17 reveal the results from the pay-performance sensitivity analysis pertaining to the changes in CEO compensation.

Table 4.14 presents the results of corporate culture and pay-performance sensitivity using *ROA* to measure firm accounting performance. Across all the columns, the coefficient on *ROA* is not significant, except in columns (4) and (8) when analysing the competitive culture on equity (and cash) incentives, for which the coefficient on *ROA* is positive (negative) and statistically significant at the 5% (10%) level. Regarding corporate culture, the results in column (1) examine *Collaborate* and reveal a positive coefficient for *Equity incentives*, albeit significant at the 10% level. Columns (2) and (6) show no relationship for *Control*, consistent with the sub-sections above.

Another result that was not displayed in Table 4.5 and subsequent analyses but is present in Table 4.13 and here in Table 4.14 is the negative and significant (at the 5% level) coefficient on *Create* in column (7) for cash incentives. Consistent throughout this chapter, in columns (4) and (8) the coefficient on *Compete* is significant at the 1% level for both *Equity* and *Cash incentives* and with the expected signs.

The variables of most interests in Table 4.14 are the interactions between corporate culture dimensions and firm performance (*ROA*). As shown in Table 4.14, the interaction term is statistically significant only in firms with *Create* and *Compete* cultures (columns (4), (7) and (8)), which corroborates my proposition that CEO incentives would be more sensitive to firm performance in growth-focused cultures than in safety-focused cultures. In terms of the coefficient on cash incentives, the interaction term *Create×ROA* (*Compete×ROA)* reports a positive and statistically significant at the 10% (5%) level association. These results imply that firms with creative and competitive cultures design their CEO cash-based incentives in a way that reinforces PPS.

Table 4.14: Corporate culture and pay-for-performance sensitivity (ROA)

Variables	Dependent variable: *Equity incentives*				Dependent variable: *Cash incentives*			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ROA	0.111	0.022	-0.082	0.454**	-0.087	0.128	-.0244	-0.397*
	(0.167)	(0.169)	(0.197)	(0.225)	(0.157)	(0.154)	(0.190)	(0.241)
Collaborate	0.075*				-0.064			
	(0.045)				(0.039)			
Collaborate × *ROA*	-0.349				0.291			
	(0.229)				(0.228)			
Control		0.028				0.012		
		(0.051)				(0.044)		
Control × *ROA*		-0.244				-0.026		
		(0.266)				(0.255)		
Create			0.067				-0.100**	
			(0.047)				(0.044)	
Create × *ROA*			-0.053				0.456*	
			(0.242)				(0.245)	
Compete				0.067***				-0.054***
				(0.018)				(0.017)
Compete × *ROA*				-0.253**				0.222**
				(0.101)				(0.109)
All controls	YES	YES	YES	YES	YES	YES	YES	YES
Observations	10505	10505	10505	10505	10505	10505	10505	10505
R-squared	0.196	0.196	0.196	0.198	0.359	0.359	0.360	0.361
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES

This table shows the regression results for the effect of corporate culture on CEO pay-performance sensitivity described in model (4.2). The dependent variable is CEO compensation measured by *Equity incentives* and *Cash incentives*. The independent variables are the firm accounting performance measure *ROA* and the four dimensions of the corporate culture based on the CFV: *Collaborate*; *Control*; *Create*; and *Compete*. The main variable of interest is the interaction term between cultural dimensions and *ROA*. I include the same set of controls as in Table 4.5. These variables are not tabulated to conserve space. Definitions of all variables are included in Appendix Table A. All independent variables are lagged by one year with respect to CEO incentives. All models include year and industry fixed effects, where industry fixed effects are based on Fama-French 48 industry classification. Firm continuous variables are winsorised at the 1st and 99th percentiles. Robust standard errors are in parentheses and are clustered at the firm level. ***, **, and * indicates significance at the 1%, 5%, and 10% level, respectively.

Remarkably, the PPS magnitude for the competitive culture as reported in column (4) is negative and statistically significant at the 5% level in terms of equity-based incentives. Intuitively, this result suggests that *Compete* has lower sensitivity to firm accounting performance when designing CEO equity-based incentives. This evidence provides less support to the optimal contracting view of CEO compensation, yet it could imply that firms with a competitive culture design CEO equity compensation plans to motivate them to take more risks, regardless of the operating profits as measured by *ROA.*

Table 4.15 presents the results of a similar test, but using *Stock return* as the measure of firm market performance, which is a different dimension of performance that is directly linked to the shareholders' wealth, and thus better aligns the interests between the CEO and shareholders. The coefficient on *Stock return* shows that CEO incentives are responsive to performance in columns (4), (5) and (7) only. Consistent with Table 4.14, the coefficients on *Collaborate* and *Control* and their interaction term with firm market performance are insignificant, signifying that such cultures may not design their CEO compensation plans with respect to market performance. Alternatively, in terms of the creative culture, the results in column (3) show a positive coefficient on *Create*, statistically significant at the 5% significance level. This is similar to the result in Table 4.13 and in line with the research proposition that anticipates a positive association between creative culture (growth-focused) and CEO equity incentives. However similar to collaborative and control cultures, the setting of CEO incentives is insensitive to firms' market-based performance for firms with a creative culture.

Furthermore, the test continues to show persistent results for the predicted association between the competitive culture and CEO equity and cash incentives as confirmed in Table 4.5. In particular, the coefficient on *Compete* is significantly associated at the 10% level or better with *Equity* and *Cash incentives*, with the anticipated signs. As well, across all models, only competitive culture has significant PPS. Precisely, the coefficient on the interaction term '*Compete*×*Stock return'* in column (4) is positive and statistically significant at the 5% level with CEO *Equity incentives*. This suggests that PPS is larger in firms with a competitive culture when setting CEO equity incentives, that is the type of compensation that is directly linked to firm risks, and ultimately shareholders' wealth.

Table 4.15 Corporate culture and pay-for-performance sensitivity (Stock return)

Variables	Dependent variable: *Equity incentives*				Dependent variable: *Cash incentives*			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Stock return	-0.029	0.007	0.014	-0.066**	-0.042*	-0.029	-0.041*	-0.006
	(0.026)	(0.024)	(0.028)	(0.028)	(0.021)	(0.022)	(0.025)	(0.024)
Collaborate	0.018				-0.024			
	(0.027)				(0.024)			
Collaborate × Stock return	0.040				0.019			
	(0.039)				(0.033)			
Control		-0.009				0.008		
		(0.025)				(0.021)		
Control × Stock return		-0.017				-0.001		
		(0.040)				(0.036)		
Create			0.062**				-0.029	
			(0.029)				(0.026)	
Create × Stock return			-0.021				0.016	
			(0.035)				(0.032)	
Compete				0.025**				-0.019*
				(0.012)				(0.011)
Compete × Stock return				0.028**				-0.010
				(0.012)				(0.011)
All controls	YES	YES	YES	YES	YES	YES	YES	YES
Observations	10505	10505	10505	10505	10505	10505	10505	10505
R-squared	0.196	0.195	0.196	0.197	0.359	0.359	0.359	0.360
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES

This table shows the regression results for the effect of corporate culture on CEO pay-performance sensitivity described in model (4.2). The dependent variable is CEO compensation measured by *Equity incentives* and *Cash incentives*. The independent variables are the firm market performance measure *Stock return* and the four dimensions of the corporate culture based on the CFV: *Collaborate*; *Control*; *Create*; and *Compete*. The main variable of interest is the interaction term between cultural dimensions and *Stock return*. I include the same set of controls as in Table 4.5. These variables are not tabulated to conserve space. Definitions of all variables are included in Appendix Table A. All independent variables are lagged by one year with respect to CEO incentives. All models include year and industry fixed effects, where industry fixed effects are based on Fama-French 48 industry classification. Firm continuous variables are winsorised at the 1st and 99th percentiles. Robust standard errors are in parentheses and are clustered at the firm level. ***, **, and * indicates significance at the 1%, 5%, and 10% level, respectively.

Taken together, the inverse relationship between stock return and CEO equity incentives and the positive interaction effect suggests that competitive culture reinforces the relationship between market performance and equity-based incentives.

Table 4.16 reports the results of the PPS test for the changes in CEO compensation, for which firm operating performance as measured by *Δ ROA* is the measure of firm performance. In this table, the coefficient of interest changes substantially compared to Table 4.14, which included regressions of the level of compensation. The important differences between Tables 4.14 and 4.16 are that the interaction terms of *Create* × Δ *ROA* and *Compete* × Δ *ROA* are not significant, whilst the coefficient on *Create* reveals a significant and positive association with the changes to equity incentives. However, similar results are obtained for *Create* and *Δ Cash incentives* as in Table 4.14. Although pay-performance sensitivity is not maintained in this table for *Create* and *Compete*, the results for *Create* continue to show support for the previous subsections and baseline analysis. Creative firms provide CEO incentives plans that encourage their risk-taking behaviour, irrespective of the operating profit.

Furthermore, in Table 4.16 the interaction term *Collaborate* × Δ *ROA* demonstrates a significant association with both the changes in equity and cash incentives, and *Control* × Δ *ROA* exhibits a negative relation with cash incentives. Although I conjecture that CEO incentives would be more sensitive to *Create* and *Compete* as growth-focused cultures compared to the safety-focused *Collaborate* and *Control*, the findings on the interactions do not necessarily contradict my proposition. The positive coefficient on the interaction term *Collaborate* × Δ *ROA* in column (1) suggests that firms with a collaborative culture design CEO pay with more equity incentives. These CEOs may be more risk averse, aligned with the risk averse nature of firms adopting this culture consistent with the signalling view discussed in section 4.2.3, suggesting that more equity-based compensation is used to motivate the CEO to take more risk to enhance the firm's operating performance. It's important to note that the pay-for-performance sensitivity is only significant in relation to this performance measure, not in terms of market performance as shown in Table 4.17. This suggests that *Collaborate* firms may prioritize CEO pay sensitivity to operating profits, in order to maintain the safety status desired by this cultural dimension, over that to stock returns, which are directly tied to shareholders' wealth. In addition, the negative interaction terms in

columns (5) and (6) continue to show that firms with *Collaborate* and *Control* cultures provide less sensitive cash compensation to curb CEO opportunistic actions and maintain safety.

In Table 4.17, when performance is measured using stock returns, the analysis maintains that *Create* has a positive (negative) and statistically significant association with the changes in equity (cash) incentives. These are different results to those presented in Table 4.15, which only uncover a significant association between creative culture and CEO cash incentives. In addition, the interaction term *Create* × *Stock return*, reports a statistically significant association with the changes in incentives, which is in contrary to the insignificant results found in Table 4.15 and the other PPS tables. The interaction terms between the three other cultural dimensions, *Collaborate*, *Control*, and *Compete*, and *Stock return* are all insignificant. In addition, and inconsistent with the previous findings of the chapter, *Compete* has a positive and statistically significant relationship with Δ *Cash incentives*, albeit only at the 10% level.

To summarise, the findings for *Create* when the changes in CEO incentives are the dependent variables in the models are more statistically significant than in the models using the levels of CEO compensation. A possible interpretation for both results on *Create* in Tables 4.16 and 4.17, is that creative culture promotes more R&D activities (Fiordelisi et al. 2019) and these investments, by nature, rely on long-term performance (Thakor 2016). The evidence in Table 4.16 on the pay-for-performance sensitivity is insignificant to creative firms' operational profits measured as ROA. Conversely, in Table 4.17, equity (cash) incentives are less (more) sensitive to stock returns. As stock returns capture short-term market performance, creative firms might choose to reduce the sensitivity of equity incentives and pay more equity-based compensation to increase the CEO's risk-taking behaviour regardless of the short-term market performance. The positive sensitivity of cash incentives to the firm's stock returns might be interpreted as minor evidence for optimal contracting, showing that some components of compensation are effectively linked to short-term performance. On the other hand, the findings on *Compete* are generally supportive of pay-for-performance sensitivity when examining the levels of CEO incentives and not the changes. Despite the difference, the evidence is largely consistent with my conjecture that CEO incentives are more sensitive to performance in *Create* and *Compete* cultures than in *Collaborate* and *Control*.

Table 4.16: Corporate culture and pay-for-performance sensitivity (ROA and the changes in CEO incentives)

Variables	Dependent variable: Δ *Equity incentives*				Dependent variable: Δ *Cash incentives*			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Δ *ROA*	-0.972***	-0.427**	-0.148	-0.013	0.358*	0.224	-0.291	-0.014
	(0.244)	(0.200)	(0.279)	(0.270)	(0.211)	(0.197)	(0.251)	(0.242)
Collaborate	-0.001				-0.011			
	(0.011)				(0.009)			
Collaborate × Δ *ROA*	1.119***				-0.786**			
	(0.374)				(0.330)			
Control		0.000				-0.009		
		(0.010)				(0.009)		
Control × Δ *ROA*		0.288				-0.624*		
		(0.315)				(0.318)		
Create			0.025**				-0.019**	
			(0.010)				(0.009)	
Create × Δ *ROA*			-0.137				0.186	
			(0.334)				(0.289)	
Compete				0.000				0.005
				(0.004)				(0.003)
Compete × Δ *ROA*				-0.110				-0.059
				(0.118)				(0.110)
All controls	YES	YES	YES	YES	YES	YES	YES	YES
Observations	10505	10505	10505	10505	10505	10505	10505	10505
R-squared	.019	0.017	0.018	0.018	0.036	0.035	0.035	0.035
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES

This table shows the regression results for the effect of corporate culture on CEO pay-performance sensitivity described in model (4.2). The dependent variable is the change in CEO compensation from one year to the next measured by Δ *Equity incentives* or Δ *Cash incentives*. The independent variables are the change in firm accounting performance measured by Δ *ROA,* and the four dimensions of the corporate culture based on the CFV: *Collaborate*; *Control*; *Create*; and *Compete*. The main variable of interest is the interaction term between cultural dimensions and Δ *ROA*. I include the same set of controls as in Table 4.5. These variables are not tabulated to conserve space. Definitions of all variables are included in Appendix Table A. All independent variables are lagged by one year with respect to CEO incentives. All models include year and industry fixed effects, where industry fixed effects are based on Fama-French 48 industry classification. Firm continuous variables are winsorised at the 1st and 99th percentiles. Robust standard errors are in parentheses and are clustered at the firm level. ***, **, and * indicates significance at the 1%, 5%, and 10% level, respectively.

Table 4.17: Corporate culture and pay-for-performance sensitivity (Stock return and the changes in CEO incentives)

Variables	Dependent variable: Δ *Equity incentives*				Dependent variable: Δ *Cash incentives*			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Stock return	0.016	0.066**	0.117***	0.027	-0.019	-0.037	-0.093***	0.003
	(0.028)	(0.028)	(0.034)	(0.034)	(0.022)	(0.025)	(0.032)	(0.03)
Collaborate	-0.009				-0.007			
	(0.013)				(0.011)			
Collaborate × Stock return	0.047				-0.003			
	(0.042)				(0.034)			
Control		0.001				-0.013		
		(0.013)				(0.012)		
Control × Stock return		-0.031				0.027		
		(0.046)				(0.041)		
Create			0.040***				-0.033***	
			(0.012)				(0.011)	
Create × Stock return			-0.089**				0.093**	
			(0.042)				(0.039)	
Compete				0.000				0.007*
				(0.005)				(0.004)
Compete × Stock return				0.009				-0.010
				(0.015)				(0.013)
All controls	YES	YES	YES	YES	YES	YES	YES	YES
Observations	10505	10505	10505	10505	10505	10505	10505	10505
R-squared	0.016	0.016	0.017	0.016	0.034	0.034	0.035	0.034
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES

This table shows the regression results for the effect of corporate culture on CEO pay-performance sensitivity described in model (4.2). The dependent variable is the change in CEO compensation from one year to the next measured by Δ *Equity incentives* and Δ *Cash incentives*. The independent variables are the firm market performance measure, *Stock return*, and the four dimensions of the corporate culture based on the CFV: *Collaborate*; *Control*; *Create*; and *Compete*. The main variable of interest is the interaction term between cultural dimensions and *Stock return*. I include the same set of controls as in Table 4.5. These variables are not tabulated to conserve space. Definitions of all variables are included in Appendix Table A. All independent variables are lagged by one year with respect to CEO incentives. All models include year and industry fixed effects, where industry fixed effects are based on Fama-French 48 industry classification. Firm continuous variables are winsorised at the 1st and 99th percentiles. Robust standard errors are in parentheses and are clustered at the firm level. ***, **, and * indicates significance at the 1%, 5%, and 10% level, respectively.

4.6. Conclusion

This chapter has examined the role of corporate culture in the design of CEO incentives. I argue that firms with a safety-focus corporate culture (*Collaborate and Control*) emphasise safety and stability rather than growth and risk-taking, therefore, they set incentives plan with more cash and less equity to maintain their stability and safety and to reduce the CEO risk-taking behaviour associated with these incentives. Alternatively, firms with a growth-focus culture (*Create and Compete*) encourage creativity, risk-taking, and innovation to achieve growth objectives, thus they require larger equity and lower cash-based incentives to encourage risk-taking behaviour and to align the interests of the CEO and shareholders to achieve growth. The results reveal supportive findings, and the effect is focussed on the competitive culture.

First, the baseline regression results show that competitive culture is positively (negatively) associated with equity (cash) incentives. These results are in line with the research hypotheses and prior literature on corporate culture and cash compensation. Second, the results for competitive culture and CEO incentives hold consistently in subsequent analyses including alternative measures for corporate culture and four endogeneity tests. Third, further analysis of Pay-for-Performance Sensitivity shows that CEO incentives are more sensitive to firm performance in firms with *Compete* and *Create* cultures than in firms with *Collaborate* and *Control.* The evidence is consistent with my argument that *Compete* and *Create* are growth-focused and so they are more risk-taking corporate culture dimensions. Therefore, firms with such cultures optimally structure CEO incentives to match these risk-taking preferences and ensure that these incentives are directly linked and sensitive to firm performance.

Overall, the results of this chapter highlight the role that corporate culture plays in determining CEO compensation and on influencing PPS. Therefore, it provides preliminary evidence that can be beneficial for regulators. It suggests that different corporate cultures have different risk-taking approaches, which would have implications for setting CEO pay. Thus, setting guidelines for corporate culture would help in shaping their risk-taking preferences and eventually may help in setting CEO pay in a more effective way for serving firms' outcomes and protecting shareholders' wealth.

The next chapter sheds light on the implications of corporate culture on a different corporate finance matter, that is firms' cash holdings.

Chapter 5: Corporate culture and cash holdings

5.1. Introduction

In this chapter, I examine the role of corporate culture in influencing firms' cash holdings decisions. Focusing on cash holdings is crucially important. Since the 1980's, the level of firms' cash reserves has increased significantly. According to Bates et al. (2009), the percentage of cash holdings in US firms has increased from 10.5% in 1980 to 23.2% in 2006. This behaviour of firms' cash hoarding has also gained the attention of the media and public opinion. According to a recently published article in *The Wall Street Journal*, "U.S. companies are sitting on the largest pile of cash ever. Investors are trying to gauge how they are going to use it".[27] As cash levels increase following economic growth, there are major strategic decisions that directors must consider: spending it internally on firm operations or externally on acquisitions; distributing it to shareholders; or simply hoarding it (Harford et al. 2008).

In principle, it is advantageous for firms to have the necessary liquidity to finance and operate their businesses and/or hedge against cash shortfalls (Opler et al. 1999). For example, Mikkelson and Partch (2003) report that firms with large cash reserves have greater R&D investments. Another benefit is that cash holdings are easily accessible and faster to liquidate by the firm's directors and shareholders than other firm's assets (Myers and Rajan 1998; Schauten et al. 2013). However, maintaining stockpiles of cash can be detrimental due to its opportunity cost and would ultimately impact firm performance and shareholders' wealth. High cash holdings might indicate a conflict of interest and agency problems between the firm's directors and shareholders (Jensen 1986). Supporting this view, cash-rich firms are more likely to engage in value-destroying acquisitions (Harford 1999), or may not necessarily invest these holdings in profitable investments with positive NPV (Al-Najjar 2013). In addition, excessive stockpiles of cash may lead a firm's directors to exploit them for their own interests at the expense of shareholders (Chung et al. 2015). Given the significant role that cash reserves play in influencing firm value and outcomes, there is a vast literature that

[27] Pellejero, S. and Davies, P. J. 2020. Investors Circle Largest Corporate Cash Hoard Ever. *The Wall Street Journal* December 4, 2020. Available at: https://www.wsj.com/articles/investors-circle-largest-corporate-cash-hoard-ever-11607086917 [Accessed: 11/01/2022].

offers several theories to identify the factors that determine a firm's cash holdings.[28] Yet, most of these studies focus on traditional firm and governance determinants. In this chapter, I extend this literature by examining whether corporate culture contributes as a determinant of cash holdings.

Corporate culture is shown to be an important firm characteristic that impacts the firm's policies and outcomes (e.g., Fiordelisi and Ricci 2014; Guiso et al. 2015b; Grieser et al. 2017; Fiordelisi et al. 2019; Jiang et al. 2019; Nguyen et al. 2019; Li et al. 2021; Andreou et al. 2022; Graham et al. 2022), but the relationship between corporate culture and cash holdings is overlooked by this literature. To fill this gap, I address the following questions: does corporate culture impact firms' cash holdings? If so, the related question to examine is to what extent does the impact influence firm value?

To begin, I emphasise information asymmetry as the main catalyst to establish the theoretical link between corporate culture and firms' cash holdings. This is important because the firm's internal informational environment, reflected by its culture, would influence the information quality and reliability with respect to its external environment and would impact the firm's decisions and outcomes (Chen et al. 2021a). To answer the research questions, I define corporate culture dimensions by adopting the Competing Values Framework CVF (Quinn and Rohrbaugh 1983; Cameron et al. 2006). This framework differentiates between four types of corporate culture: *Compete, Create, Collaborate,* and *Control*, each of them having its own values and orientations.[29] Building on the CVF (Figure 2.1 in Chapter 2), collaborative and creative cultures are associated with flexibility and they promote an open communication system and have a horizontal managerial structure (Zammuto et al. 2000). These properties improve the internal information quality and ultimately reduces information asymmetry issues within the firm (De Long and Fahey 2000; Gallemore and Labro 2015) as well as with external stakeholders (Chen et al. 2021a). A competitive culture emphasises stability and incorporates information from the external environment to achieve its financial goals (Hartnell et al. 2011). Thus, due to its integration into the external environment, competitive culture also signifies lower information asymmetry. On the other hand, control culture follows a hierarchical managerial system, that is also focused on the firm's internal

[28] These theories are presented in Section 5.2.1.
[29] A thorough explanation of the CVF is presented in Chapter 2.

environment (Zammuto et al. 2000). These characteristics deter an open communication system (De Long and Fahey 2000; Linnenluecke and Griffiths 2010), signify a concentration of power (Fiordelisi and Ricci 2014), and prioritising access to information for the firm upper-level directors. Consequently, in contradiction to the other three dimensions, the control culture has the highest information asymmetry within the firm and with external stakeholders.

The firms' informational environment (i.e., information asymmetry) is also particularly connected to cash holding levels (Drobetz et al. 2010). It influences the directors' behaviour and the ability of shareholders and other outsiders to understand this behaviour (Chung et al. 2015). According to Myers and Majluf (1984), information asymmetry creates an adverse selection problem and plays a crucial role in firms' financing decisions. Therefore, firms will rely on internal funds instead of external financing, especially when there is high information asymmetry that might lead to an increase in the costs of issuing debt or/and equity. Alternatively, having an abundant amount of cash holdings in addition to high information asymmetry might exacerbate the free cash flow problem between the firm's directors and shareholders because the shareholders would not be able to effectively monitor the directors and how they utilise the cash (Jensen 1986).

Drawing on the informational environment in each corporate culture dimension and on the role of information asymmetry between the firm's directors and shareholders on cash holdings, I explore the relationship between corporate culture and cash holdings. I postulate that corporate culture dimensions with low information asymmetry (i.e., *Compete, Create,* and *Collaborate)* have the same impact on cash holdings, whereas corporate culture with high information asymmetry (i.e., *Control*) will have the opposite impact on cash holdings. I test two opposing hypotheses. On the one hand, the *investment opportunity hypothesis* proposes that cash holdings are a valuable buffer when information asymmetry is high and external financing is costly (Drobetz et al. 2010; Chung et al. 2015). Thus, I argue that in cultures signifying low information asymmetry (i.e., *Compete, Create,* and *Collaborate*), cash holdings levels might be lower because external financing would be less costly to finance their investments. Alternatively, in cultures where information asymmetry might be a symptom (i.e., *Control*), shareholders would be more concerned about their cost of capital, and cash holdings would be more desired to fund investment opportunities. Accordingly, under the investment opportunity hypothesis, I predict that firms with *Compete*, *Create*, and

Collaborate cultures have lower cash holdings, and firms with a *Control* culture have larger cash holdings.

On the other hand, the *monitoring cost hypothesis* predicts that larger cash reserves exacerbate managerial discretion to waste these liquid assets, particularly when there is high information asymmetry that results in poor shareholders monitoring (Drobetz et al. 2010; Chung et al. 2015). Hence, I argue that in corporate cultures demonstrating low information asymmetry, shareholders are willing to accept more cash holdings because they will have a better monitoring role in a such transparent environment. In contrast, when corporate culture is informatively opaque, shareholders' monitoring would be less effective, thus, higher cash holdings would be avoided. To test this hypothesis, I predict that firms with *Compete*, *Create*, or *Collaborate* cultures have larger cash holdings, and firms with a *Control* culture have lower cash holdings.

To test these hypotheses, I apply Quantitative Textual Analysis (QTA) on firms' 10-K filings to measure corporate culture based on the CVF dimensions. QTA was initially introduced to finance research by Loughran and McDonald (2011; 2016). I follow a few studies that have already adopted the CVF to measure corporate culture using QTA (Fiordelisi and Ricci 2014; Fiordelisi et al. 2019; Nguyen et al. 2019; Barth and Mansouri 2021; Chen et al. 2021a; Wang et al. 2021; Andreou et al. 2022). The premise of this method is to have four scores of corporate culture, each of which represents one of the dimensions of the CVF.[30] *Cash holdings* is measured as the as the ratio of cash and short-term investments to total assets (Han and Qiu 2007; Chen 2008; Bates et al. 2009; Al-Najjar 2013).

Focusing on a sample comprising all publicly traded non-financial non-utility US companies from 1999 to 2019 I first perform empirical tests to relate the four cultural dimensions to the firm's informational environment. I use three proxies for information asymmetry including analyst coverage, dispersion of analysts' forecasts and a composite measure of information asymmetry, the IA-index, as suggested by the literature (e.g., Drobetz et al. 2010; Chung et al. 2015). Then, when I investigate the relation between corporate culture and cash holdings, the baseline regression results show that corporate culture

[30] Chapter 3 provides a full explanation on the construction of these corporate culture dimensions scores.

dimensions with low information asymmetry (i.e., *Compete, Create,* and *Collaborate*) have higher cash holdings. This evidence supports the *monitoring cost hypothesis.* In principle, to moderate the conflict of interest between a firm's directors and shareholders, the free cash flow available for directors must be reduced (Jensen 1986). The results take a further step and show that firms with corporate cultures with low information asymmetry could enhance shareholders' monitoring and therefore impact cash holdings. Given the ability of shareholders to monitor and penalise the managers for poor performance in an informatively more-transparent culture, the shareholders of such firms would be more willing to accept that managers maintain higher cash reserves to meet any future investment opportunities that may arise. Alternatively, the baseline regression does not report significant results for *Control.*

Despite this, it could be argued that firms could hold cash as a precautionary motive to hedge against cash shortfalls (Opler et al. 1999; Almeida et al. 2004; Ozkan and Ozkan 2004). I perform further analysis to test this conjecture and to examine whether the precautionary motive drives the results. For example, firms with volatile cash-flows and higher R&D investments are more likely to hold more cash to hedge against business uncertainty (Dittmar et al. 2003; Bates et al. 2009; Chen et al. 2015; Chen et al. 2021b). Using these two risk proxies and to indicate the precautionary motive, I continue to find that *Compete, Create,* and *Collaborate* cultures hold relatively more cash. In addition, I find that firms with competitive and creative cultural dimensions hold cash when they have higher R&D investments. Yet, these results hinder the validity of the precautionary motive in explaining the increase in cash holdings and support the *monitoring cost hypothesis* on the role of information asymmetry on cash holdings. In addition, this test shows that a *Control* culture may reinforce firms to hold more cash for different purposes other than the proposed research hypotheses and the precautionary motive.

Extending my analysis beyond the baseline regressions, I perform a range of robustness, endogeneity, and further tests. First, I test the robustness of the baseline results to alternative measures of corporate culture dimensions: the dominant corporate culture, which is an indicator variable of the main cultural scores; and another corporate culture framework provided by Li et al. (2021) and its sub-components that might parallel the dimensions of the CVF. The values in the CVF are theoretically established, whereas the Li et al. (2021) dimensions are identified using an empirical framework that highlights the most advertised values on S&P 500 firms' websites. Thus, the aim of this second alternative measure is to

compare the results obtained by the CVF dimensions to those found by Li et al. (2021) dimensions. The main findings are robust to these two alternative measures of corporate culture. The dominant corporate culture measures: *Compete-*, *Create-*, and *Collaborate-dominant* reveal a positive and statistically significant coefficients, which are the same results found in the baseline regression estimation. Three alternative dimensions from Li et al. (2021), *Innovation*, *Teamwork*, and *Respect*, show findings consistent with their parallel dimensions in the CVF, namely *Create, Collaborate*, and *Control*. In particular, *Innovation* and *Teamwork* have positive and statistically significant associations with cash holdings, whereas *Respect* exhibits a negative association with cash holdings. Most notably, as the CVF framework and Li at al. (2021) quantify corporate culture using different methodologies, the test incorporating the corporate culture measures of Li et al. (2021) indicates that their cultural dimensions capture distinct aspects of corporate culture compared to the dimensions measured from the CVF. In addition, the main results are robust to alternative measure of cash holdings, and to a different estimation method, that is, Fama-MacBeth (1973) regressions, which is a methodological approach that accounts for autocorrelations in the residuals of the baseline OLS regression.

Second, to address endogeneity concerns from omitted variables and reverse causality that may drive my results, I perform the following tests. First, I re-run the baseline regression using lag regressions. The first regression lags the independent variables by one year (corporate culture dimensions and control variables), and in the second lag regression I examine the long-run impact of corporate culture on the level of cash holdings by performing a time-dynamic model using a 3-year lag between corporate culture and cash holdings. My second strategy performs two matching techniques: propensity score matching and entropy balancing. In these analyses, I compare cash holdings in a treatment group against a control group, where treatments are firms with a particular dominant corporate culture, and the control group contains firms without that dominant corporate culture. Last, I estimate a two-stage least squares (2SLS) using the industry mean culture score as an Instrumental Variable (IV). The results of these tests confirm my primary findings in providing evidence consistent with the *monitoring cost hypothesis* in explaining the relationship between corporate culture and cash holdings.

To gain further insight, I next attempt to address the optimality of the relationship between corporate culture and cash holdings by answering the second research question,

whether this relationship affects firm profitability. More precisely, I shed light on the joint impact of corporate culture and cash holdings on return on assets (ROA). In this test, I focus on excess cash holdings because it captures significant information about future firm prospects that are related to the firm's profitability (Simutin 2010). On the whole, the results demonstrate that competitive and creative cultures accumulate more cash holdings, and when they do, they use the excess cash in a way that enhances future profitability as proxied by ROA. Remarkably, the excess cash holdings of firms with a collaborative culture might not be optimal in enhancing their profitability (ROA). The results on control culture show that such firms do not have excess cash that could influence firm profitability.

My work in this chapter contributes to the literature in two ways. First, I contribute to the literature on the role of corporate culture in corporate finance and decision-making. There has been an ongoing debate and a growing literature on the role of corporate culture on many firm outcomes and overall performance (e.g., Fiordelisi and Ricci 2014; Grieser et al. 2017; Fiordelisi et al. 2019; Li et al. 2021; Wang et al. 2021). I add to this literature by highlighting the significance of corporate culture on firms' cash holdings policies and overall value. Second, I complement the literature on the determinants of cash holdings. While the previous studies focus on firm- and governance-level determinants, only a few studies have considered cultural factors, which are mainly related to national culture (Ramirez and Tadesse 2009; Chen et al. 2015; Dudley and Zhang 2016). My study differs from those as it focuses on corporate culture, an important yet overlooked determinant of cash holdings. I provide evidence on the role of the firm's culture to influence its informational environment, and in turn, impacting the level of cash holdings.

The remainder of this chapter is organised as follows: Section 5.2 provides the theoretical and empirical background of cash holdings, the link between corporate culture and cash holdings, and the development of research hypotheses; Section 5.3 describes the data; Section 5.4 reports empirical results, robustness tests, and endogeneity tests; Section 5.5 offers further analyses; and Section 5.6 concludes.

5.2. Literature review and hypotheses

5.2.1. Cash holdings: Theoretical and empirical background

The level of corporate cash holdings has increased considerably in recent decades (Bates et al. 2009; Bates et al. 2018). Essentially, cash holdings are important because cash is vital for firms to have the necessary liquidity to finance and operate their businesses or cover cash shortages (Opler et al. 1999). In addition, cash holdings are easily accessible and faster to liquidate by the firm's directors and shareholders than the firm's other assets (Myers and Rajan 1998; Schauten et al. 2013). Consistent with this view, the literature shows how crucial it is to protect shareholders' wealth and govern cash holdings from the manipulation of firm directors (e.g., Dittmar et al. 2003; Ozkan and Ozkan 2004; Pinkowitz et al. 2006; Harford et al. 2008; Florackis and Sainani 2018, among others). In line with the importance of cash reserves, the literature has proposed three dominant theories for the firm's cash holdings.

Keynes (1936) is one of the earliest works on corporate cash holdings, which proposes two motives for holding cash: the transaction motive, where firms hold liquid assets so that they do not have to liquidate fixed assets or depend on costly external funds; and the precautionary motive, where firms hold cash as a buffer against potential cash shortages or for future investment opportunities. Opler et al. (1999) combine these to build the trade-off model of cash holdings. They argue that there is an optimal level of cash holdings based on a cost-benefit analysis. There is a trade-off between the costs of foregone investment opportunities due to cash shortage and the marginal costs of holding those liquid assets to minimise the need for costly external funds (Kim et al. 1998; Opler et al. 1999).

Alternatively, the pecking order theory assumes no optimal level of cash holdings because cash is a negative debt (Opler et al. 1999). Myers and Majluf (1984) establish the theoretical background of the pecking order theory relying on information asymmetry. They argue that firms follow a hierarchical order of financing for their investments, and eventually, this should help maximise shareholders' wealth. According to the pecking order theory, internal financing using cash holdings is the most preferred financing method because it is the least costly. Directors of firms do not have to use external funding through debt or equity when cash is available. Debt and equity could be too expensive due to asymmetric information between the directors and the external financing providers.

Jensen (1986) develops the free cash flow theory based on the agency conflict that might arise between the firm's directors and shareholders. According to Jensen (1986), there is a moral hazard problem in the free cash flow available for directors. Some directors might

have greater discretion and would use cash for their own benefits. In addition, directors might choose to hold cash instead of being exposed to the monitoring associated with capital market funding resulting from issuing debt or equity, thus creating a governance monitoring issue (Jensen and Meckling 1976). Consequently, to mitigate this agency conflict, shareholders force the firm to reduce cash through pay-out policies and reduce the free cash flow available for directors (Jensen 1986; Stulz 1990).

It is well-established in the empirical literature that these three theories contribute to explaining firms' cash holdings. Most of these studies focus on firm and governance factors influencing firms' cash holdings. For example, the pioneering work by Opler et al. (1999) provides empirical evidence supporting the trade-off theory. As a precautionary motive, firms hold more cash when they have riskier cash flows and higher growth opportunities. Furthermore, supporting the transaction cost motive, those firms hold less cash when the access to the capital market is easier and external financing is less costly. Similarly, the study of Bates et al. (2009) uses a set of US firms covering the period from 1980 to 2006. They find evidence suggesting that firms accumulate cash due to precautionary motives, i.e., supporting the trade-off theory. They also test the free cash flow theory, but they do not find evidence supporting this theoretical framework in explaining the increase in cash holdings.

Alternatively, Dittmar et al. (2003) argue that the free cash flow theory can explain firms' cash holdings in an international sample. According to their study, directors cannot be compelled by shareholders to disgorge cash reserves when those shareholders have weak protection, and so the free cash flow issue would be exacerbated. Indeed, they report that in countries with weak shareholders' rights, firms hold more cash (almost double) than firms operating in countries with stronger shareholders' rights. Dittmar et al. (2003) also provide evidence supporting the pecking order theory, where they find that firms hold more cash when raising external financing is less costly and therefore they chose to opt for debt financing.

Ozkan and Ozkan (2004) study a UK sample and confirm that firms' cash flows, growth opportunities, other liquid assets, leverage, and bank loans are crucial determinants for cash holdings. They also find that managerial ownership has a negative association with cash holdings. Using various proxies to reflect corporate governance in US firms, Harford et al. (2008), provide more comprehensive evidence on the association between free cash flow

theory and cash holdings. Overall, they find that firms with poor governance mechanisms hold less cash. In particular, firms with weaker shareholder rights and low insider ownership (poor governance) have lower cash holdings than their counterparts with better shareholders rights and greater insider ownership (better governance). As well, those firms distribute their excess cash holdings through repurchases instead of dividends to have the least commitment with shareholders. Relatedly, Chen (2008) uses the S&P 1500 sample, Ferreira and Vilela (2004) use a sample of EMU countries, and Al-Najjar (2013) covers emerging markets and all propose the three main theories and report results consistent with the previous literature on the firm-level and governance-level determinants of cash holdings.

Apart from the firm and governance determinants of firm's cash holdings, scarce attempts investigate the role of informal institutions, including cultural and social factors. For example, Chen et al. (2015) examine an international sample consisting of 27,801 firms from 41 countries covering the period 1989 to 2009 and argue that the variations in cash holdings in these firms are due to cultural differences. They use Hofstede's (1980; 2001) individualism and uncertainty avoidance dimensions to measure national culture. Building on the precautionary motive of the trade-off theory, they hypothesise that directors from cultures that score high in uncertainty avoidance choose to hoard cash to hedge against undesired cash shortages in the future. On the other hand, directors from individualistic societies are more overconfident about the firm's profitability in the future and therefore they do not accumulate excess cash. Their findings confirm that this is the case. Cash holdings are negatively associated with individualism and positively associated with uncertainty avoidance. This is consistent with an earlier study by Ramirez and Tadesse (2009), which reports a positive association between uncertainty avoidance and cash holdings in their sample that covers almost fifty countries between 1990 to 2004.

Alternatively, Dudley and Zhang's (2016) study provides support to the agency (free cash flow) theory when they studied the impact of the level of societal trust and corporate cash holdings. Examining data covering firms across 54 countries, they find that shareholders in low-trusting societies force firms' directors to disgorge cash. Furthermore, the association between societal trust and cash holdings is greater when shareholders' rights and governance quality are poor in such societies.

Excluding these studies, the role of culture, particularly corporate culture, remains undiscovered. In this chapter, I aim to contribute to the literature by examining corporate culture as a further determinant of firms' cash holdings. The following section explains the association between corporate culture and cash holdings and develops the research hypotheses.

5.2.2. Corporate culture and cash holdings

Although there are studies in the finance literature that document the importance of corporate culture in impacting the firm's outcomes (Fiordelisi and Ricci 2014; Guiso et al. 2015b; Grieser et al. 2017; Fiordelisi et al. 2019; Jiang et al. 2019; Nguyen et al. 2019; Barth and Mansouri 2021; Li et al. 2021; Andreou et al. 2022; Graham et al. 2022), the research on the role of corporate culture on firm's cash holdings is limited. To fill this gap, I postulate that corporate culture may be a crucial determinant of the firm's cash holdings. Most importantly, to establish the theoretical link between corporate culture and firms' cash holdings and motivated by the previous work (discussed in detail in the next paragraph) on culture and firm liquidity and investment decisions, I emphasise information asymmetry as the main catalyst to explain this relationship. This is important because the firm's internal informational environment reflected by its culture would influence the information quality and reliability with respect to its external environment and would impact the firm's decisions and outcomes (Chen et al. 2021a). In addition, firms' informational environments are particularly relevant to their liquidity and investment decisions as documented in the literature since the issues and consequences of firms' financing decisions can be explained explicitly by information asymmetry and agency cost of free cash flow (Myers and Majluf 1984; Jensen 1986; Pawlina and Renneboog 2005; Drobetz et al. 2010; Chung et al. 2015).

A few studies of the impact of cultural factors on liquidity and investment decisions present evidence in line with this context. Kashefi-Pour et al. (2020) rely on information asymmetry and the agency issue of free cash flow to examine the relationship between Hofstede's (2001) national culture dimensions and firms' investment-cash flow sensitivity. Kashefi-Pour et al. (2020) find that both theoretical views explain the relationship between national culture and investment-cash flow sensitivity. Their study adds to the previous work of Chen et al. (2015) who find a significant association between two national culture dimensions, individualism and uncertainty avoidance, and the level of firms' cash holdings.

Furthermore, while they mainly focus on investment-cash flow sensitivity, Jiang et al. (2019) report that the corporate culture of integrity reduces the free cash flow problem. In other words, firms with high integrity culture do not need to hoard cash as they can rely on external financing to finance their investment when required. Therefore, higher integrity is associated with lower investment-cash flow sensitivity. They also report that firms with such a culture need to have lower information asymmetry to attain as such advantage.

Together, these studies highlight the role of information asymmetry and free cash flow perspectives and incorporating cultural factors in explaining the firm's liquidity and investment decisions. However, there is no direct empirical study, as far as I am aware, that examines the impact of corporate culture on cash holdings. To do so, I develop two competing hypotheses to test this relationship between culture and cash holdings relying on the informational environment of corporate culture as the main mechanism.

5.2.3. The relationships between the CVF and cash holdings and hypotheses development

To begin, I examine the relationship between corporate culture and the firm's cash holdings by adopting the competing values framework (CFV) (Quinn and Rohrbaugh 1983; Cameron et al. 2006).[31] Building on the CVF (Figure 2.1 in chapter 2), both the *Collaborate* and *Create* cultures promote an open communication system and have a horizontal managerial structure (Zammuto et al. 2000). This, in turn, suggests that an effective communication system improves the internal information quality and ultimately reduces information asymmetry issues inside the firms (De Long and Fahey 2000; Gallemore and Labro 2015). This informatively transparent culture also reduces the information asymmetry between the firm and external stakeholders, as the better access to information could hasten the dissemination of information (Chen et al. 2021a). The third cultural dimension according to the CVF is *Compete*, which emphasises stability and the firm incorporates information from the external environment to achieve its financial goals (Hartnell et al. 2011). Most importantly, while fostering stability and control, *Compete* is externally focused, similar to *Create*, and generating short term value is its fundamental objective (Thakor 2016). So, in this dimension, competitiveness is encouraged, and to achieve optimal financial performance,

[31] A full definition of the Competing Values Framework CVF is presented in Chapter 2.

it is essential to assimilate and respond to information from the external environment (Andreou et al. 2022; Cameron et al. 2022). As Bergh et al. (2019) highlight, information exchanges with the firm's external stakeholders can decrease information asymmetry. Therefore, due to its pivotal exposure to and integration into the external environment, the competitive culture would signify lower information asymmetry. Consistent with the discussion above, I argue that *Collaborate, Create*, and *Compete* have a more transparent informational environment, and, as such, they are synonymous with lower information asymmetry. To the extent that information asymmetry drives the relation between culture and cash holdings, this suggests that these three dimensions would have the same impact on the firm's level of cash holdings.

Alternatively, the remaining *Control* dimension of culture follows a hierarchical and centralised managerial system, which is also focused on the firm's internal environment (Zammuto et al. 2000). Such properties signify a bureaucratic system that discourages an open communication system (De Long and Fahey 2000; Linnenluecke and Griffiths 2010) and makes the power concentrated in the hands of firms' CEOs (Fiordelisi and Ricci 2014). This could indicate that the CEO and other high-ranking managers would have access to superior information and might exacerbate the information asymmetry within the firm and eventually with shareholders and the external environment. Thus, in contrast to the other three dimensions, *Control* is the most informatively opaque and so has the highest information asymmetry, leading to the opposite impact on cash holdings compared to the other three cultural dimensions.

Drawing on the informational environment in each corporate culture dimension and the role of information asymmetry between the firm's directors and shareholders on cash holdings, I explore the relationship between corporate culture and cash holdings. I test two opposing hypotheses on the relationship between corporate culture and cash holdings. Myers and Majluf (1984) and Drobetz et al. (2010) assert that information asymmetry creates an adverse selection problem and plays a crucial role in firms' financing decisions. Therefore, firms will rely on internal funds instead of external financing, especially when there is high information asymmetry that might lead to an increase in the costs of issuing debt or/and equity. Thus, if the firm has an opaque informational environment, shareholders would be more concerned about their cost of capital, and cash holdings would be more desired to fund investment opportunities. However, cash holdings might not be as much of a concern if the

firm has a more transparent informational environment, as external financing would be less costly and could be used to finance projects instead of cash (Chung et al. 2015). This situation suggests that corporate culture might impact firms' cash holdings levels since it represents the extent of information asymmetry of the firm. In corporate cultures where information asymmetry between a firm's directors and shareholders tends to be low, cash holdings might be lower.

Instead, in cultures where information asymmetry might be exaggerated as a symptom of the culture, managers would tend to hold more cash because it is in shareholders' interests to use internal funds instead of relying on more costly external financing. Consistent with these notions, I postulate that in firms with competitive, creative, or collaborative corporate cultures, that have low information asymmetry, cash holdings levels will be lower, and in firms with a controlling corporate culture, that signifies a high information asymmetry, cash holdings levels will be higher. Following the literature (e.g., Chung et al. 2015), I call this the *investment opportunity hypothesis* of cash holdings and it is expressed in the following hypotheses:

$H3_a$: Under the investment opportunity hypothesis, firms with Compete, Create, or Collaborate cultures have lower cash holdings;
$H3_b$: Under the investment opportunity hypothesis, firms with a Control culture have larger cash holdings.

Jensen (1986) argues that free cash flow might create agency conflicts between the firm's directors and shareholders. Having an abundant amount of cash would create a moral hazard problem and might provide directors with incentives to spend it on value-decreasing investments or use it for their private benefit (Drobetz et al. 2010). Thus, to mitigate such an issue, the free cash flow available for directors should be reduced (Jensen 1986; Stulz 1990). More cash holdings as well as higher information asymmetry would exacerbate the free cash flow problem (Drobetz et al. 2010). According to Chung et al. (2015), in firms with a transparent informational environment, i.e. low information asymmetry, shareholders are willing to accept larger cash reserves because they will have a more effective monitoring role in such a transparent environment, to prevent directors from taking advantage of their agency position. On the other hand, if firms have a high information asymmetry, it would be more challenging for firm shareholders to differentiate between value-increasing investment

opportunities from value-decreasing ones (Drobetz et al. 2010). Hence, in the face of such uncertainty, making it harder to effectively monitor directors, shareholders will force them to reduce the firm's cash holding to avoid the risk of directors misusing this cash.

This is also in line with Jensen and Meckling (1976) who indicate that directors might choose to hold cash instead of being exposed to the monitoring of the capital market resulting from issuing debt and/or equity. Therefore, from a free cash flow perspective, in cultures where information asymmetry is low, shareholders would permit managers to hold more cash because shareholders will have a better monitoring role in a such transparent environment. Conversely, in cultures with an informatively opaque environment, it would prevent the shareholders from effectively monitoring the directors and consequently, shareholders would force firms to reduce the free cash flow available to directors. Therefore, I postulate that in firms with competitive, creative, or collaborative corporate cultures, cash holdings will be higher, and in firms with a controlling corporate culture, cash holdings will be lower. Following the literature, I call this the *monitoring cost hypothesis* of cash holdings, and I test it by proposing the following hypotheses:

$H4_a$: Under the monitoring cost hypothesis, firms with Compete, Create, or Collaborate cultures have larger cash holdings;
$H4_b$: Under the monitoring cost hypothesis, firms with a Control culture have lower cash holdings.

5.3. Data, variables, and descriptive statistics

5.3.1. Data and sample

Following the literature investigating the US market, the sample for this study contains all publicly traded US companies from 1999 to 2019. I collect the necessary accounting and financial information from Compustat. Corporate culture proxies are calculated using companies' annual reports (10-K filings) from the US Securities and Exchange Commission's (SEC) Electronic Data Gathering, Analysis and Retrieval (EDGAR) database. Financial and utility firms are excluded due to their requirement to follow statutory capital and legal regulations (Opler et al. 1999; Bates et al. 2009). Any firms with missing data are also excluded. The final sample is an unbalanced panel consists of 3,313 firms with 27,071 firm-year observations over the sample period.

5.3.2. Variables definition

5.3.2.1. Corporate culture and information asymmetry

The measurement of corporate culture dimensions: *Compete; Create; Collaborate; and Control* is explained in detail in **Chapter 3**.

As I argue that these corporate culture dimensions should reflect the firms' informational environment and the extent of information asymmetry between the firm's directors and shareholders, I employ empirical tests using three proxies for information asymmetry suggested by the literature (e.g., Drobetz et al. 2010; Chung et al. 2015, among others). I obtain data on analysts' forecasts from I/B/E/S. The first and main proxy is the number of analysts (*Analyst coverage*) following the firm. A larger Analyst coverage suggests that more information is discovered and revealed to external stakeholders and thus represents lower information asymmetry. The second proxy is the dispersion of analysts' forecasts (*DISP*), which I measure by dividing the standard deviation of analysts' 1-year forecasts by the previous year-end share price (Chordia et al. 2011; Chung et al. 2015). A larger value for *DISP* suggests more disagreement among analysts, which is indicative of higher information asymmetry. In both *Analyst coverage* and *DISP*, I add one and take the natural logarithm to transform the variables to a normal distribution. Following Drobetz et al. (2010), the third proxy is a composite measure of information asymmetry (*IA-index*). This is an index constructed using five simpler proxies that could reflect information asymmetry. These variables are *Firm size* (large firms are more mature, and therefore have lower information asymmetry), firm *R&D investments*, *Tobin's Q* (as firms with more R&D investments and growth opportunities face more information asymmetry due to the uncertain outcomes of these investments), *Analyst coverage* and the Error in analysts' forecasts (*ErrorF*). *ErrorF* is calculated as the difference between the actual and forecasted earnings per share (EPS) scaled by the median earnings per share forecast. The actual and forecast EPS are the averages of all monthly EPS for a firm each year. In this proxy, I also add one and take the natural logarithm to transform it to a normal distribution. A larger *ErrorF* indicates a higher information asymmetry. To obtain the *IA-index*, I first calculate the firm's quantile rankings over all firms for each of the five variables that construct the index. Then, I sum up the scores of all the five variables. Thus, *IA-index* ranges from 5 (the smallest value

of *IA-index* with the lowest degree of information asymmetry) to 25 (the largest value of *IA-index* with the greatest degree of information asymmetry).

I report the results of corporate culture and information asymmetry in Table 5.1. In Panel A, I reveal the OLS model results where I regress *Analyst coverage* on the four cultural dimensions whilst controlling for firm size and operating performance (ROA), as well as year and industry fixed effects. Columns (1) to (4) introduce each of the cultural dimensions separately in the OLS regression model. The columns show that the coefficients on *Compete*, *Create*, and *Collaborate* are positive and statistically significant at the 1% significance level. Column (5) includes all cultural dimensions in one regression and the coefficients remain significant for the competitive and creative cultures. *Analyst coverage* does not show any significant association with *Control*. This empirical test supports the notion that corporate culture reflects the firm's informational environment. Most importantly, *Compete, Create*, and *Collaborate* capture the low information asymmetry as predicted by my arguments of these dimensions based on the CVF.

In Panel B, I report the results using the second proxy of information asymmetry (*DISP*). While only the coefficients on *Compete* and *Control* stay significant in column (5), the coefficient estimates in columns (1) to (4) on all dimensions shows a negative and statistically significant association with the dispersion of analysts' forecasts. Nevertheless, the coefficient magnitude of *Compete, Create*, and *Collaborate*, is larger compared to that of Control. As higher *DISP* indicates greater information asymmetry, these results are consistent with the notion that firms with competitive, creative, and collaborative cultures have more transparent informational environments compared to firms with a control culture.

Finally, in Panel C, I regress the third proxy of information asymmetry (*IA-index*) on the four cultural dimensions. The coefficient estimates in columns (1), (2), and (4) show a positive and statistically significant association between *Compete, Create*, and *Control* cultures and the *IA-index.* In column (5), only *Compete* and *Control* remain significant when adding all dimensions in the same model. The positive coefficient on *Control* is associated with the perception that the control culture has an opaque informational environment. Conversely, the results on *Compete* and *Create* are contradictory to the previous findings in Panels A and B, as the positive coefficient indicate that the cultural dimensions are correlated with greater information asymmetry.

Table 5.1: Validation tests of corporate culture and information asymmetry

Panel A.					
Variables	Dependent variable: *Analyst coverage*				
	(1)	(2)	(3)	(4)	(5)
Compete	0.171***				0.152***
	(0.018)				(0.019)
Create		0.244***			0.144***
		(0.048)			(0.049)
Collaborate			0.135***		0.062
			(0.051)		(0.047)
Control				0.022	0.034
				(0.032)	(0.032)
Firm controls	YES	YES	YES	YES	YES
Observations	20871	20871	20871	20871	20871
R-squared	0.291	0.287	0.286	0.285	0.292
Year and Industry FE	YES	YES	YES	YES	YES
Panel B.					
Variables	Dependent variable: *DISP*				
	(1)	(2)	(3)	(4)	(5)
Compete	-0.147***				-0.122***
	(0.040)				(0.041)
Create		-0.236*			-0.163
		(0.125)			(0.132)
Collaborate			-0.182**		-0.124
			(0.089)		(0.089)
Control				-0.106**	-0.129**
				(0.051)	(0.054)
Firm controls	YES	YES	YES	YES	YES
Observations	17153	17153	17153	17153	17153
R-squared	0.191	0.189	0.188	0.188	0.192
Year and Industry FE	YES	YES	YES	YES	YES
Panel C.					
Variables	Dependent variable: *IA-index*				
	(1)	(2)	(3)	(4)	(5)
Compete	1.013***				1.002***
	(0.153)				(0.158)
Create		0.650*			0.132
		(0.35)			(0.367)
Collaborate			0.42		0.010
			(0.286)		(0.299)
Control				1.002***	1.021***
				(0.304)	(0.298)
Firm controls	YES	YES	YES	YES	YES
Observations	17791	17791	17791	17791	17791
R-squared	0.423	0.415	0.415	0.416	0.425
Year and Industry FE	YES	YES	YES	YES	YES

This table presents the results from tests that regress three proxies for information asymmetry on the CVF cultural dimensions: *Compete; Create; Collaborate*; and *Control*. In Panel A the dependent variable is the number of analysts following the firm (*Analyst coverage*). In Panel B, the dependent variable is the dispersion of analysts' forecasts (*DISP*). In Panel C the dependent variable is the *IA-index*. Control variables include *Firm size* and *ROA*. Definitions of all variables are included in Appendix Table A. The OLS model also includes year and industry fixed effects, where industry fixed effects are based on Fama-French 48 industry classification. Robust standard errors are in parentheses and are clustered at the firm level. ***, **, and * indicates significance at the 1%, 5%, and 10% level, respectively.

Nevertheless, these findings should also be interpreted with caution. Even though the *IA-index* is used in the literature as a proxy for information asymmetry, a caveat about this measure is that it might not perfectly capture information asymmetry in my study. It could be endogenously related to the firm's corporate culture as it includes firm-level proxies (i.e., firm size, R&D investments, Tobin's Q) which could be influenced by corporate culture. Thus, it may not separate the impact of these culture-influenced firm factors and the impact of information asymmetry.

Given the limitations of the *IA-index* proxy for this study, without conducting further analysis of this proxy, I place more weight on the results shown in Panels A and B. These indicate moderate support for the notion that corporate culture reflects the firm's informational environments. Specifically, the *Analyst coverage* and *DISP* proxies suggest that *Compete*, *Create*, and *Collaborate* have more transparent informational environments compared to *Control*, consistent with my interpretations from the theory underlying the CVF.

However, taken together, the proxies of information asymmetry moderately support, the notion that corporate culture reflects the firm's informational environments. Most importantly, two out of the three proxies are consistent with my projection that *Compete*, *Create*, and *Collaborate* have more transparent informational environment compared to Control.

5.3.2.2. Cash holdings

Following the literature, I calculate cash holdings (*Cash holdings*) as the ratio of cash and short-term investments to total assets (Han and Qiu 2007; Chen 2008; Bates et al. 2009; Al-Najjar 2013). I also use an alternative measure for *Cash holdings*, which is the natural logarithm of this cash holdings ratio (*lnCash holdings*). The motivation for this log transformation is to reduce the issue of extreme outliers (Chen et al. 2015; Dudley and Zhang 2016).

5.3.2.3. Control variables

Several variables are known to determine the firm's cash holdings according to a large literature (Opler et al. 1999; Dittmar et al. 2003; Ozkan and Ozkan 2004; Han and Qiu 2007; Chen 2008; Bates et al. 2009; Chen et al. 2015; Dudley and Zhang 2016). These

variables are included in my regression model as control variables to ensure a more robust examination of the specific and incremental relationship between corporate culture and cash holdings.

The first determinant for cash holdings is firm size (*Firm size)*. Opler et al. (1999) propose that due to economies of scale, larger firms should hold lower levels of cash. They find a negative association between the firm's size and its cash holdings. Furthermore, Ozkan and Ozkan (2004) note that size could be an indicator of information asymmetry. Larger firms have a more transparent informational environment and thus external financing would be less costly compared to smaller firms. This in turn suggests a negative association between size and cash holdings. However, they find a positive and significant association between firm size and cash holdings. Due to these inconsistent results, I do not predict a direction for the association between size and cash holdings. I calculate *Firm size* as the natural logarithm of the book value of the total assets.

Leverage (*Leverage)* is a proxy for firm risk and its ability to issue debt. Based on the trade-off theory, the literature suggests that when the firm can issue debt as an alternative method of finance, they would have lower cash reserves (Opler et al. 1999; Ferreira and Vilela 2004; Ozkan and Ozkan 2004). Thus, a negative association is expected between leverage and cash holdings. I measure *Leverage* as the sum of short-term debt and long-term debt divided by the firm's total assets.

Capital expenditures (*Capital expenditures)* reflect the firm's investment opportunities. According to Bates et al. (2009), capital expenditures generate assets that can be used as security. Therefore, it can increase the ability of firms to use debt and reduce cash holdings. Accordingly, building on the trade-off theory (Opler et al. 1999), capital expenditures would have a negative relationship with cash holdings. *Capital expenditures* is measured as the ratio of capital expenditures to total assets.

Net working capital (*Net working capital*) reflects other assets that could be used as an alternative to cash. Hence, motivated by the trade-off theory, larger net working capital would be associated with lower cash holdings (Bates et al. 2009). *Netwc* is calculated as the ratio of working capital minus cash and short-term investments to total assets.

Market to book (*M/B*) ratio is a proxy for firm growth opportunities. In line with the trade-off and the pecking order theories, firms with higher investments opportunities are expected to have a higher level of cash holdings, as a precautionary motive and to reduce the reliance on the more costly external financing (Opler et al. 1999; Dittmar et al. 2003). *M/B* is the ratio of book value of total assets minus book value of common equity plus the market value of common equity to book value of total assets.

Bates et al. (2009) report that firms with higher cash flows reserve more cash to meet their investment opportunities. In addition, as a precautionary motive, Dittmar et al. (2003) report that firms with more volatile cash flows reserve cash to hedge against cash shortfalls in the future. Therefore, both of these variables are expected to have a positive association with cash holdings. *Cash flow* is defined as the ratio of operating income before depreciation, minus interest, and taxes, to the book value of total assets. Following Chen et al. (2015), *Cash flow volatility* is the standard deviation of cash flows for the previous ten years, requiring at least three years of observations.

Research and development (R&D) investments is another proxy for the firm's growth opportunities. As a precautionary motive, firms with greater R&D investments are assumed to have larger cash holdings to finance these investments and to face any financial distress in the future, caused by the risky nature of R&D investments (Opler et al. 1999; Bates et al. 2009). *R&D investments* is measured as an intensity ratio: research and development expenditure to total assets.

Dividend policy (*Dividend policy)* is a dummy variable that takes the value of 1 if the firm paid a dividend in that year and 0 otherwise. Opler et al. (1999) argue that firms can raise capital by cutting their dividend when they are short of cash. Also, Bates et al. (2009) note that dividend-paying firms have better access to the capital markets, and so raising funds externally would be less risky. These two arguments support both the trade-off and the pecking order theories. Together, these imply a negative association between the dividend dummy and cash holdings. A summary of all the variables included in the regression models is presented in Table A in the Appendix.

5.3.3. Descriptive statistics and correlation matrix

Table 5.2 reports the summary statistics of the main variables. In my sample, firms' cash holdings constitute approximately 26% of their total assets. This percentage is slightly higher than those reported in previous studies. For example, Bates et al. (2009) report that the average cash to assets ratio during 1999-2006 is around 19%-23%, and Chung et al. (2015) and He and Wintoki (2016) report an average of 20% and 16% for their cash ratios, respectively. In addition, there is a variation across the scores of the four corporate culture dimensions, which is consistent with (Fiordelisi and Ricci 2014). On average, 0.76%, 0.69%, and 0.62% of the whole 10-K filing signify a *Create, Collaborate,* and *Control* cultures, respectively. Instead, a competitive culture represents roughly 2.3% of the whole 10-K filing with a median of 2.2% and a standard deviation of 0.5%. This dimension has the highest scores among the four corporate cultures examined in this study.

In terms of firm characteristics, the mean firm size is $4111.117 million, firm leverage is 20%, and capital expenditures and net working capital ratios are approximately 4%. As well, the average M/B ratio is 2.4, and cash flow and cash flow volatility have an average of -0.024 and 0.23, respectively. Lastly, the average R&D expenses is around 10% and about 30% of firms pay dividends to their shareholders.

Table 5.2: Summary statistics

Variables	Mean	Standard Deviation	Median
Cash holdings	0.256	0.252	0.164
Compete	2.318	0.489	2.25
Create	0.755	0.158	0.756
Collaborate	0.687	0.177	0.657
Control	0.617	0.206	0.594
Firm size (in $M)	4111.117	18137.560	408.978
Leverage	0.202	0.274	0.146
Capital expenditures	0.040	0.041	0.028
Net working capital	0.042	0.483	0.058
M/B	2.478	3.664	1.748
Cash flow	-0.024	0.531	0.076
Cash flow volatility	0.238	1.317	0.050
R&D investments	0.098	0.182	0.037
Dividend policy	0.302	0.459	0

This tables reports the summary statistics for the main variables of the study. The sample consists of 3,313 firms with 27,071 firm-year observations covering the period 1999-2019. Definitions of each of the variables are included in Appendix Table A.

Table 5.3 shows the Pearson correlation coefficient of the main regression variables. As shown, there are positive and statistically significant correlations at the 1% level between cash holdings and all corporate culture dimensions. In principle, the results for *Compete,*

Create, and *Collaborate* cultures are in line with the propositions of the *monitoring cost hypothesis*. However, the finding on the control culture is consistent with the *investment opportunity hypothesis*. These results show preliminary evidence that there is a relationship between corporate culture and cash holdings. The next empirical tests aim to apply rigour to explore such findings more thoroughly and appropriately. In addition, the correlation between cash holdings and the firm characteristics variables is significant at the 1% level and the direction of the correlation is in accordance with previous studies, except for the firm cash flow variable (Opler et al. 1999; Ferreira and Vilela 2004; Ozkan and Ozkan 2004; Bates et al. 2009; Chen et al. 2015).

In general, the Pearson correlation coefficients show that the independent variables are significantly correlated. However, the correlations between them are low in economic terms. Thus, the results of the correlation matrix do not identify any serious multicollinearity issue between the independent variables, and so including them in the regression model would not likely create any spurious estimations of the results.

Table 5.3: Correlation matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) *Cash holdings*	1						
(2) *Compete*	0.199***	1					
(3) *Create*	0.073***	0.283***	1				
(4) *Collaborate*	0.270***	0.201***	0.015**	1			
(5) *Control*	0.023***	0.068***	0.080***	-0.043***	1		
(6) *Firm size*	-0.382***	-0.062***	0.103***	-0.070***	-0.015**	1	
(7) *Leverage*	-0.210***	-0.165***	-0.069***	-0.020***	-0.105***	0.141***	1
(8) *Capital expenditures*	-0.244***	-0.130***	-0.004	-0.041***	-0.038***	0.074***	0.031***
(9) *Net working capital*	-0.164***	-0.027***	-0.007	-0.098***	0.022***	0.110***	-0.480***
(10) *M/B*	0.232***	0.003	-0.024***	0.071***	0.016***	-0.190***	0.285***
(11) *Cash flow*	-0.288***	0.059***	0.047***	-0.088***	0.032***	0.348***	-0.336***
(12) *Cash flow volatility*	0.178***	-0.035***	-0.022***	0.030***	-0.014**	-0.214***	0.079***
(13) *R&D investments*	0.525***	0.062***	-0.006	0.223***	-0.022***	-0.396***	0.096***
(14) *Dividend policy*	-0.324***	-0.221***	-0.033***	-0.164***	0.068***	0.443***	0.045***
	(8)	(9)	(10)	(11)	(12)	(13)	(14)
(8) *Capital expenditures*	1						
(9) *Net working capital*	0.013**	1					
(10) *M/B*	-0.019***	-0.658***	1				
(11) *Cash flow*	0.102***	0.721***	-0.637***	1			
(12) *Cash flow volatility*	-0.062***	-0.289***	0.270***	-0.399***	1		
(13) *R&D investments*	-0.146***	-0.404***	0.444***	-0.668***	0.271***	1	
(14) *Dividend policy*	0.026***	0.079***	-0.079***	0.168***	-0.100***	-0.251***	1

This table shows the Pairwise correlation coefficient of the main regression variables. ***, **, and * indicate significance at the 1%, 5%, and 10% level respectively.

5.4. Empirical results

To test whether corporate culture dimensions influence the firm's cash holdings, I begin my analysis by following the literature and estimate the baseline OLS regression model:

$$Cash\ holdings_{i,t} = \alpha + \beta_1\ Corporate\ culture_{i,t} + \gamma Z_{i,t} + Year_t + Industry_i + \varepsilon_{i,t} \quad (5.1)$$

where *i* denotes firms, and *t* denotes years. The dependent variable is cash holdings. The independent variables of most importance are those relating to the four corporate culture dimensions: *Compete, Create, Collaborate*, and *Control*. Z is a vector of the firm characteristics defined above that are known determinants of cash holdings, which serve as control variables. $Year_t$ and $Industry_i$ are firm and industry fixed effects respectively. *Industry* represents a dummy variable constructed using the Fama and French 48 industry classifications and is used to control for the unobserved omitted variables that may influence cash holdings between industries. *Year* is also a dummy variable and captures the time-invariant year effects. Continuous variables are winsorised at the 1% and 99% levels to reduce the impact of any extreme values. Robust standard errors are clustered at the firm level. The econometric specification is in line with the previous studies (e.g, Dittmar et al. 2003; Harford et al. 2008; Bates et al. 2009; Chen et al. 2015; Chung et al. 2015).[32]

5.4.1. Corporate culture and cash holdings

In this section I examine the relationship between corporate culture and firms' cash holdings. Table 5.4 presents the results of the estimation of the baseline OLS regression of equation (5.1) that investigates the relationship between corporate culture and cash holdings. The dependent variable is cash holdings and columns (1) to (4) show that each corporate culture dimension (*Compete, Create, Collaborate,* and *Control*) are estimated independently

[32] I do not include firm fixed effects in the baseline regression because corporate culture might be slowly changing over time (Nguyen et al. 2019; Fang et al. 2023). Thus, a model including firm fixed effects that depends on within-firm variations might not capture the influence of the test variable (i.e., corporate culture), even if its effect is indeed present due to the relatively low within-firm variations of the test variable (Wintoki et al. 2012).

as the main independent variable. Column (5) includes all the dimensions included in the model at the same time.

Table 5.4: Corporate culture and firms' cash holdings

Variables	Dependent variable: *Cash holdings*				
	(1)	(2)	(3)	(4)	(5)
Compete	0.041***				0.025***
	(0.007)				(0.008)
Create		0.115***			0.098***
		(0.017)			(0.017)
Collaborate			0.105***		0.094***
			(0.016)		(0.016)
Control				0.013	0.016
				(0.010)	(0.011)
Firm size	-0.014***	-0.015***	-0.015***	-0.014***	-0.015***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Leverage	-0.211***	-0.211***	-0.214***	-0.216***	-0.205***
	(0.019)	(0.019)	(0.019)	(0.02)	(0.019)
Capital expenditures	-0.650***	-0.675***	-0.659***	-0.665***	-0.659***
	(0.050)	(0.051)	(0.05)	(0.051)	(0.051)
Net working capital	-0.061***	-0.063***	-0.062***	-0.065***	-0.058***
	(0.015)	(0.016)	(0.015)	(0.016)	(0.015)
M/B ratio	0.004***	0.004***	0.004***	0.004***	0.004***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Cash flow	0.045***	0.048***	0.047***	0.050***	0.042***
	(0.009)	(0.010)	(0.009)	(0.010)	(0.009)
Cash flow volatility	0.001	0.001	0.002	0.001	0.002
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
R&D investments	0.349***	0.352***	0.339***	0.358***	0.331***
	(0.028)	(0.028)	(0.027)	(0.028)	(0.027)
Dividend policy	-0.043***	-0.045***	-0.046***	-0.049***	-0.040***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Constant	0.182***	0.204***	0.200***	0.262***	0.092
	(0.058)	(0.058)	(0.054)	(0.055)	(0.059)
Observations	27071	27071	27071	27071	27071
R-squared	0.527	0.528	0.528	0.524	0.533
Year FE	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES

This table reports the results of corporate culture on firms' cash holdings using an OLS regression model. The dependent variable is *Cash holdings* measured as the ratio of cash and short-term investments to total assets. The main independent variables are the four dimensions of the corporate culture based on the CVF: *Compete*, *Create*, *Collaborate*, and *Control*. The control variables include the firm characteristics. Definitions of all variables are included in Appendix Table A. All models include year and industry fixed effects, where industry fixed effects are based on Fama-French 48 industry classification. Continuous variables are winsorised at the 1st and 99th percentiles. Robust standard errors are in parentheses and are clustered at the firm level. ***, **, and * indicates significance at the 1%, 5%, and 10% level, respectively.

The results reported in columns (1) to (3) show that firm cash holdings are positively associated with *Compete*, *Create*, and *Collaborate* corporate cultures. The coefficients are all statistically significant at the 1% level. The coefficient on the *Control* dimension of culture in

column (4) is also positive, but is insignificant. Column (5) shows the results hold when including all corporate culture dimensions in the model. In terms of economic significance, the results in column (1) suggest that a standard deviation increase (approximately 0.49%) in a firm's competitive culture is associated with an approximate 2% (0.041 × 0.489) increase in firm cash holdings. Analogously, in columns (2) and (3), a standard deviation increase in a firm's creative culture (about 0.16%) and collaborative culture (about 0.18%) leads to an approximate 1.8% (0.115 × 0.158) and 1.9% (0.105 × 0.177) increase in firm cash holdings, respectively.

The results are consistent with the *monitoring cost hypothesis* that proposes a positive association between competitive, creative, and collaborative cultures and cash holdings. In principle, to moderate the conflict of interest between a firm's directors and shareholders, the free cash flow available for directors must be reduced (Jensen 1986). Firms with an abundant amount of cash as well as operating in an environment that represents high information asymmetry would also reduce the shareholders' ability to effectively monitor the managers, and subsequently exacerbate the free cash flow problem (Drobetz et al. 2010). As a consequence, according to the *monitoring cost hypothesis*, shareholders' monitoring would be more effective if the firm works in a more transparent informational environment (Chung et al. 2015). The results in Table 5.4 suggest that firms with corporate cultures with low information asymmetry environment (i.e., *Compete, Create, Collaborate*) could enhance shareholders' monitoring and therefore impact cash holdings. Given the ability of shareholders to monitor and penalise the managers for poor performance in an informatively more-transparent culture, those shareholders of such firms would be more willing to accept that managers maintain higher cash reserves to meet any future investment opportunities that may arise. The results are also in line with previous literature that provide supporting evidence to the free cash flow theory in determining firms' cash holdings (Chen 2008; Chung et al. 2015; Dudley and Zhang 2016).

Regarding the control variables, the results are in line with the trade-off theory as expected from the predictions of the existing literature (Opler et al. 1999; Dittmar et al. 2003; Bates et al. 2009; Chen et al. 2015; Chung et al. 2015; El Kalak and Tosun 2022). Precisely, larger firms and firms with more leverage have lower cash holdings, as do firms with higher capital expenditures, net-working capital, and those that pay dividends. Conversely, firms

with higher growth opportunities (higher M/B ratio and R&D expenditures) hold more cash, as do firms with higher cash-flow.

5.4.2. Alternative hypothesis, the precautionary motive

The baseline results indicate that the positive relationship between corporate culture and cash holdings are consistent with the monitoring cost hypothesis. However, these results may also have other explanations. For example, the precautionary motive can also explain how firms determine their cash holdings (Opler et al. 1999; Almeida et al. 2004; Ozkan and Ozkan 2004; Chen 2008). Most importantly, the precautionary motive could also stem from the impact of information asymmetry on external financing, as it proposes that firms may be hesitant to raise funds from capital markets, even if they have the ability to do so, due to market-related concerns such as under-pricing of issuing new securities (Al-Najjar 2013). According to Fresard (2010), cash holdings can be a strategic weapon that firms could use when they face strong competitors in the market or when they work in intensive R&D industries. Thus, holding cash as a precautionary buffer will be crucial for survival (He and Wintoki 2016).

To test whether corporate culture is associated with firm's precautionary motive for holding cash, I use two risk proxies from the literature to indicate the precautionary motive: cash flow volatility and R&D. Firms with volatile cash-flows and higher R&D investments would be more likely to hold cash as a precautionary motive to hedge against business uncertainty (Dittmar et al. 2003; Bates et al. 2009; Chen et al. 2015; Chen et al. 2021b). These two variables are already included as controls in the baseline regression model as they are two of the key determinants of corporate cash holdings. Thus, I should observe that these variables have a consistent positive sign in this additional test to support the precautionary motive. However, most importantly, in this analysis, I test whether a firm with a specific corporate culture has an additional incremental precautionary motive for holding cash, as well as the monitoring cost hypothesis. Accordingly, to examine whether the precautionary motive drives the results, I interact the corporate culture dimensions with the two precautionary proxies and include them in the baseline regression model. The interaction term, the key variable of interest, examines whether firms with a specific corporate culture are expected to hold more cash as precautionary savings when the firm has volatile cash

flows or larger R&D expenditures. Furthermore, if the results hold for the corporate culture dimensions, then I could conclude that the monitoring cost hypothesis helps in justifying the firms' cash holdings in addition to the precautionary motives. Table 5.5 reports the results.

Columns (1) to (5) present the results when interacting the corporate culture dimensions with cash flow volatility while columns (6) to (10) present the results when interacting the corporate culture dimensions with R&D. The results in all columns show the effect of corporate culture on cash holdings. In particular, *Compete, Create,* and *Collaborate* cultures show coefficients that are positive and significantly associated with corporate cash holdings at the 5% level or better, as proposed by the *monitoring cost hypothesis*.

The insignificant coefficient on *Control* across all columns in this table is consistent with the baseline regression result in Table 5.4, thus, the relationship between a controlling culture and cash holdings cannot be established, and the arguments on research hypotheses are not supported in this additional test.

Most importantly, columns (1) to (3) indicate that the coefficients on cash flow volatility and the interaction terms between the competitive, creative, and collaborative cultures and cash flow volatility are all insignificant, which suggests that firms with such cultures do not hold cash as a precautionary motive when they have higher cash flow volatility. Alternatively, in column (4) the coefficient on *Cash flow volatility* is negative and statistically significant, albeit only at the 10%, and the coefficient on *Control* is insignificant. In addition, the coefficient on the *Control* × *Cash flow volatility* interaction term is positive and statistically significant at the 5% level. Collectively, the negative coefficient on *Cash flow volatility,* the insignificant coefficient on *Control* and the result on the interaction term indicates that a controlling culture may reinforces firms to hold more cash for different reasons other than the precautionary motive.

Table 5.5: Corporate culture, cash holdings, and precautionary savings

Variables	Dependent variable: *Cash holdings*									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Cash flow volatility	0.013	0	-0.001	-0.015*	-0.01					
	(0.013)	(0.013)	(0.01)	(0.008)	(0.021)					
R&D investments						-0.042	-0.11	0.294***	0.164**	-0.465***
						(0.098)	(0.086)	(0.075)	(0.080)	(0.132)
Compete	0.042***				0.026***	0.024***				0.017**
	(0.007)				(0.008)	(0.008)				(0.008)
Create		0.115***			0.096***		0.066***			0.054***
		(0.017)			(0.017)		(0.019)			(0.019)
Collaborate			0.105***		0.092***			0.099***		0.081***
			(0.016)		(0.016)			(0.018)		(0.018)
Control				0.004	0.009				-0.015	-0.003
				(0.012)	(0.013)				(0.016)	(0.015)
Compete × Cash flow volatility	-0.005				-0.003					
	(0.006)				(0.005)					
Create × Cash flow volatility		0.001			0.002					
		(0.019)			(0.016)					
Collaborate × Cash flow volatility			0.003		0.007					
			(0.014)		(0.013)					
Control × Cash flow volatility				0.027**	0.022					
				(0.013)	(0.015)					
Compete× R&D investments						0.177***				0.094**

						(0.042)				(0.041)
Create× R&D investments							0.635***			0.52***
							(0.115)			(0.121)
Collaborate× R&D investments								0.055		0.115
								(0.083)		(0.082)
Control× R&D investments									0.331***	0.200*
									(0.123)	(0.117)
All controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	27071	27071	27071	27071	27071	27071	27071	27071	27071	27071
R-squared	0.527	0.528	0.528	0.524	0.534	0.529	0.531	0.528	0.525	0.538
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

This table reports the results of the interaction terms between corporate culture and precautionary proxies. I use the baseline regression OLS model. The dependent variable is *Cash holdings* measured as the ratio of cash and short-term investments to total assets. The independent variables are the four dimensions of the corporate culture based on the CVF: *Compete, Create, Collaborate,* and *Control*. The main variable of interest is the interaction term of cultural dimensions and the precautionary proxies. Columns (1) to (5) present the results when interacting the corporate culture dimensions with cash flow volatility, and columns (6) to (10) present the results when interacting the corporate culture dimensions with R&D investments. I include the same set of controls as in Table 5.4. These variables are not tabulated to conserve space. Definitions of all variables are included in Appendix Table A. All models include year and industry fixed effects, where industry fixed effects are based on Fama-French 48 industry classification. Continuous variables are winsorised at the 1st and 99th percentiles. Robust standard errors are in parentheses and are clustered at the firm level. ***, **, and * indicates significance at the 1%, 5%, and 10% level, respectively.

Remarkably, *R&D investments* displays coefficient estimates that are not consistent across columns (6) to (10). It is insignificant in columns (6) and (7) when introducing *Compete* and *Create* cultures in the regression model, but in columns (8) and (9) it demonstrates a positive and significant coefficient when including *Collaborate* or *Control*. In contrast, it is negative and statistically significant at the 1% level when incorporating all dimensions in the regression model as shown in column (10). This inconsistency in results hinders the validity of the precautionary motive in this particular test. In addition, the coefficients on *Compete, Create,* and *Collaborate* cultures continue to report a positive and significant association with corporate cash holdings at the 5% level or better, as proposed by the *monitoring cost hypothesis*. Most importantly, columns (6), (7) and (10) reveal a positive and significant coefficient on the interaction terms *Compete× R&D investments* and *Create× R&D investments* at the 5% level or better. These findings suggest that firms with corporate cultures focused on competitiveness and creativity hold more cash when they have higher R&D investments.

It is possible to interpret the results as follows. The insignificant negative coefficient on *R&D investments* in (6), (7) (and (10)) rule out the argument that firms hold more cash as a precautionary motive when they have greater R&D investemnts (Opler et al. 1999; Dittmar et al. 2003; Ozkan and Ozkan 2004). Instead, and as proposed by the *monitoring cost hypothesis* on the role of information asymmetry on cash holdings, in firms with a more transparent informational environment, that is corporate culture with low information asymmetry, shareholders would have more effective monitoring and would allow the managers to hold more cash to finance the firms' investment. These arguments are supported by the positive and significant coefficients on *Compete* and *Create* and on their interaction term with R&D investments.

In terms of the controlling culture, *Control× R&D investments* shows a positive and significant coefficient at the 1% level in column (9) and 10% level in column (10). Consistent with the results on cash flow volatility, the evidence on R&D investments and control culture also reveal that a controlling culture may reinforces firms to hold more cash for different purposes other than the precautionary motive.

It could be argued that *R&D investments* might not be the most appropriate proxy for precautionary savings in this study since it might be correlated with corporate culture,

particularly *Create* (Fiordelisi et al. 2019). Therefore, as an additional test, I repeat the analysis using the *M/B* ratio as a proxy for the precautionary motive. According to Opler et al. (1999) and Bates et al. (2009), firms with more growth opportunities tend to accumulate more cash to hedge against costly future financial distress. The results are tabulated in Table A5.1 in the Appendix. *M/B* displays negative coefficient estimates in columns (1), (2), and (5) and insignificant coefficients in columns (3) and (4). In addition, only *Collaborate* demonstrates a positive and significant coefficient in columns (3) and (5). Therefore, the inconsistency of these results weakens the notion of the precautionary motive. Most notably, in columns (1), (2), and (5) the interaction terms *Compete* × *M/B* and *Create* × *M/B* demonstrate a positive and significant coefficient at the 1% level. Thus, consistent with the findings on R&D investments, the results support the view that shareholders in a better informational environment allow directors to hold more cash. Thus, firms with growth opportunities accumulate more cash to finance these opportunities in the future.

Overall, this analysis reveals that the *monitoring cost hypothesis* continues to be the key theoretical perspective in explaining the relationship between competitive, creative, and collaborative cultures and cash holdings. Yet, the results on the control culture suggest that firms with such cultures hold cash only when they have volatile cash flows and to finance R&D investments if available.

5.4.3. Robustness checks

In this section I perform several tests to confirm the robustness of the findings in Table 5.4.

5.4.3.1. Other ways of measuring corporate culture

I re-estimate the baseline regression using two alternative measures for corporate culture: dominant corporate culture, and Li et al.'s (2021) corporate culture dimensions, which were previously defined and applied in Chapter 4, Section 4.4.2. Table 5.6 reports the results. In Panel A, I define dominant corporate culture as a dummy variable that equals one for a firm whose corporate culture score is in the top quartile across all firms in a particular year, and zero otherwise (Nguyen et al. 2019; Li et al. 2021). The results in all columns show that the original results of the baseline regression estimation are robust to this alternative measure. In particular, *Compete, Create,* and *Collaborate-dominant* appear with positive and

statistically significant coefficients, at the 1% level, suggesting a positive relation between these dimensions and cash holdings, reinforcing the findings of the baseline specification.

Table 5.6: Robustness test using other ways of measuring corporate culture

Panel A. Alternative measure of corporate culture (dominant culture)

Variables	Dependent variable: *Cash holdings*				
	(1)	(2)	(3)	(4)	(5)
Compete-dominant	0.038***				0.032***
	(0.007)				(0.007)
Create-dominant		0.025***			0.022***
		(0.005)			(0.005)
Collaborate-dominant			0.041***		0.039***
			(0.006)		(0.006)
Control-dominant				0.003	0.001
				(0.005)	(0.005)
All controls	YES	YES	YES	YES	YES
Observations	27071	27071	27071	27071	27071
R-squared	0.526	0.526	0.528	0.524	0.531
Year FE	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES

Panel B. Alternative measure of corporate culture using Li et al. (2021) dimensions

Variables	Dependent variable: *Cash holdings*				
	(1)	(2)	(3)	(4)	(5)
Quality	0.004				0.001
	(0.003)				(0.003)
Innovation		0.009***			0.007***
		(0.002)			(0.002)
Teamwork			0.024***		0.023***
			(0.003)		(0.003)
Respect				-0.009***	-0.015***
				(0.003)	(0.003)
All controls	YES	YES	YES	YES	YES
Observations	18330	18330	18330	18330	18330
R-squared	0.580	0.581	0.584	0.581	0.587
Year FE	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES

This table shows robustness test using other ways for measuring corporate culture including dominant corporate culture and Li et al.'s (2021) corporate culture dimensions measures. I use the baseline regression OLS model (5.1). The dependent variable is *Cash holdings* measured as the ratio of cash and short-term investments to total assets. Panel A reports the results for the OLS regression model, where the independent variables of interest are the dominant corporate culture measures based on the CVF: *Compete-dominant; Create-dominant; Collaborate-dominant*; and *Control-dominant*. Dominant corporate culture is a dummy variable that equals 1 for a firm whose corporate culture score is in the top quartile across all firms in a particular year, and zero otherwise Panel B reports the results of the baseline OLS regression model, where the independent variables are the four dimensions of the corporate culture based on Li et al. (2021): *Quality; Innovation; Teamwork*; and *Respect*. I include the same set of controls as in Table 5.4. Definitions of all variables are included in Appendix Table A. All models include year and industry fixed effects, where industry fixed effects are based on Fama-French 48 industry classification. Continuous variables are winsorised at the 1st and 99th percentiles. Robust standard errors are in parentheses and are clustered at the firm level. ***, **, and * indicates significance at the 1%, 5%, and 10% level, respectively.

In Panel B of Table 5.6, I adopt the measures of Li et al. (2021) as substitute variables for corporate culture.[33] While the CVF is my preferred paradigm for deriving measures of corporate culture, motivated by its theoretical background and rigour, Li et al.'s (2021) metrics hold some important benefits. Li et al. (2021) work relies on the Q&A section in earning calls transcripts to derive empirical corporate culture dimensions previously identified from the most advertised values obtained from the S&P 500 firms' websites, rather than the 10-K filings that are used by the CVF. Thus, this is an important robustness test to examine whether there are any differences in the relationships between corporate culture and cash holdings when using these alternative measures. In particular, using Li et al.'s (2021) corporate culture dimensions might provide unexpected empirical evidence compared to the findings of the CFV dimensions as they use a different methodology to measure different dimensions.

To run this test, and according to the similarities in the bags of words that are used to construct the dimensions in both works, I use the dimensions of Li et al. (2021) that are most likely to indicate the same values as in the CVF. Specifically, the *Compete, Create, Collaborate* and *Control,* dimensions in the CVF are parallel to the *Quality, Innovation, Teamwork,* and *Respect* dimensions of Li et al. (2021) respectively. [34]

The results in Panel B are qualitatively similar to the main findings shown in Table 5.4 above, particularly for *Innovation* and *Teamwork*. These dimensions both have positive and statistically significant coefficients in columns (2) and (3), demonstrating an association with cash holdings similar to the *Create* and *Collaborate* dimensions of the CVF. In addition, in column (4) the *Respect* dimension of Li et al. (2021) has a negative and statistically significant relation with cash holdings, while *Quality* in column (1) is insignificant. Overall, the estimates for the *Innovation* and *Teamwork* dimensions are in line with *the monitoring cost hypothesis.* Firms with a corporate culture that promotes creativity and innovation, and those with a corporate culture that promotes teamwork and collaboration, have a flexible

[33] A full explanation of the Li et al. (2021) approach to corporate culture measurement was provided in Chapter 4, Section 4.4.2.

[34] Li et al. (2021) paper has a fifth dimension i.e., integrity. This dimension emphasises the sentimental values (Guiso et al. 2015) and has no equivalent in the CVF, thus I do not include it in this test. For further robustness, I also re-run the test including this dimension. The coefficient on the integrity dimension is insignificant.

communication system that enhances the informational environment and makes information asymmetry less relevant in such firms. Consequently, consistent with the *monitoring cost proposition*, shareholders in firms with low information asymmetry would allow the directors to hold more cash due to the shareholders' ability to effectively monitor those directors in a such transparent environment. Alternatively, the shareholders would not allow higher cash holdings because they may not monitor the directors effectively in an opaque information environment. Interestingly, the *Respect* dimension in this analysis lends support to this argument with a significant negative coefficient, while the parallel control dimension of the CVF showed an insignificant coefficient estimate. These results highlight that the Li et al. (2021) and CVF dimensions capture different measures of corporate culture, given that the two frameworks use different documents to detect corporate culture. Correspondingly, to find more robust results for the CVF, I re-estimate the baseline regression including all eight dimensions in the regression model (5.1). The results in Table A5.2 continue to reveal that the *Compete, Create,* and *Collaborate-dominant* cultures of the CVF have a positive association with corporate cash holdings, and this association is at the 5% significance level or better.

5.4.3.2. Further robustness checks

In this section, I perform two additional tests to check the robustness of the baseline results on the relationship between corporate culture and cash holdings. First, I use an alternative measure for cash holdings, which is the natural logarithm of the cash holdings ratio applied above (cash and short-term investments to total assets). The motivation for this log transformation is to reduce the issue of extreme outliers (Chen et al. 2015; Dudley and Zhang 2016). Panel A in Table 5.7 reports the results. Consistent with the results in Table 5.4, the estimation results are the same as those for the baseline regression. Specifically, firms with competitive, creative, and collaborative cultures are associated with higher levels of cash holdings.

Second, as a further robustness test, I perform the Fama-MacBeth (1973) estimation method as an alternative approach to the baseline model. This methodology is often used in the cash holdings literature (Opler et al. 1999; Ferreira and Vilela 2004; Bates et al. 2009; Chen et al. 2015; Chung et al. 2015; Huang and Mazouz 2018). It is used to capture the cross-sectional differences in the sample while reducing the time-series differences. In other words,

the coefficient estimates of the OLS regression might be biased because of the cross-sectional correlation in the residuals of the panel regression.

Table 5.7: Further robustness tests

Panel A. Alternative measure of cash holdings (log of cash ratio)

Variables	Dependent variable: *lnCash holdings*				
	(1)	(2)	(3)	(4)	(5)
Compete	0.312***				0.248***
	(0.043)				(0.046)
Create		0.652***			0.506***
		(0.102)			(0.104)
Collaborate			0.363***		0.249***
			(0.094)		(0.093)
Control				-0.008	0.007
				(0.057)	(0.057)
All controls	YES	YES	YES	YES	YES
Observations	27023	27023	27023	27023	27023
R-squared	0.434	0.432	0.429	0.428	0.437
Year FE	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES

Panel B. Alternative estimation method: Fama-MacBeth regression

	Dependent variable: *Cash holdings*				
	(1)	(2)	(3)	(4)	(5)
Compete	0.018				0.005
	(0.010)				(0.011)
Create		0.059***			0.054***
		(0.015)			(0.013)
Collaborate			0.154***		0.154***
			(0.009)		(0.012)
Control				-0.001	-0.002
				(0.006)	(0.005)
All controls	YES	YES	YES	YES	YES
Number of years	21	21	21	21	21
Observations	27071	27071	27071	27071	27071
R-squared	0.480	0.475	0.484	0.473	0.493

This table reports the results for further robustness checks. In Panel A, I use the baseline regression OLS model. The dependent variable *logCash holdings* is the alternative measure for *Cash holdings*, which is the natural logarithm of the ratio of cash and short-term investments to total assets. Alternatively, Panel B reports the estimates of Fama-MacBeth (1973) regression where the dependent variable is cash holdings measured as the ratio of cash and short-term investments to total assets. In both Panels, the main independent variables are the four dimensions of the corporate culture based on the CVF: *Compete, Create, Collaborate*, and *Control*. The control variables include the firm characteristics used in Table 5.4. These variables are not tabulated to conserve space. Definitions of all variables are included in Appendix Table A. All models include year and industry fixed effects, where industry fixed effects are based on Fama-French 48 industry classification. Continuous variables are winsorised at the 1st and 99th percentiles. Robust standard errors are in parentheses and are clustered at the firm level. ***, **, and * indicates significance at the 1%, 5%, and 10% level, respectively.

To reduce this bias, the Fama-MacBeth method runs a cross-sectional regression for each year of cash holdings on corporate culture dimensions and the additional control

variables. After that, the average slope coefficients from the cross-sectional regressions are used to reach the final estimates and the time-series of the coefficient's estimates are used to calculate the standard errors.

Panel B in Table 5.7 reports the estimation output, where the coefficients estimates are the mean coefficients from the annual cross-sectional regressions over the sample period. *Create* and *Collaborate* show coefficients that are both positive and significant. The coefficient on *Compete* (*Control*) is positive (negative), but insignificant. Except for the insignificant coefficient on the competitive culture, the Fama-MacBeth regression has similar findings as the OLS regression results in Table 5.4. On the whole, the robustness checks show that the main results of the baseline regression are robust to alternative measures of corporate culture and cash holdings, and an alternative methodological approach that accounts for autocorrelations in the residuals of the baseline OLS regression.

5.4.4. Endogeneity

Thus far, the results of the robustness tests are in line with the baseline results, showing positive associations between competitive, creative, and collaborative corporate cultural dimensions and cash holdings. However, such relationships may be the result of endogeneity issues: omitted variables and reverse causality (Abdallah et al. 2015). While it is challenging to mitigate endogeneity completely, I perform the following tests, as suggested in the literature, to alleviate the potential bias. To begin, I re-estimate model (5.1) using lagged variables. I then employ two alternative matching techniques, namely Propensity Score Matching (PSM) and entropy balancing. Lastly, I perform Two-Stage Least Squares (2SLS) estimation with an Instrumental Variable (IV).[35]

[35] I show in Chapter 6 that *Independent directors' connectedness* is correlated with corporate culture. Thus, to attempt to reduce omitted variable bias, I include this control variable in the regression model (5.1). The results are presented in Table A5.3 in the Appendix. Notably, the sample size is significantly reduced because BoardEx only provides information on directors' networks for S&P 1500 firms, which limits the size of the sample in this analysis. The test reveals that only *Create* remains positive and significant with cash holdings. Other cultural dimensions are insignificant. These results could be related to the sample specifications as the information on directors' networks only covers S&P 1500 firms. The coefficient on *Independent directors' connectedness* is also insignificant. Although the results are not significant, this evidence suggests that connectedness might be a mechanism that influences culture and indirectly might influence firms' cash holdings through its impact on corporate culture.

5.4.4.1. Lag regressions

Some note that corporate culture is fairly fixed over time (Nguyen et al. 2019), while others posit that corporate culture can change over time based on the firm's life cycle (Cameron and Quinn 2011). This could indicate that some firm characteristics, including cash holding positions, might influence its culture. Accordingly, it could be argued that the baseline and other robustness test results are subject to reverse causality. First, to address the concern of this endogeneity issue I run a lag regression in Table 5.8 Panel A (Harford et al. 2008; Amess et al. 2015; He and Wintoki 2016). In this test, corporate culture variables and control variables in model (5.1) are lagged by one year with respect to the dependent variable, cash holdings. Although slightly smaller, the coefficient estimates in Panel A remain the same as the baseline regression results in Table 5.4. Competitive, creative, and collaborative corporate cultures have a positive and significant association with cash holdings.[36]

Second, it could be argued that a one-year lag might not resolve the causality issue due to the persistence of the key variables of interest. Accordingly, I examine a longer-run relationship between corporate culture and the level of cash holdings by performing another lag regression using a 3-year time distance. This time-dynamic model allows the model estimates to be more robust compared to the one-year lagged model, providing more reliable results (Andreou et al. 2022). In this test, firms cash holdings are led one-year ahead (t+1), while corporate culture are lagged 2-years behind (t-2). To corroborate my main findings, I should observe a persistent, positive, and significant relationship between competitive, creative, and collaborative cultures and cash holdings.

Columns (1), (2), (3), and (5) in Panel B continue to reveal evidence similar to that in Table 5.4. As *Compete*, *Create*, and *Collaborate* are positively associated with cash holdings up to 3 years into the future, it is more likely that corporate culture influences the firms' future cash holdings rather than firms' cash holdings are prompting corporate culture.

[36] As a further robustness test, I perform the lag regression for the other measures of corporate culture and cash holdings that are introduced in Section 5.4.3. The results are presented in Table A5.4 in the Appendix, and they continue to show results consistent to Tables 5.6 and 5.7, which are consistent with the baseline findings on corporate culture and firms' cash holdings.

Collectively, the findings in Table 5.8 are consistent with the monitoring cost hypothesis and show that my main results are not likely to be driven by reverse causality.

Table 5.8: Endogeneity: Lag regressions

Panel A. One-year lag regression

Variables	Dependent variable: *Cash holdings* $_t$				
	(1)	(2)	(3)	(4)	(5)
Compete $_{t-1}$	0.037***				0.024***
	(0.008)				(0.008)
Create $_{t-1}$		0.095***			0.080***
		(0.018)			(0.018)
Collaborate $_{t-1}$			0.098***		0.087***
			(0.017)		(0.017)
Control $_{t-1}$				-0.001	-0.001
				(0.013)	(0.014)
All controls $_{t-1}$	YES	YES	YES	YES	YES
Observations	22850	22850	22850	22850	22850
R-squared	0.533	0.533	0.534	0.530	0.538
Year FE	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES

Panel B. Time-dynamic regression

Variables	Dependent variable: *Cash holdings* $_{t+1}$				
	(1)	(2)	(3)	(4)	(5)
Compete $_{t-2}$	0.034***				0.023***
	(0.008)				(0.009)
Create $_{t-2}$		0.077***			0.063***
		(0.018)			(0.018)
Collaborate $_{t-2}$			0.087***		0.078***
			(0.018)		(0.018)
Control $_{t-2}$				0.002	0.001
				(0.009)	(0.009)
All controls $_t$	YES	YES	YES	YES	YES
Observations	17169	17169	17169	17169	17169
R-squared	0.531	0.531	0.532	0.529	0.536
Year FE	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES

This table reports the results of corporate culture on firms' cash holdings using lead-lag OLS regression models. The dependent variable is *Cash holdings* measured as the ratio of cash and short-term investments to total assets. The main independent variables are the four dimensions of the corporate culture based on the CVF: *Compete*, *Create*, *Collaborate*, and *Control*. The same set of controls as in Table 5.4 is included in each regression. These variables are not tabulated to conserve space. In Panel A, all independent variables are lagged by one year with respect to cash holdings. In Panel B, the time distance spans a 3-year period between cash holdings and corporate culture, where cash holdings are one-year ahead (t+1) and corporate culture are (t-2), other controls are at time (t). Definitions of all variables are included in Appendix Table A. All models include year and industry fixed effects, where industry fixed effects are based on Fama-French 48 industry classification. Continuous variables are winsorised at the 1st and 99th percentiles. Robust standard errors are in parentheses and are clustered at the firm level. ***, **, and * indicates significance at the 1%, 5%, and 10% level, respectively.

5.4.4.2. Propensity Score Matching (PSM)

To address endogeneity further, I perform a propensity score matching (PSM) analysis to control for omitted variables issue that might have led to a spurious relationship between corporate culture and corporate cash holdings (Florackis and Sainani 2018; Hoi et al. 2019).

The PSM technique allows for the comparison of cash holdings between two groups of firms with similar firm characteristics, but different in terms of their corporate culture. The treatment group contains firms with a particular dominant corporate culture dimension and the control group includes firms without a dominant corporate culture since their culture measures are in the lowest three quartiles across all firms. Apart from the treatment effect, firms in both groups should be matched as closely as possible based on other characteristics. Following the literature, propensity score matching is a two-step process. The first step is to use a logit model to determine the propensity score for a firm to be part of the treatment group. The dependent variable in this logit model is the dominant corporate culture dummy variable measure for each cultural dimension, and the independent variables are the same controls used in equation (5.1) with year and industry fixed effects included. Columns (1a), (2a), (3a), and (4a) in Table 5.9 show the estimation results of the pre-matched logit regressions in which different firm characteristics determine the dominance of a specific corporate culture.

In the second step, I use the results of the pre-match models and use the nearest-neighbour algorithm with no replacement and a calliper of 1% to create a matched sample. Specifically, each firm-year with a corporate culture score in the top quartile for a particular cultural dimension (the treatment group) is matched with a firm-year with a corporate culture score in the bottom quartiles (the control group) with the nearest propensity score.[37]

[37] For a robustness test, I rerun the PSM analysis using an alternative measure for dominant corporate culture treatment groups and their control groups. Precisely, each firm-year with a corporate culture score in the top quartile Q4 (the treatment group) is matched with a firm-year with a corporate culture score in the bottom quartile Q1 (the control group) with the nearest propensity score. The results are qualitatively similar to those when using the main measure for dominant corporate culture.

Table 5.9: Endogeneity: Propensity score matching estimates (logit model)

Variables	*Compete-dominant*		*Create-dominant*		*Collaborate-dominant*		*Control-dominant*	
	Pre-match (1a)	Post-match (1b)	Pre-match (2a)	Post-match (2a)	Pre-match (3a)	Post-match (3a)	Pre-match (4a)	Post-match (4b)
Firm size	0.091***	-0.002	0.090***	0.003	0.084***	0.001	-0.104***	-0.004
	(0.012)	(0.015)	(0.01)	(0.011)	(0.010)	(0.011)	(0.010)	(0.011)
Leverage	-1.958***	-0.007	-0.841***	0.007	-0.568***	0.016	-1.321***	0.035
	(0.122)	(0.134)	(0.084)	(0.098)	(0.085)	(0.076)	(0.117)	(0.097)
Capital expenditures	-3.224***	0.643	1.572***	-0.056	-0.953**	0.175	-0.054	-0.162
	(0.587)	(0.652)	(0.407)	(0.494)	(0.438)	(0.503)	(0.431)	(0.523)
Net working capital	-0.967***	-0.043	-0.285***	0.041	-0.431***	-0.009	-0.027	0.051
	(0.147)	(0.111)	(0.064)	(0.079)	(0.090)	(0.066)	(0.122)	(0.084)
M/B ratio	-0.028***	0.003	-0.001	-0.003	-0.022***	0.002	0.060***	0.009
	(0.009)	(0.012)	(0.007)	(0.008)	(0.007)	(0.007)	(0.010)	(0.008)
Cash flow	1.474***	0.153	0.309***	0.035	0.355***	0.064	0.227***	0.109
	(0.143)	(0.134)	(0.081)	(0.099)	(0.086)	(0.070)	(0.068)	(0.087)
Cash flow volatility	-0.074***	0.011	0.008	000	-0.023*	0.002	0.020	-0.014
	(0.023)	(0.028)	(0.015)	(0.015)	(0.013)	(0.014)	(0.013)	(0.013)
R&D investments	2.676***	0.300	0.741***	0.130	1.805***	0.195	-0.306*	0.348
	(0.216)	(0.235)	(0.147)	(0.188)	(0.160)	(0.148)	(0.165)	(0.194)
Dividend policy	-0.820***	0.054	-0.27***	0.018	-0.344***	-0.002	0.614***	-0.093
	(0.048)	(0.062)	(0.038)	(0.046)	(0.044)	(0.052)	(0.038)	(0.045)
Constant	-1.282***	0.201	-3.676***	0.664	-1.304***	0.641	-2.740***	0.037
	(0.229)	(0.379)	(0.549)	(0.899)	(0.453)	(0.714)	(0.759)	(1.003)
Observations	26668	7968	26984	12735	26984	12170	27050	13111
Pseudo R^2	0.355	0.005	0.095	0.002	0.147	0.002	0.103	0.002
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES

This table reports the results of the propensity score matching logit analysis. The dependent variable is dominant corporate culture dimension: *Compete-dominant; Create-dominant*; *Collaborate-dominant*; and *Control-dominant*, measured as a dummy variable that takes the value of 1 if the score of a certain corporate culture is in the top quartile across all firms in a particular year, and zero otherwise. The main independent variables are the same set of controls as in Table 5.4. Definitions of all variables are included in Appendix Table A. All models include year and industry fixed effects, where industry fixed effects are based on Fama-French 48 industry classification. Continuous variables are winsorised at the 1st and 99th percentiles. Robust standard errors are in parentheses. ***, **, and * indicates significance at the 1%, 5%, and 10% level, respectively.

I re-estimate the logit model of the first step for the post-matched sample to verify that there are no distinguishable differences between the treatment and the control groups across the observable characteristics. The post-match estimation output is shown in columns (1b), (2b), (3b), and (4b) in Table 5.9 and show no statistically significant results for any of the coefficients, confirming that there are no significant differences between the two groups. Furthermore, the magnitudes of the coefficients in the post-match columns are lower than those in the pre-match columns, as is the pseudo-R-squared. Therefore, the results indicate that the propensity score matching eliminates any distinguishable differences other than the differences related to corporate culture.

Panel A in Table 5.10 reports the results of the propensity score matching analysis for the average cash holdings for the treatment group (firms with a dominant corporate culture dimension) and the control group (firms with no dominant culture). In Panels A1, A2, and A3 of Table 5.10 there are significant differences, at the 1% level, between the mean cash holdings of the treatment group and control group. The results show that firms with dominant competitive, creative, and collaborative corporate cultures have higher cash holdings than firms with no such dominant cultures. Corroborating the main findings as well, there is no significant difference in the level of cash holdings between firms with a dominant controlling culture and those without such a culture.

As a last test, I re-run model (5.1) to examine the main measures of corporate culture on cash holdings for the new matched sample. The results are presented in Table 5.10 Panel B. Consentient with findings reported in earlier sub-sections, the test reveal that *Compete-dominant, Create-dominant,* and *Collaborate-dominant* are positively associated with cash holdings in columns (1), (2), and (3), respectively. These coefficient estimates are statistically significant at the 1% level. Again, *Control-dominant* has no significant coefficient.

Table 5.10: Endogeneity: Propensity score matching estimates

Panel A. Propensity score matching estimates (two-sample t test with equal variances)

Panel A1. competitive corporate culture and cash holdings

	Treatment group	Control group	Treatment group	Control group			
	Obs1	Obs2	Mean1	Mean2	Diff	S.E.	T-stat
Cash holdings	3984	3984	0.291	0.254	0.036***	0.005	-7.20

Panel A2. Creative corporate culture and cash holdings

	Treatment group	Control group	Treatment group	Control group			
	Obs1	Obs2	Mean1	Mean2	Diff	S.E.	T-stat
Cash holdings	6368	6368	0.266	0.240	0.026***	0.004	-6.20

Panel A3. Collaborative corporate culture and cash holdings

	Treatment group	Control group	Treatment group	Control group			
	Obs1	Obs2	Mean1	Mean2	Diff	S.E.	T-stat
Cash holdings	6085	6085	0.339	0.299	0.039***	0.005	-7.80

Panel A4. Control corporate culture and cash holdings

	Treatment group	Control group	Treatment group	Control group			
	Obs1	Obs2	Mean1	Mean2	Diff	S.E.	T-stat
Cash holdings	6556	6556	0.258	0.258	-0.005	0.004	-1.20

Panel B. Corporate culture and cash holdings (OLS regression on PSM matched sample)

Variables	Dependent variable: *Cash holdings*			
	(1)	(2)	(3)	(4)
Compete-dominant	0.039***			
	(0.007)			
Create-dominant		0.029***		
		(0.005)		
Collaborate-dominant			0.042***	
			(0.006)	
Control-dominant				-0.001
				(0.005)
All controls	YES	YES	YES	YES
Observations	7968	12736	12170	13112
R-squared	0.423	0.485	0.520	0.458
Year FE	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES

This table reports the PSM estimation results. Panel A presents the differences in corporate cash holdings based on propensity score matching of a firm with a dominant/not dominant culture. The dominant corporate culture is measured as a dummy variable that takes the value of 1 if the score of a certain corporate culture is in the top quartile across all firms in a in a particular year, and zero otherwise. Panel B reports the results of the baseline OLS estimation of equation (5.1) for the new matched sample. The dependent variable is cash holdings measured as the ratio of cash and short-term investments to total assets. The main independent variables of interest are the dominant corporate culture measures based on the CVF: *Compete-dominant; Create-dominant*; *Collaborate-dominant*; and *Control-dominant*. The control variables include firm characteristics as Table 5.4. Definitions of all variables are included in Appendix Table A. All models include year and industry fixed effects, where industry fixed effects are based on Fama-French 48 industry classification. Continuous variables are winsorised at the 1st and 99th percentiles. Robust standard errors are in parentheses and are clustered at the firm level. ***, **, and * indicates significance at the 1%, 5%, and 10% level, respectively.

Hence, the results of the PSM mitigates the endogeneity concerns of omitted variables and adds evidence to the main findings and to my argument on the suitability of the monitoring cost hypothesis for explaining the relationship between corporate culture and corporate cash holdings.[38]

5.4.4.3. Entropy balancing

The third approach I employ to tackle the endogeneity issue, and the second matching technique, is entropy balancing.[39] Similar to the PSM described above, entropy balancing requires a binary variable to identify the treatment effect. I use the dominant corporate culture dummy variable measure as the indicator variable.[40] I balance the sample by including the same set of controls that I use in the baseline regression as covariates.

To demonstrate the success of entropy balancing, I report the results for the dominant competitive, creative, collaborative, and control cultures, respectively in Table A5.5 in the Appendix to conserve space. Panel A in Table A5.6 reports the distribution of covariates between the treatment and control groups before the entropy balancing. Panel B reveals that the entropy balancing successfully weights the observations and removes the differences between the two groups as documented in the almost identical value of the mean of the covariates.

I then re-estimate the baseline regression model defined in equation (5.1) for the entropy balanced weighted sample and report the results in Table 5.11. Consistent with Table 5.4 and subsequent analyses, the coefficient estimates on the *Compete-dominant, Create-*

[38] There could be cases where firms end up with more than one dominant culture in a specific year. As a further robustness test, for the newly matched sample, I remove those firms that have more than one dominant culture in each year and rerun the baseline regression. The results are reported in Table A5.5 in the Appendix. This test show results consistent with the findings in this chapter, particularly for *Compete* and *Collaborate*. In addition, it shows that *Control* has a negative and statistically significant association with cash holdings, consist with the notion of the *monitoring cost hypothesis.* This result on *Control* is also found in Table 5.12 when performing the 2SLS.

[39] The advantages of using this relatively novel matching technique in this thesis are discussed thoroughly in Chapter 4, Section 4.4.3.3.

[40] Following the robustness test for the PSM, I perform entropy balancing using the alternative measures for treatment and control groups in the methodology. Precisely, the treatment group is firms with a corporate culture score in the top quartile Q4, and the control group is firms with a corporate culture score in the bottom quartile Q1. The results are qualitatively similar to those when using the main measure for dominant corporate culture.

dominant, and *Collaborate-dominant* cultures remain positive and statistically significant at the 1% level, consistent with the monitoring cost hypothesis.

5.11: Endogeneity: Entropy balancing

Variables	Dependent variable: *Cash holdings*			
	(1)	(2)	(3)	(4)
Compete-dominant	0.036***			
	(0.005)			
Create-dominant		0.027***		
		(0.003)		
Collaborate-dominant			0.054***	
			(0.004)	
Control-dominant				0.003
				(0.003)
All controls	YES	YES	YES	YES
Observations	27071	27071	27071	27071
R-squared	0.347	0.483	0.529	0.452
Year FE	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES

This table reports the results of regressions estimating the relations between corporate culture dimensions and cash holdings using the entropy balancing weighted sample. The dependent variable is *Cash holdings* measured as the ratio of cash and short-term investments to total assets. The main independent variables of interest are the dominant corporate culture based on the CFV: *Compete-dominant; Create-dominant; Collaborate-dominant;* and *Control-dominant*. These variables are measured as a dummy variable that takes the value of 1 if the score of a certain corporate culture is in the top quartile across all firms in a particular year, and zero otherwise. The control variables include the firm characteristics as in Table 5.4. Definitions of all variables are included in Appendix Table A. All models include year and industry fixed effects, where industry fixed effects are based on Fama-French 48 industry classification. Continuous variables are winsorised at the 1st and 99th percentiles. Robust standard errors are in parentheses. ***, **, and * indicates significance at the 1%, 5%, and 10% level, respectively.

5.4.4.4. Two-stage Least Squares (2SLS)

To alleviate the potential endogeneity concerns of reverse causality further, I estimate a two-stage least squares (2SLS) regression using the industry's year-average cultural dimension score as an instrumental variable (IV). The justification behind using the industry year-average cultural score is based on Gordon (1991), Sadri and Lees (2001), and Jiang et al. (2019) who state that corporate culture is strongly influenced by the characteristics of the industry in which they operate.

More importantly, the industry's mean culture score satisfies the inclusion and exclusion criteria of the IV. That is, the industry average culture (instrument) does not affect cash holdings (dependent variable) other than through its correlation with the corporate culture (the assumed endogenous independent variable), thus satisfying the relevance criteria of the IV (correlated with corporate culture). The exclusion criteria are likely satisfied by this

IV as it is less likely that the industry culture would have a direct impact on cash holdings or via other mechanisms other than the firm's corporate culture. Table 5.12 shows the 2SLS regression estimation results. As there are no within-industry differences in the IVs, I exclude industry fixed effects but include year fixed effects dummies.

The first-stage regressions are reported in columns (1), (3), (5), and (7), where corporate culture dimensions are dependent variables regressed on industry average cultural dimension as the IV, including the same set of control variables that are specified in the baseline model of equation (5.1) and Table 5.4. The coefficient estimates on the instruments for all four corporate culture dimensions are positive and statistically significant at the 1% level, implying that the instruments are valid. In addition, the Kleibergen–Paap Wald F-statistic for weak instruments exceeds the threshold value of 16.38 proposed by Stock and Yogo (2005), thus rejecting the null hypothesis that the instrument is weak. Accordingly, these findings provide evidence that suggest that the industry's mean culture is a valid instrument for all cultural dimensions.

The results of the second-stage regression are reported in columns (2), (4), (6), and (8) for *Compete, Create, Collaborate,* and *Control*, respectively. In the second stage, the fitted value of each culture dimension is retained from the first stage and adopted as the independent variables representing corporate culture. The estimates for the second stage are confirming my main findings in Table 5.4, particularly for the competitive and collaborative cultures.

Consistent with the monitoring cost hypothesis, the coefficients on the *Fitted Compete* and *Fitted Collaborate* are positive and statistically significant at the 1% level, reinforcing the view that those cultures have lower information asymmetry and hence shareholders would allow the firms' directors to hold more cash because of the effective monitoring in these transparent environments (Chung et al. 2015) that could alleviate agency concerns.

Table 5.12: Endogeneity: Two-Stage Least Squares (2SLS)

Variables	Dependent variables							
	First stage	Second stage	First stage	Second stage	First stage	Second stage	First stage	Second stage
	Compete	*Cash holdings*	*Create*	*Cash holdings*	*Collaborate*	*Cash holdings*	*Control*	*Cash holdings*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Industry mean (Compete)	0.927***							
	(0.022)							
Fitted Compete		0.028***						
		(0.010)						
Industry mean (Create)			0.942***					
			(0.046)					
Fitted Create				-0.201***				
				(0.064)				
Industry mean (Collaborate)					0.905***			
					(0.041)			
Fitted Collaborate						0.776***		
						(0.086)		
Industry mean (Control)							0.968***	
							(0.0482)	
Fitted Control								-0.382***
								(0.058)
All controls	YES	YES	YES	YES	YES	YES	YES	YES
Year FE		YES		YES		YES		YES
Observations		27071		27071		27071		27071
R-squared		0.432		.407		0.289		0.343
Kleibergen-Paap rk Wald F-stat.	1746.723		413.494		497.805		402.453	

This table presents the estimates from the 2SLS framework. Columns (1), (3), (5), and (7) show the first-stage regression where each corporate culture dimension is regressed on the industry mean cultural dimension score (instrumental variable), and control variables. Columns (2), (4), (6), and (8) report the results of the second stage regressions, in which cash holdings is regressed on the stage one fitted value and the same controls. The main independent variables of interest are the four dimensions of the corporate culture based on the CFV: *Compete, Create*, *Collaborate*, and *Control*. I include the same set of controls as in Table 5.4. These variables are not tabulated to conserve space. Definitions of all variables are included in Appendix Table A. For brevity, I only report the coefficients on the IV and fitted corporate culture variables. All models include year fixed effects. Continuous variables are winsorised at the 1st and 99th percentiles. Robust standard errors are in parentheses and are clustered at the firm level. ***, **, and * indicates significance at the 1%, 5%, and 10% level, respectively.

Interestingly, the coefficient on the *Fitted Create* is significant, but in the opposite direction to the main result shown in Table 5.4. This in an unexpected finding as all the previous sub-sections reveals a positive and significant association between creative corporate culture and cash holdings. A new finding emerging in Table 5.12, but consistent with the monitoring cost hypothesis, is the significant coefficient estimate on *Fitted Control*, which is negative and significant at the 1% level. As a controlling corporate culture might foster higher information asymmetry, shareholders will force directors to reduce the cash holding because it would be harder to effectively monitor them to ensure they are not misusing this cash.

Collectively, the results of the endogeneity tests provide evidence consistent with the monitoring cost hypothesis in explaining the relationship between corporate culture and cash holdings. After alleviating the potential impacts of omitted variables and reverse causality, the baseline regression findings still hold. In firms with a corporate culture that demonstrates lower information asymmetry, the shareholders would allow the managers to hold more cash to meet future investments. Given the lower information asymmetry, the shareholders would have a more effective monitoring role due to a more transparent environment. As such, in firms with competitive, creative, and collaborative cultures, higher cash holdings would be more acceptable, since the monitoring would prevent agency conflicts meaning that cash balances need not serve as the tool for influencing the behaviour of directors. The next section reveals further test in association with this relationship.

5.5. Corporate culture, excess cash holdings, and firm profitability

So far, the results of the previous tests show that competitive, creative, and collaborative corporate cultures have a positive and significant association with cash corporate holdings. However, the findings so far do not reveal any conclusions on the role of corporate culture in determining the optimality of cash holdings for firm value and shareholders' wealth. Therefore, in this section, I shed light on the joint impact of corporate culture and cash holdings on future firm profitability and value. I focus on excess cash holdings instead of the level of cash used in the previous analyses for two reasons. According to Simutin (2010), excess cash captures significant information about future firm prospects that are related to firm profitability. As well, higher managerial entrenchment could waste the

excess cash, and so exacerbating the free cash flow issue and reflecting negatively on firm value, as suggested by Harford et al. (2008).

Following the literature (e.g., Opler et al. 1999; Harford et al. 2008; Huang and Mazouz 2018), I test this relationship by looking at excess cash, and how the interaction between this variable and corporate culture dimensions impact firm profitability and value. *Excess cash* is the residual from the cross-sectional regression of firms' cash holdings ratio on a set of firm variables, in addition to year and industry fixed effects. Firm variables are the same ones used in model (5.1), as they are the key determinants of cash holdings. These variables are firm size, leverage, growth opportunities (M/B ratio), profitability, net working capital, cash flow volatility, R&D to sales, and acquisitions to sales. To test the joint impact of corporate culture and excess cash on firm profitability and value, I run the following regression:

$$Firm\ profitability_{i,t} = \alpha + \beta_1\ Excesscash_{i,t-1} + \beta_2\ Corporate\ culture_{i,t-1} + \beta_3\ Excesscash_{i,t-1} \times Corporate\ culture_{i,t-1} + \gamma Z_{i,t-1} + Year_t + Industry_i + \varepsilon_{i,t} \quad (5.2)$$

where *Firm profitability* is measured by *ROA*, which is measured as the earnings before interest, taxes, depreciation, and amortisation divided by total assets (TA). Corporate culture variables are the four dimensions of the corporate culture based on the CVF: *Compete, Create*, *Collaborate*, and *Control*. Z is a vector of control variables that are firm size, leverage, capital expenditures, net working capital, and an indicator variable for dividend-paying firms. These control variables are based on the previous literature on the determinants of firm value (Allayannis and Weston 2001; Harford et al. 2008; Roll et al. 2009; Huang and Mazouz 2018). In addition, I run the regression including the one-year lagged values of the independent variables: excess cash; corporate culture dimensions; the interaction terms; and the control variables. The lagged values help in alleviating the endogeneity issue and it captures the impact of corporate culture and cash holdings on the future firm performance, which is the aim of this test. The model also includes year and industry fixed effects, and the standard errors are clustered at the firm level. Full definitions of all variables are presented in Appendix Table A.

Table 5.13 presents the estimation results. The coefficient on lagged *Excess cash* is negative and statistically significant in all columns suggesting that holding excess cash at the beginning of the year would reflect negatively on the firm's future profitability. This result is consistent with findings reported by Dittmar and Mahrt-Smith (2007) and Harford et al. (2008). *Compete* shows a positive and statistically significant coefficient at the 1% level in column (1). Alternatively, *Create* reveals an insignificant association with the firm's *ROA* in column (2), and *Collaborate* demonstrates a negative coefficient that is statistically significant at the 5% level. These results suggest that competitive culture influence firm's profitability better than the three other cultures.

More importantly, the interaction terms between excess cash and corporate culture show varying interpretations. First, in column (1), *Compete* when interacting with *Excess cash* generates a positive and statistically significant relationship with profitability. This magnitude is significant at the 1% level. In terms of economic significance, an increase in *Excess cash* × *Compete* by one unit leads to a 0.209 percent rise in profitability on average. Thus, the interaction term demonstrates that firms with a competitive culture partially offset reverse the negative impact of excess cash on firm profitability. Second, although the coefficient on *Create* is insignificant in column (2), the interaction term with *Excess cash* is positive and statistically significant at the 1% level. In economic terms, increasing the interaction term by a single unit leads to a 0.325 percent rise in firms' profitability. Possible interpretations of these findings are as follows.

Reflecting on the baseline regression in Table 5.4, competitive and creative cultures have a positive association with cash holdings. This is in line with the *monitoring cost hypothesis*, in which shareholders of firms with such cultures would allow directors to hold more cash due to the effective monitoring they can perform in this transparent informational environment. The results in Table 5.5 and Table A5.1 also corroborate this monitoring cost argument and show that those firms hold cash to finance their R&D investments and growth opportunities. Reinforcing this evidence, competitive and creative firms with a more transparent informational environment and hypothetically a better-monitored cultural environment, accumulate more cash and the excess cash tends to not be dissipated, instead it is more likely to be used in a way that enhances firm profitability.

Table 5.13: Corporate culture, excess cash and their relationship to firm profitability

Variables	Dependent variable: *ROA*			
	(1)	(2)	(3)	(4)
Excess cash $_{t-1}$	-0.768***	-0.499***	-0.146*	-0.375***
	(0.118)	(0.119)	(0.089)	(0.082)
Compete $_{t-1}$	0.047***			
	(0.008)			
Excess cash $_{t-1}$ × *Compete* $_{t-1}$	0.209***			
	(0.041)			
Create $_{t-1}$		0.030		
		(0.019)		
Excess cash $_{t-1}$ × *Create* $_{t-1}$		0.325**		
		(0.138)		
Collaborate $_{t-1}$			-0.045**	
			(0.019)	
Excess cash $_{t-1}$ × *Collaborate* $_{t-1}$			-0.138	
			(0.109)	
Control $_{t-1}$				0.023
				(0.017)
Excess cash $_{t-1}$ × *Control* $_{t-1}$				0.199
				(0.124)
Firm size $_{t-1}$	0.044***	0.045***	0.045***	0.045***
	(0.003)	(0.003)	(0.003)	(0.003)
Leverage $_{t-1}$	0.010	0.002	0.000	0.001
	(0.032)	(0.032)	(0.032)	(0.032)
Dividend policy $_{t-1}$	0.037***	0.032***	0.030***	0.030***
	(0.007)	(0.007)	(0.007)	(0.007)
Capital expenditures $_{t-1}$	0.471***	0.444***	0.440***	0.447***
	(0.084)	(0.084)	(0.083)	(0.084)
Net working capital $_{t-1}$	0.268***	0.267***	0.266***	0.267***
	(0.073)	(0.073)	(0.073)	(0.072)
Constant	-0.487***	-0.404***	-0.353**	-0.397***
	(0.146)	(0.145)	(0.142)	(0.142)
Observations	21655	21655	21655	21655
R-squared	0.368	0.362	0.362	0.362
Year FE	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES

This table reports the regression results of the relationship between corporate culture, excess cash, and firms' profitability and value. I use OLS regression model as presented in equation (5.2). The dependent variable is *ROA*. *Excess cash* is the residual from regressing firms' cash holdings on a set of firm variables (firm size, leverage, growth opportunities (M/B ratio), profitability, net working capital, cash flow volatility, R&D to sales, and acquisitions to sales), in addition to year and industry fixed effects. The corporate culture variables are based on the CVF: *Compete, Create, Collaborate, and Control*. Additional control variables include the firm characteristics: firm size, leverage, dividend policy, capital expenditures, and net working capital. Definitions of all variables are included in Appendix Table A. All models include year and industry fixed effects, where industry fixed effects are based on Fama-French 48 industry classification. Continuous variables are winsorised at the 1st and 99th percentiles. Robust standard errors are in parentheses and are clustered at the firm level. ***, **, and * indicates significance at the 1%, 5%, and 10% level, respectively.

Remarkably in column (3), the interaction term *Excess cash* × *Collaborate* is not significantly associated with the firm's future profitability. Initially, I show in Table 5.4 and Table 5.5 that a collaborative culture is associated with higher cash holdings, which is consistent with the *monitoring cost hypothesis* and not due to precautionary motives. Interpreting with caution, the result in Table 5.13 implies that if the accumulation of cash leads to an excess cash holding in such firms, the collaborative culture might not be deploying this excess cash directly for enhancing the short-term firm's profitability.

To provide a deeper explanation of *Compete, Create,* and *Collaborate* results, I use the CVF Figure 2.1 presented in Chapter 2. According to the horizontal axis (i.e., the right two quadrants of the CVF Figure 2.1), competitive and creative cultures focus more on the external environment to accomplish their day-to-day operations (Zammuto et al. 2000). Thus, their excess cash holdings tend to be used to boost the firm's profitability. Instead, the collaborative culture (i.e., the top left quadrant of the CVF Figure 2.1) is more internally oriented where its focus is on the firm's stability and long-run performance. Thus, their excess cash holdings strategies may not be instantaneously reflected on the firm short-term profitability proxied by *ROA*.

Moreover, in column (4) *Excess cash* × *Control* has an insignificant association with the firm future profitability. In Table 5.4, I find no significant association between control culture and cash holdings, and in Table 5.5, I observe that the precautionary motive cannot fully explain why those firms with a controlling culture hold cash. The results in this table show that such firms do not have excess cash that could influence firm profitability. When reflecting on these results in the CVF Figure 2.1, an intuitive interpretation is that firms with a control culture (i.e., the bottom left quadrant of the CVF Figure 2.1) foster internal focus and promote a bureaucratic system, which may reduce the unproductive reserving of cash and hence do not hoard excess cash that would impact firm profitability.

5.6. Conclusion

In this chapter, I have focused on a new determinant of corporate cash holdings that has been overlooked in prior studies, corporate culture. I shed light on the informational environment in each corporate culture dimension and on the role of information asymmetry on

cash holdings to test two opposing hypotheses describing the relationship between corporate culture and cash holdings: the *investment opportunity hypothesis* and the *monitoring cost hypothesis*.

Using a sample consisting of non-financial non-utility US companies between 1999-2019, the baseline results show that firms with competitive, creative, and collaborative cultures have higher cash holdings. These results are consistent with the *monitoring cost hypothesis* of cash holdings. More precisely, in cultures where information asymmetry is low, shareholders would permit managers to hold more cash because shareholders will have a better monitoring role in a such transparent environment. Thus, firms with these types of culture would hold more cash. The subsequent test invalidates the precautionary motive for holding cash and corroborates the *monitoring cost hypothesis*. A new finding to emerge from this test is that a control culture can also accumulate cash despite contrasting with the predictions of the research hypotheses and precautionary motive. The findings of the main analysis are robust to subsequent analyses including alternative measures of corporate culture and cash holdings, an alternative estimation model, and four endogeneity tests.

The final analysis demonstrates that the joint impact of corporate culture and excess cash holdings is beneficial for the firm's profitability (ROA), particularly if the firm has competitive or creative cultures, while the joint impact of the collaborative culture (and control culture) and cash holdings is insignificantly linked to the firm's ROA.

Overall, my study contributes to the existing literature by examining a new determinant of cash holdings. Furthermore, it reveals significant implications for directors. Establishing a corporate culture that enhances a more transparent informational environment could be beneficial in facilitating a better and more effective monitoring of the firm's directors. This manifests as higher cash holdings. With the availability of relatively more internal finance of the highest liquidity, firms may use this financial resource strategically and generate higher profitability.

In this chapter, I show the role of corporate culture on cash holdings. In chapter 4, I demonstrate the influence of corporate culture on CEO compensation. For the next and final empirical chapter, I focus on the role of the board of directors in determining corporate

culture. In particular, I examine whether independent directors' connectedness helps in creating a corporate culture that might reflect positively on the firm value.

Chapter 6: Director connectedness and corporate culture

6.1. Introduction

Selecting a firm's board of directors is one of the ultimate governance mechanisms that shareholders trust to guarantee that directors would act to maximise their wealth and enhance firm value and outcomes (Anderson et al. 2011). A large body of literature emphasises the effectiveness of firms' boards in the monitoring, advising, and enhancing of strategic decisions (Hillman and Dalziel 2003; Roberts et al. 2005). Another growing literature sheds light on the importance of corporate culture on various firm policies and outcomes (e.g., Fiordelisi and Ricci 2014; Guiso et al. 2015b; Grieser et al. 2017; Fiordelisi et al. 2019; Jiang et al. 2019; Nguyen et al. 2019; Barth and Mansouri 2021; Li et al. 2021; Andreou et al. 2022; Graham et al. 2022; Fang et al. 2023). Combining these two streams together, a recent study by Graham et al. (2022) reveals survey-based evidence that the firm's leadership could be an instrumental factor in building an effective and strong corporate culture. Although the literature provides insights that a firm's leadership influences its culture, which is an outcome that crucially shapes the firm's outcomes, there is no empirical study that tests the implications of the board of directors on corporate culture directly. I aim to fill this gap in this chapter. In particular, I investigate the importance of director connectedness (measured using independent directors' connectedness) in influencing and promoting a strong corporate culture. To do so, I raise the following research questions: (1) does independent directors' connectedness affect firms' corporate culture; and (2), what is the overall impact of this relationship on firm value?

Despite the emergent evidence that shows the consequences of corporate culture on various firm outcomes, the research on the determinants of corporate culture is limited. Guiso et al. (2015b) show that institutional ownership negatively influences firm integrity culture, whereas Andreou et al. (2022) document that transient institutional ownership promotes the firm's competitive culture. A more recent study by Datta et al. (2023) discovers, for the first time, how board structure might promote the corporate culture. In particular, they reveal that having female directors on the board strengthens the firm's culture and this positive influence manifests as a greater value of cash holdings. Motivated by this limited literature, and given the prominence of corporate culture for impacting firm policies and value, I argue that

independent directors' connectedness, as a crucial board characteristic, can have a fundamental impact on the firm' culture.

Director's connectedness also referred to as director interlocks, ties, or networks, is when "a person is on the board of directors of two or more corporations, thereby providing a link or interlock between them" (Fich and White 2005, p. 175). I focus on independent directors' connectedness because it is suggested to be more influential than other board characteristics. For example, it is more instrumental than board size on firm performance, as the size of the board could be a barrier in some situations (Boyd 1990). In addition, unlike the board's independence, directors' connectedness should reflect their social capital in having the superiority in accessing non-public information and increasing their effectiveness on the board of directors, which grants them influence and power to impact other directors (Intintoli et al. 2018; Amin et al. 2020). In particular, directors' connectedness facilitates information dissemination and access to resources, which enhances the monitoring and advising roles of interlocked directors (Larcker et al. 2013; Akbas et al. 2016). As well, external social connections signify the quality of board members in terms of providing more insights and knowledge to board decision-making, because these connections imply a strong career experience and superior exposure to diverse corporate cultures and hierarchies (Anderson et al. 2011).

Directors' networks as social capital have important implications at the firm level (Hillman et al. 2009). The empirical evidence, however, provides mixed findings on the effectiveness of directors' connectedness on various firm policies and outcomes. On the one hand, independent directors ties reflect their capability and greater experience (Ferris et al. 2003) . Well-connected directors have greater access to information and resources about firms' strategic policies, industry movements, economic developments, and information about executives' compensation and openings in other firms, and they have greater incentives to monitor the board, all of which might benefit firm performance (e.g., Larcker et al. 2013; Renneboog and Zhao 2014; Intintoli et al. 2018; Amin et al. 2020; Fang et al. 2021). On the other hand, connected directors might imply busy directors and thus they would not have enough time to effectively monitor the board. This consequently would lead to poor corporate governance (e.g., Fich and White 2003; Fich and Shivdasani 2006; Renneboog and Zhao 2011; Fracassi and Tate 2012, and others).

Theoretically, according to the agency theory (Jensen and Meckling 1976), the vital role of the board of directors is to monitor the firm's executives on behalf of the shareholders and a connected independent director implies superior human capital and reputation (Fama and Jensen 1983). Thus, for these reputational reasons, independent directors' connectedness signifies a monitoring advantage. According to the resource dependence theory (Pfeffer and Salancik 1978), directors' connections could help in providing information on new regulations, market circumstances, industry trends, other companies' corporate culture and hierarchies, and vital market information (Hillman et al. 2000; Hillman and Dalziel 2003; Hillman et al. 2009; Anderson et al. 2011; Larcker et al. 2013). As well, social network theory (Haythornthwaite 1996) postulates that well-connected individuals have priority in accessing private information due to their networks, and these connections increase their power to influence the board's decisions (Adler and Kwon 2002; Amin et al. 2020). Thus, being a critical element of the monitoring mechanism and providing resources, advising and influence, and based on the instrumental role of the firm's leadership in building an effective and strong corporate culture (Graham et al. 2022), I extend the above notions and hypothesise that independent directors' connectedness is significantly associated with firms' corporate culture.

To test this hypothesis, I construct the proxy for *Independent directors' connectedness* following Akbas et al. (2016), which is built upon directors' network information data from BoardEx. I define *Corporate culture* based on the four corporate culture dimensions of the Competing Values Framework CVF (Quinn and Rohrbaugh 1983; Cameron et al. 2006). This framework differentiates between four types of corporate culture dimension: *Compete*; *Create*; *Collaborate;* and *Control*, each of which has its own values and orientation. Building on the CVF (Figure 2.1 in Chapter 2), I use an aggregate measure for a strong corporate culture, where *Corporate culture* is the sum of the four corporate culture dimension scores for each firm in each year.[41] I calculate the score of each dimension by applying Quantitative Textual Analysis (QTA) on firms' 10-K filings to measure corporate culture based on the CVF dimensions. QTA was initially introduced to finance by Loughran and McDonald (2011; 2016). I follow a few studies that have already adopted the CVF to measure corporate culture using QTA (Fiordelisi and Ricci 2014; Fiordelisi et al.

[41] The reasons for using an aggregate measure for corporate culture in this chapter are provided in section 6.6.2.

2019; Nguyen et al. 2019; Barth and Mansouri 2021; Chen et al. 2021a; Wang et al. 2021; Andreou et al. 2022; Fang et al. 2023).[42]

I focus on a sample of 1,212 firms in Standard and Poor's (S&P) 1500 index with 8,434 firm-year observations ranging from 2002 to 2018. The empirical findings provide robust evidence that independent directors' connectedness has a positive and significant impact on firms' *Corporate culture*. In terms of economic significance, a standard-deviation increase in the fraction of independent directors' connectedness is associated with a 3.40% increase in the firm's culture. As strong corporate culture is crucial for firm's success and performance (Li et al. 2021; Graham et al. 2022), my empirical result shows that independent directors connectedness may contribute to this desired outcome. In addition, this result is in line with previous literature documenting the advantages of directors' networks (e.g., Pfeffer and Salancik 1978; Fama and Jensen 1983; Hillman et al. 2000; Hillman et al. 2009; Anderson et al. 2011; Intintoli et al. 2018; Fang et al. 2021).

Extending my analysis beyond the baseline regression, I perform a range of robustness and endogeneity tests. First, I test the robustness of the baseline result to an alternative measure, namely *Strong cultureCVF*, which is an indicator variable of the main proxy. In addition, I use the *Strong cultureLi_etal* provided by Li et al. (2021), which is constructed using five dimensions that captures different values compared to the CVF dimensions. As well, I perform three methodology-related tests: (1) an alternative specification model for constructing the connectedness variable; (2) quantile regression as an alternative estimation method to control for the data distribution in the sample; and (3) additional control variables related to governance mechanisms. The results show that the original finding is robust to these tests.

Second, to address endogeneity concerns from omitted variables and reverse causality that may drive my results, I perform the following tests. I execute two matching techniques: propensity score matching and entropy balancing. In these analyses, I compare strong culture in a treatment group against a control group, where firms in the treatment group are those with independent directors with large connections, meaning *Independent directors' connectedness* is higher than the industry mean. Firms in the control group are those with

[42] A full explanation of the measurement of corporate culture dimensions in presented in Chapter 3.

independent directors with low connections. In addition, I run a test to tackle the possible reverse causality of firms with strong culture that might be attracting well-connected directors. These tests provide support to the view that independent directors' connectedness positively influences firms' culture and that my result is not driven by endogeneity issues.

To gain further insight, I test whether the impact of independent directors' connectedness on corporate culture stems from the monitoring and/or advising channel. Well-connected directors are a substantial element of the monitoring mechanism (Fama and Jensen 1983; Eisenhardt 1989; Hillman and Dalziel 2003; Intintoli et al. 2018). In addition, as they have greater access to information and resources, they are better at providing advice and knowledge (Hillman et al. 2000; Hillman and Dalziel 2003; Hillman et al. 2009; Larcker et al. 2013; Fang et al. 2021). Most importantly, previous literature shows that firms benefit more from independent directors' connectedness when those firms are poorly governed and are more complex. Thus, well-connected independent directors are more influential when there is a higher need for monitoring and advising (Coles et al. 2008; Anderson et al. 2011; Amin et al. 2020; Chang and Wu 2020). Hence, I propose that the influence of independent directors' connectedness on firms' strong culture would be greater when firms have higher monitoring and advising needs. The evidence suggests that independent directors' connectedness is more influential for firms' culture when those firms require more advising due to the complex nature of their operations.

In subsequent analysis, I focus on the implications of independent directors' connectedness and corporate culture on firms' value creation. Therefore, I test whether independent directors' connectedness intensifies the firm's culture as a channel to influence the firm's future value. In line with the previous test of monitoring or advising channels, I divide the sample into subsamples of high and low monitoring or advising needs. The results show that the joint impact of independent directors' connectedness and corporate culture is positive and significant for firms' Tobin's Q and ROA when those firms require high advising due to their complexity. The monitoring advantage of independent directors' connectedness could not be confirmed.

My study contributes to the limited literature on the determinants of the corporate culture. To the best of my knowledge, there are very few empirical studies of the determinants of corporate culture. The exceptions are Guiso et al. (2015b), who find some

evidence of a negative association between a traditional governance variable, i.e., large holders of the firm's shares, and a firm's culture of integrity; Andreou et al. (2022), who report a positive and significant association between transient institutional investors and a firm's competitive culture; Graham et al. (2022), who provide survey-based evidence on the implication of a firm's leadership on establishing its corporate culture; and Datta et al. (2023), who reveal that female directors increase the value of cash holdings by indirectly improving the corporate culture. My work extends these studies by demonstrating that independent directors' connectedness has a positive and significant effect on firms' corporate culture. In addition, it shows that the positive influence of these connections on firms' strong culture stems from the advising channel.

Furthermore, my study contributes to the literature on the effectiveness of social connections of the firm's directors on firm policies and outcomes. For example, the previous studies show that directors' connectedness has a significant impact on R&D spending (Dalziel et al. 2011), firm performance (Larcker et al. 2013), CEO compensation (Renneboog and Zhao 2011), takeover process (Renneboog and Zhao 2014), M&A transactions (Cai and Sevilir 2012), innovation (Chang and Wu 2020), and corporate social performance (Amin et al. 2020). To the best of my knowledge, this is the first study to shed light on the impact of independent directors' connectedness on corporate culture, an important firm intangible asset that has only recently been the focus of research in corporate finance and is shown to have some influence on economic outcomes.

The remainder of this chapter is organised as follows: Section 6.2 provides the theoretical and empirical background to directors' connectedness, the link between independent directors' connectedness and corporate culture, and the development of the research hypothesis; Section 6.3 describes the data; Section 6.4 reports the empirical results, robustness tests, and endogeneity tests; Section 6.5 offers further analyses and Section 6.6 concludes the chapter.

6.2. Literature review

6.2.1. Director connectedness: Theoretical and empirical background

The existing research examining directors' connectedness and firm policies and performance has generally focused on two main perspectives: agency theory (Jensen and

Meckling 1976) and resource dependence theory (Pfeffer and Salancik 1978). Essentially, firm shareholders (principals) provide the funds to the firm and delegate responsibility to the managers (agents) for the day-to-day operations. The separation of the ownership and control might create an agency conflict between the firm's shareholders and managers (Jensen and Meckling 1976). In addition, this separation might also be affected by information asymmetry in the principal-agent relationship (Jensen and Murphy 1990). Hence, the vital role of the board of directors is to monitor the firm's executives on behalf of the shareholders and alleviate the agency conflict that might arise (Fama and Jensen 1983; Eisenhardt 1989; Hillman and Dalziel 2003). Band (1992) asserts the authoritative role independent directors play in monitoring the self-serving behaviour of the firm's managers and protecting the shareholders' wealth. Furthermore, Fama and Jensen (1983) add that external directorships and connections of independent directors signify their human capital value and reputation. Thus, they would execute more supervision on the board as their reputation is linked to their connections (Fang et al. 2021).

While the main fiduciary responsibility of the board is to monitor the managers, and this can be explained by the agency theory, the resource dependence theory postulates that organizations depend on the external environment to gain information about the financial and physical resources (Pfeffer and Salancik 1978). These resources are summarised into four benefits: advising and counselling; access to information through multiple channels; legitimacy; and better access to other resources (Pfeffer and Salancik 1978). Resource dependence theory suggests that managers (as human capital) of the firm and their connections (as social capital) could help in reducing uncertainty and dependency on the external environment (Hillman et al. 2000; Hillman and Dalziel 2003; Hillman et al. 2009). As well, they provide fundamental information on new regulations, market circumstances, industry trends, and other important market information (Larcker et al. 2013). Therefore, the board's human and social capital could be vital tools for encouraging board effectiveness (Dalziel et al. 2011). And so, having a well-connected member on the board of directors can be instrumental in increasing firm value and performance.

Along with agency and resource dependence theories as the main perspectives for explaining directors' network implications on the firm's outcomes, this stream of research also exploits the social network theory. The notion of social capital in the resource dependence theory is related to the social network theory (Amin et al. 2020). Network theory

posits that individuals with large connections have superior access to private information due to their networks (Haythornthwaite 1996). In addition, well-connected directors can act as hubs to enhance the flow and the quality of information transmission (Jackson et al. 2017), and eventually these connections increase the directors' power of influencing others working with them for the firm's or their advantage (Adler and Kwon 2002; Amin et al. 2020).

The empirical evidence shows that directors' connectedness has both positive and negative consequences, and sometimes no relationship. Concerning the positive impact, director connectedness has been identified as a major contributing factor to firm performance. Larcker et al. (2013) demonstrate that board connectedness facilitates access to information and external resources which reflects positively on the firm's stock returns and accounting performance. They report that firms with well-connected boards have an average of 4.68% annual returns and have higher return-on-assets (ROA) compared to firms with weak board connections. Similarly, Intintoli et al. (2018) state that well-connected board members have more experience and knowledge and thus, better access to information. In addition, their reputation is superior due to their connections and thus they have greater motivations to protect it against fraudulent reporting. All of these attributes make them more incentivised to monitor the board effectively. Their empirical results support this view. They find that well-connected independent, non-co-opted audit committee (AC) members are associated with lower earnings management and more accounting conservatism.[43] On the other hand, they do not find any association between co-opted AC members or non-AC members and financial reporting quality. In a recent study, Fang et al. (2021) investigate whether directors' social connections could prevent managers' bad news hoarding that influences stock price crash risk. They find that directors' connectedness is negatively associated with future stock price crash risk given their superior access to information and better monitoring. Furthermore, due to the principal informational advantages of board connectedness, Amin et al. (2020) report a positive association between independent directors' connectedness and a firm's CSR performance.

In other strands of the literature, many papers have reported the positive impact of directors' networks on firms' policies including firm innovation and R&D development, and firms' mergers and acquisitions (M&A) strategies. For example, Dalziel et al. (2011)

[43] Co-opted directors are directors appointed after the CEO assumes office (Intintoli et al. 2018).

integrate resource dependence and agency theories to study how the independence of the firm's board and the network of its members enhance the monitoring and advising responsibilities. Studying a sample consisting of 225 publicly traded US firms in the pharmaceuticals and biotechnology industries from 2001 to 2003, they find that directors' human capital (i.e., social networks) differs between independent and inside directors in influencing firm R&D spending. Independent directors with more connections to other tech firms have a positive impact on R&D spending. In a more recent paper, Iyer et al. (2020) argue that well-connected directors have better access to information and thus, they advise the board effectively concerning R&D investments. Consistent with their prepositions, their results show that directors' connectedness is positively associated with R&D investments. In a related study, Chang and Wu (2020) report that companies' innovation is positively associated with directors' connectedness. Interestingly, the positive impact on connectedness is more effective when firms have poorer governance and require more advising. This is consistent with Amin et al.'s (2020) findings concerning the effectiveness of independent directors' connectedness for companies operating in a competitive business environment, those that require more advising, and companies whose governance is poor and requires more monitoring.

In terms of firms' M&A strategies, Stuart and Yim (2010) postulate that directors' connectedness is a determining factor that influences change-of-control transactions. They document that firms having directors experienced in private equity deals are roughly 42% more likely to become targets in private equity-backed, take-private offers. Cai and Sevilir (2012) find that information asymmetries are lower when the boards of the target and the bidder are connected through one director. Their results show that acquirer firms achieve higher announcement returns and obtain lower takeover premiums when they share a common director with the target. This is due to the acquirer's connections with the target. As discussed earlier, a connected director has better access to information and thus, provides them with a bargaining advantage in the transaction negotiations with the target firm. Furthermore, Renneboog and Zhao (2014) document that directors' connectedness is positively associated with the frequency of takeovers. In addition, these connectedness increases the probability of successfully completed deals and decreases the time of the negotiations. Together, these studies provide important insights into the significant informational role that directors' connectedness has on firms' M&A strategies.

directors' connectedness, however, could harm firm performance and governance. For example, Core et al. (1999) report that busy independent directors as an alternative measure of their connectedness, are associated with excess CEO compensation and this subsequently leads to decreasing firm performance. Similarly, Fich and White (2003) find that firms with connected directors provide higher compensation. In addition, CEO turnover after poor firm performance is lower in firms with connected directors. The reason is that interlocked relationships increase CEO entrenchment, who exploit these connections for their own interests. Research findings by Renneboog and Zhao (2011) also confirm the positive (negative) impact of directors' connectedness on CEO compensation (pay-performance sensitivity) in their UK-based sample. Such findings confirm that connected directors could be too busy to effectively monitor the board. In the same vein, Fich and Shivdasani (2006) analyse a sample comprising of the 1992 Forbes largest 500 firms lists, and document that boards with busy independent directors are correlated with poor governance. Those firms have lower profitability, lower market-to-book ratios, and weaker CEO turnover-performance sensitivity.

Examining broader samples including S&P 1500 companies (Fracassi and Tate 2012) and S&P 500 companies (Cashman et al. 2012), these studies report that directors' connectedness negatively influences firm value. Furthermore, Armstrong and Larcker (2009) and Bizjak et al. (2009) show the consequences of directors' connections on the increase of options backdating. directors' connectedness is also a significant determinant of earnings management, particularly when the commonly connected director works for a firm that manages its earnings (Chiu et al. 2013). The evidence presented on the negative association between directors' connectedness and firm performance and governance is challenging the monitoring perspective of the boards.

Collectively, the literature seems to provide inconclusive evidence on the implications of directors' connectedness. On the one hand, well-connected directors have greater access to information and resources, have greater incentives to monitor the board, and thus might benefit firm performance. On the other, connected directors might imply busy directors who do not have enough time to monitor the board effectively. Consequently, this would lead to poor corporate governance.

In this chapter, I attempt to contribute to the literature by examining the impact of independent directors' connectedness on a new aspect that has not yet been studied, as far as I am aware. Since connected directors could act as monitors and advisers and might provide information on the external environment, they might also influence how a firm designs its organisational strategies. Amin et al. (2020) show that independent directors' connectedness enhances firms' financial and social outcomes represented in CSR performance. Extending this study, I argue that independent directors' connectedness might also influence another social outcome of the firm, its corporate culture. The following section explains the anticipated relationship between independent directors' connectedness and corporate culture, and presents the research hypothesis.

6.2.2. Independent directors' connectedness and corporate culture

Corporate culture, as an intangible asset, has been under scrutiny by corporate finance scholars due to its implications on firm performance and outcomes.[44] For example, integrity has been documented as an important component of corporate culture that influences firm performance, attractiveness to job offerings, R&D and innovation, and investment-cash flow sensitivity (Guiso et al. 2015b; Grieser et al. 2017; Jiang et al. 2019; Graham et al. 2022). Furthermore, an employee-friendly corporate culture positively influences the firm's overall performance (Fauver et al. 2018) and improves the firm innovativeness (Chen et al. 2016). Fiordelisi and Ricci (2014) report the moderating role of corporate culture on the relationship between firm performance and CEO turnover. Nguyen et al. (2019) show the implications of growth-focused corporate cultures on bank loan decisions. Fiordelisi et al. (2019) display the implications of creative corporate culture on a firm's innovative success. Barth and Mansouri (2021) reveal the importance of corporate culture on bank stability, while Fang et al. (2023) exhibit the role of corporate culture on firm value and stability during the recent financial crisis. Nevertheless, corporate culture is also found to have negative consequences. Biggerstaff et al. (2015) clarify how an unethical culture shaped by the suspicious behaviour of CEO stock option backdating can increase their fraudulent activities. Research findings by Davidson et al. (2015) also point toward the negative impact of a corporate culture shaped by CEOs' prior legal transgressions on the likelihood of committing fraud.

[44] Chapter 2 provides a full review of corporate culture.

Despite the growing evidence in the finance literature on corporate culture, the determinants of corporate culture or what could shape its aspects are yet to be discovered. To start, Guiso et al. (2015b) document that corporate culture is a public value that is important to shareholders. As well, it has been discussed theoretically that a firm's leadership establishes its culture (Hermalin 2013). O'Reilly et al. (2014) argue that corporate culture is an asset that could be affected by the top management team. Undeniably, the main goal of the firm leadership (i.e., the board of directors), is monitoring, advising, and enhancing the decision-making strategies (Roberts et al. 2005). Thus, focusing on the firm's culture should, arguably, be one of the board's top priorities, as it is beneficial to the firm's shareholders and has implications for the firm's outcomes as emphasised in recent literature. Relatedly, in their survey study, Graham et al. (2022) support Hermalin's (2013) theory by providing evidence indicating that the firm's leadership is an instrumental factor in building the firm's culture. In addition, Graham et al. (2022) note that the leadership should set effective policies that serve to create a corporate culture that enhances firm value.

Despite the importance of the board of directors in shaping the firm's culture, the current empirical literature in corporate finance forgoes analysis of whether this factor affects corporate culture. To the best of my knowledge, there are very scarce empirical studies that investigate the determinants of corporate culture. The exceptions are Guiso et al. (2015b), Andreou et al. (2022), the survey-based evidence of Graham et al. (2022), and recently Datta et al. (2023). Guiso et al. (2015b) record a negative association between a traditional governance variable, large holders of the firm's shares, and a firm's culture of integrity. Andreou et al. (2022) report a positive association between transient institutional ownership and a firm's competitive culture. The latest study by Datta et al. (2023) concentrates on top executive gender representation and its implication on the value of cash holdings. While it is not the main focus of their study, they explore whether corporate culture is a channel through which female directors could apply their monitoring role. Their findings suggest that female directors positively enhance the firm's corporate culture, and this positive influence is indirectly reflected in a greater market value of the firm cash holdings. My study attempts to contribute to this literature, and fills this gap by answering the question of whether independent directors' connectedness, as a crucial board attribute, influences a firm's culture.

Independent directors are one of the main board compositions that influence and monitor the board's decision-making processes (Fama and Jensen 1983). Hillman et al.

(2000) argue that independent directors have the necessary resources required to deal with external factors. Westphal and Milton (2000) confirm that independent directors are more influential when they have external networks with other directors on other boards. As noted by Cai and Sevilir (2012), connected boards between firms could enhance communication and the spread of information and provide a comprehensive understanding of the other company's corporate culture. Having external networks implies a superior experience and thus superior exposure to various corporate cultures and hierarchies, thereby providing more insights and knowledge to board decision-making (Anderson et al. 2011).

In this chapter, I argue that a firm's culture could be influenced by independent directors' connectedness. To identify a firm's culture, I rely on the Competing Values Framework (CFV), established by Quinn and Rohrbaugh (1983) and developed by Cameron et al. (2006). This framework provides a holistic representation of corporate culture's core values, and it is firmly established and empirically applied in management and organisational studies (Linnenluecke and Griffiths 2010; Cameron and Quinn 2011; Hartnell et al. 2011). As presented in Chapter 2 Figure 2.1, the CVF provides four dimensions of corporate culture: *Compete; Create; Collaborate*; and *Control.* These dimensions are divided along two axes. Each axis represents two main orientations. The vertical axis shows flexibility and control orientations, and the horizontal axis presents internal versus external orientations. These four dimensions represent competing values and there is no preferred or best cultural type that a firm should follow. Thus, I expect that independent directors' connectedness is significantly associated with the firms overall "corporate culture" that reflects the combined value of these dimensions. I sum these dimensions into a unified variable that measures the firm's overall culture and I name it *Corporate culture*.

Aggregating these dimensions into a unified variable is appropriate for three reasons. First, corporate culture is considered an intangible resource that could impact a firm's financial performance (Flatt and Kowalczyk 2008). As argued by Sørensen (2002), holding mutual values and norms within the firm, among its employees, could be translated into a "strong" corporate culture that would benefit the overall firm performance. Thus, combining these competing cultural dimensions into one variable could represent the overall value of corporate culture. Second, companies could have a mix of several dimensions that represents their corporate culture (Quinn and Rohrbaugh 1983; Andreou et al. 2022; Cameron et al. 2022). Third, there might be a balance among these cultural values in impacting firm

outcomes (Graham et al. 2022). As documented by Li et al. (2021), firms with a strong corporate culture, as a combination of five values, are associated with more risk-taking, greater operational efficiency, higher CEO compensation design promoting risk-taking and long-term orientation, and overall better firm value. Therefore, I combine the CVF dimensions to reflect firms' overall culture.

The link between independent directors' connectedness and strong corporate culture is built upon the theoretical perspectives of agency and resource dependence theories. The monitoring view of directors' connectedness is related to the agency theory (Jensen and Meckling 1976), whereas, advising and providing resources is related to the resource dependence theory (Pfeffer and Salancik 1978). As discussed earlier, one of the main goals of the board of directors is monitoring its members (Jensen and Meckling 1976; Hillman and Dalziel 2003; Roberts et al. 2005). Fama and Jensen (1983) state that directors' networks indicate superior human capital and reputation. Hence, to protect their reputation they should impose effective monitoring. More recently, Fang et al. (2021) report that well-connected directors reduce stock price crash risk when there is a need for monitoring. In addition, having directors with external connections with the external environment would be beneficial to those firms. Well-connected directors can be a vital resource to have better access to information about other companies' corporate culture and hierarchies, industry trends, as well as new regulations (Pfeffer and Salancik 1978; Hillman et al. 2000; Hillman et al. 2009; Anderson et al. 2011; Larcker et al. 2013). The above influential roles can be strategic to the firm's culture. Being an important element of the monitoring mechanism and providing resources and advising, and based on the instrumental role of the firm's leadership in building an effective and strong corporate culture (Graham et al. 2022), I propose that independent directors' connectedness may play a role in influencing firms' corporate culture. This leads to the research hypothesis:

H5: Independent directors' connectedness is significantly associated with the firm's Corporate culture.

6.3. Data, variables, and descriptive statistics

6.3.1. Data and sample

The sample contains all firms in the Standard and Poor's (S&P) 1500 index. The associated data are extracted from multiple databases. First, corporate culture proxies are calculated using companies' annual reports (10-K filings) from the US Securities and Exchange Commission's (SEC) Electronic Data Gathering, Analysis and Retrieval (EDGAR) database. Second, information on directors' networks is from BoardEx. In the final sample, I restrict the analysis to independent directors' networks only. Third, companies' accounting and financial data are from Compustat. Fourth, institutional ownership data are from Thompson-Reuters Ownership Database. Fifth, analyst information is collected from I/B/E/S. The sample starts in 2002, which is the earliest year BoardEx started to provide directors' connections. The sample ends in 2018 to ensure that all variables needed to calculate the connectedness measure are available, particularly data on institutional ownership and analysts' coverage. After merging information from all these datasets and after excluding financial and utility firms, and firms with missing data, the final sample is an unbalanced panel data set including 1,212 firms with 8,434 firm-year observations for the period ranging from 2002 to 2018.

6.3.2. Variables definition

6.3.2.1. Corporate culture

The measurement of the CVF corporate culture dimensions: *Compete*; *Create*; *Collaborate*; and *Control* are explained in detail in Chapter 3. Related to the above arguments on the relationship between independent directors' connectedness and firms' culture, and in line with Li et al. (2021) and Graham et al. (2022) on using a comprehensive measure to capture a firm's overall culture, I use an aggregate measure for the corporate culture. *Corporate culture* is the sum of the four corporate culture dimensions scores for each firm in each year.[45]

[45] It could be argued that this simple aggregation variable has at least two issues. For example, the aggregate measure does not identify whether Corporate culture is driven by a certain dimension. For instance, one firm could have a high score for *Compete* and lower scores for other cultural dimensions, whereas a different firm could have a larger *Control* score than the three other dimensions. Thus, the aggregate Corporate culture for the first firm comes from *Compete*, while for the second firm, the aggregate score comes from *Control*, but this detail is lost in the summation. Also, it could be maintained that the four dimensions have different distributions, so the aggregate measure could be

6.3.2.2. Independent directors' connectedness

I follow Akbas et al. (2016) and Fang et al. (2021) to construct *Independent directors' connectedness*. I use network information from BoardEx as it contains a range of external social and professional links including current and past employers, educational institutions attended, civil activities such as non-profit organisations, and military service. The construction of connectedness is a two-step process. I first aggregate each independent director's networks at the board level. According to Akbas et al. (2016), this straightforward aggregation has two disadvantages. Total networks will increase with the number of directors leading to a high correlation between board size and networks. In addition, directors' networks could be correlated with other firm variables such as size and age. Thus, in the second step of constructing the connectedness measure, I regress the natural logarithm of the aggregate board-level independent directors' networks (first step) on the natural logarithms of firm size, firm age, the board size, institutional ownership, and *Analyst coverage*. The residual values of the regressions are the proxy for *Independent directors' connectedness*. This approach minimises the potential issues arising from any correlation between connectedness and firm characteristics, as well as any issues resulting from omitted variables that might impact these firm characteristics.[46]

misleading because it does not take into account the separate distributions of each of the four dimensions. However, the purpose of this chapter, the Corporate culture variable is not designed to measure the strength of a specific dimension, but rather to have a composite score of these cultural dimensions into a unified proxy. According to Cameron et al. (2022), firms could have a mix of all cultural dimensions, and sometimes one or more cultural types dominate. Thus, having a straightforward aggregate measure of corporate culture based on the CVF dimensions in this study satisfies these requirements. Nevertheless, these concerns are acknowledged. Moreover, the complexity of designing an appropriate aggregate measure of Corporate culture is left to future research.

[46] Centrality proxies are another way to measure director's connectedness used in the literature (e.g., Renneboog and Zhao 2011; Larcker et al. 2013; Intintoli et al. 2018, among others). The connectedness measure used in my work is similar to the *degree* centrality (Akbas et al. 2016). Other centrality measures are *betweenness*, *closeness*, and *eigenvector*. These centrality measures are usually highly correlated with the *degree* centrality. For example, in Larcker et al. (2013) *degree* has a Pearson (Spearman) correlation of (0.94) with *closeness*, (0.92) with *betweenness*, and (0.91) with *eigenvector*, while in Intintoli et al. (2018) the correlation of *degree* is (0.85) with *closeness*, (0.81) with *betweenness*, and (0.81) with *eigenvector*. As my connectedness variable mirrors *degree* centrality and the correlation between centrality measures is high, it is likely that my *Independent directors' connectedness* variable captures most of the information in the other measures. Therefore, not using the other proxies is not expected to cause a large deficiency in the research.

6.3.2.3. Control variables

I include several firm characteristics that might impact the firms' culture (Andreou et al. 2022). I control for *Firm size*, which is the natural logarithm of the book value of the total asset; *Leverage*, which is the sum of short-term debt and long-term debt divided by the firm's total assets); firm accounting performance (*ROA*), which is calculated as the earnings before interest, taxes, depreciation, and amortisation (*EBITDA*) divided by total assets (*TA*).; and *Firm age*, which is the number of years since the firm appeared in CRSP. Following the corporate governance literature (e.g., Renneboog and Zhao 2011; Akbas et al. 2016; Kuang and Lee 2017; Amin et al. 2020), I control for board characteristics as they represent the internal governance system. In addition, board characteristics, such as *Board size*, *Board independence*, and *Board busyness* could be important influences on corporate culture. *Board size* is the total number of directors on the board. *Board independence* is the number of independent directors divided by the total number of directors on the board. *Board busyness* is the number of busy directors scaled by board size, where busy directors are those who hold three or more directorships.

6.3.3. Descriptive statistics and correlation matrix

Panel A of Table 6.1 reports the summary statistics of the main variables. The mean (median) *Corporate culture* is 4.4% (4.3%), respectively. The mean value of *Independent directors' connectedness* is 0.012, which is relatively higher than the corresponding statistic reported by Akbas et al. (2016) (0.0011), and by Fang et al. (2021) (0.0015). Conversely, the median and the standard deviation statistics are similar to those reported by these two studies. There might be two explanations for the difference in the mean value between my sample and theirs.

Table 6.1: Summary statistics and correlation

Panel A. Summary statistics

Variables	Mean	Standard Deviation	Median
Corporate culture	4.390	0.650	4.318
Independent directors' connectedness	0.012	0.639	0.063
Firm size (in $M)	8178.116	29495.567	1842.688
Leverage	0.214	0.174	0.202
ROA	0.146	0.082	0.138
Firm age	29.676	17.524	24
Board size	9.082	2.067	9
Board independence	0.77459	0.124	0.800
Board busyness	0.07847	0.103	0.000

Panel B. Correlation matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) *Corporate culture*	1								
(2) *Independent directors' connectedness*	0.151***	1							
(3) *Firm size* (in $M)	-0.024**	0.056***	1						
(4) *Leverage*	-0.261***	-0.059***	0.109***	1					
(5) *ROA*	-0.032***	-0.020*	-0.003	-0.096***	1				
(6) *Firm age*	-0.261***	0.040***	0.219***	0.163***	-0.004	1			
(7) *Board size*	-0.195***	-0.007	0.292***	0.242***	0.045***	0.434***	1		
(8) *Board independence*	-0.039***	0.257***	0.117***	0.121***	-0.003	0.243***	0.155***	1	
(9) *Board busyness*	-0.076***	0.160***	0.165***	0.104***	-0.015	0.129***	0.200***	0.129***	1

This table reports the summary statistics and correlation matrix of the main variables of the study. The sample consists of 8434 firm-year observations of 1,212 firms (excluding financial and utility firms) from the (S&P) 1500 index over the period 2002-2018. Panel A reports the summary statistics while, Panel B shows the Pairwise correlation coefficients, where ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively. Definitions of each of the variables are included in Appendix Table A.

First, in terms of sample selection, my study exclusively focuses on S&P 1500 firms, whereas the other two studies examine broader samples that may include smaller firms compared to the S&P 1500 index. Second, Akbas et al. (2016) sample period ends in 2011 and Fang et al. (2021) ends in 2015, whereas my sample ends in 2018. Together, these might suggest two things: my sample includes larger firms, which are relatively more likely to have connected directors, whereas those smaller firms are less likely to have connected directors so the average gets pulled down, and in recent years, the S&P 1500 firms' boards may be appointing more independent directors and those directors have more connections. Furthermore, in terms of connectedness measure, the statistics demonstrate that the mean is closer to the median in my sample, whereas, in the other two studies, the mean is much smaller than the median. So, the distribution in their studies is skewed to the left, however, my sample is reasonably closer to normal distribution. Therefore, this might indicate that the regression used to estimate independent directors' connectedness may be more appropriate for my data.

Regarding firm characteristics, the average firm age is around 29 years old and has total assets worth approximately $8,200 million. The mean firm leverage is 21.4%, and the average firm ROA is 14.6%. In terms of governance variables, the average board size is 9, and the fraction of independent directors on the board is roughly 77%. As well, the average board comprises 8% of busy directors.

Panel B shows the Pearson correlation coefficient of the main variables. As shown, there are positive and statistically significant correlations at the 1% level between *Independent directors' connectedness* and *Corporate culture*. The other variables have a negative and statistically significant association with corporate culture. These results show preliminary evidence that there could be a relationship between independent directors' connectedness and a firm's culture as proposed in the research hypothesis H5: *Independent directors' connectedness is significantly associated with the firm's Corporate culture*. The next empirical tests aim to explore this relationship more rigorously. Apart from this, Pearson correlation statistics show, in general, that the independent variables are significantly correlated. However, the correlations between them are low in economic terms. Thus, the results of the correlation matrix do not identify any multicollinearity issue between the independent variables, and including them all in the regression model would not likely create any problematic estimations of the results.

6.4. Empirical results

To test whether independent directors' connectedness influences the firm's culture, I begin my analysis by estimating the baseline OLS regression model:

$$Corporate\ culture_{i,t} = \alpha + \beta_1\ Independent\ directors'\ connectedness_{i,t} + \gamma Z_{i,t} + Year_t + Industry_i + \varepsilon_{i,t} \quad (6.1)$$

where *i* denotes firms, and *t* denotes years. The dependent variable is *Corporate culture*. The independent variable of most importance is *Independent directors' connectedness*. Z is a vector of the firm characteristics defined above that may determine the firm's culture, which serve as control variables. $Year_t$ and $Industry_i$ are dummy variables capturing year and industry fixed effects respectively. *Industry* is constructed using the Fama and French 48 industry classifications and is used to control for the unobserved omitted variables that may influence culture between industries. *Year* is also a dummy variable and captures the time-invariant year effects. Firm variables are winsorised at the 1% and 99% levels to reduce the impact of any extreme values. Robust standard errors are clustered at the firm level.[47]

6.4.1. Independent directors' connectedness and corporate culture

In this section, I examine the relationship between independent directors' connectedness and a firm's corporate culture. Table 6.2 presents the results of the estimation of the baseline OLS regressions. In column (1), the regression includes only *Independent directors' connectedness* as the explanatory variable and in column (2) the regression introduces the additional firm and governance controls as well as the year and industry fixed effects. The coefficient on *Independent directors' connectedness* in both columns is positive and significant. The inclusion of firm and governance controls and year and industry fixed effects in column (2) enhanced the model fit as reported by the R-squared (0.022 to 0.50). This is expected as the sample is panel data, and the inclusion of these controls and fixed effects is needed to control for unobserved heterogeneity. In terms of economic significance, the results in column (2) suggest that a standard-deviation increase in the fraction of

[47] I do not include firm fixed effects in the baseline regression because the independent directors' connectedness and corporate culture might be slowly changing over time (Nguyen et al. 2019; Amin et al. 2020; Fang et al. 2023). Thus, firm fixed effects model might not capture the relationship between the two test variables due to the relatively low within-firm variations (Wintoki et al. 2012).

independent directors' connectedness (approximately 63.9%), is associated with an increase in the firm's culture by 3.40% (= 0.053× 0.639). This result is consistent with research hypothesis H5, which posits a significant association between independent directors' connectedness and a firm's culture.

Table 6.2: Independent directors' connectedness and firm's culture

Variables	Dependent variable: *Corporate culture*	
	(1)	(2)
Independent directors' connectedness	0.154***	0.053***
	(0.03)	(0.021)
Firm size		-0.027**
		(0.013)
Leverage		-0.459***
		(0.083)
ROA		0.028
		(0.152)
Firm age		-0.004***
		(0.001)
Board size		0.009
		(0.007)
Board independence		-0.002*
		(0.001)
Board busyness		-0.001
		(0.001)
Constant	4.388***	3.627***
	(0.021)	(0.255)
Observations	8434	8434
R-squared	0.023	0.504
Year FE	NO	YES
Industry FE	NO	YES

This table reports the results of independent directors' connectedness on firms' culture using an OLS regression model. The dependent variable is *Corporate culture* measured as the sum of the four corporate culture dimensions scores based on the CVF: *Compete, Create, Collaborate,* and *Control*. The main independent variable is the *Independent directors' connectedness,* which is the residual obtained from a regression of the natural logarithm of aggregate networks on the natural logarithms of firm size, board size, firm age, number of analysts (*Analyst coverage*) and institutional ownership. The control variables include firm and board characteristics. Definitions of all variables are included in Appendix Table A. All models include year and industry fixed effects, where industry fixed effects are based on Fama-French 48 industry classification. Firm variables are winsorised at the 1st and 99th percentiles. Robust standard errors are in parentheses and are clustered at the firm level. ***, **, and * indicates significance at the 1%, 5%, and 10% level, respectively.

Regarding the control variables, there are significant associations between most of the firm control variables and corporate culture. There is a negative and significant association between the *Firm size*, *Leverage*, and *Firm age* and *Corporate culture.* Moreover, there is a

negative and a statistically significant association at the 10% level between *Board independence and Corporate culture.*[48]

The positive association between independent directors' connectedness and corporate culture can be interpreted by the agency theory and resource dependence arguments that connected independent directors are beneficial to the firms. To start, Graham et al. (2022) sheds light on how it is crucially important for a firm's leadership to strengthen the firm's culture, which is a desired outcome that has proven to enhance the firm's performance (Li et al. 2021). As external connections of independent directors signify their human capital value and reputation, they would execute more monitoring on the board as their reputation is linked to their connections (Fama and Jensen 1983; Intintoli et al. 2018; Fang et al. 2021). In addition, well-connected independent directors are a vital resource to have better access to information about other companies' cultures and hierarchies, industry trends, as well as new regulations (Pfeffer and Salancik 1978; Hillman et al. 2000; Hillman et al. 2009; Anderson et al. 2011; Cai and Sevilir 2012; Larcker et al. 2013). Taken together, being an important element of the monitoring mechanism and providing resources and advising, and based on the instrumental role of the firm's leadership in building an effective and strong corporate culture (Graham et al. 2022), the evidence in the baseline regression shows that connected independent directors play a role in increasing the firm's culture.

6.4.2. Robustness checks

In this section, I perform several tests to confirm the robustness of the findings from the baseline regression in Table 6.2.

6.4.2.1. Other ways of measuring corporate culture

I re-estimate the baseline regression using two alternative measures for corporate culture: the first one is the *Strong cultureCVF* derived from my main measure using the CVF dimensions; and the second one *Strong cultureLietal* is based on Li et al. (2021) and their

[48] In an extra test, reported in Table A6.1 in the Appendix, I drop *Independent directors' connectedness* from the regression model and replace it with these board characteristics to see whether these factors influence corporate culture. The coefficients on these variables are not significant, which corroborates my argument that *Independent directors' connectedness* is more influential for enhancing the firm's culture than other board characteristics.

corporate culture dimensions, which were previously defined and applied in Chapter 4, Section 4.4.2. In line with Li et al. (2021) and Graham et al. (2022), I use an indicator measure to identify firms with strong corporate cultures. I define *Strong cultureCVF* and *Strong cultureLietal* as a dummy variable that equals one for a firm whose corporate culture score is in the top quartile across all firms in a particular year, and zero otherwise. Columns (2) and (3) in Table 6.3 report the results. The results show that the original finding of the baseline regression estimation, displayed in column (1) for convenience, is robust to these alternative measures. Although the significance level of the coefficient on *Independent directors' connectedness* reduces to 5% in column (2), the economic significance increased significantly. In particular, a standard deviation increase in the fraction of independent directors' connectedness leads to an increase of 17.19% in the firm's strong culture under this alternative measure.[49] The coefficient on *Independent directors' connectedness* in column (3) for the Li et al. (2021) *Strong cultureLietal* measure shows a stronger magnitude and better statistical significance at the 1% level.

6.4.2.2. Further robustness checks

In this section, I perform three additional methodology-related tests to check the robustness of the results on the relationship between independent directors' connectedness and corporate culture.

In column (4) in Table 6.3, I use an alternative measure of *Independent directors' connectedness,* where I additionally account for year-specific and industry-specific factors that might influence director network size. I include year and industry fixed effects when generating the residuals of independent directors' networks. The main result is robust to this alternative measure, albeit showing a smaller statistical significance at the 5% level under the alternative measure. In column (5), I test the robustness of my result by estimating a quantile regression to check whether the relationship between independent directors' connectedness and corporate culture might be influenced by extreme outliers.

[49] The difference in economic significance between *Corporate culture* and *Strong cultureCVF* is not a concern because this might be driven by the transformation of variables. Nguyen et al. (2019) report different coefficient estimates (but with the same sign) for their additional robustness measures of corporate culture variables based on the CVF.

Table 6.3: Robustness checks

Dependent variable: *Corporate culture*

Variables	Baseline regression results	*Strong cultureCVF*	*Strong cultureLietal*	Alternative connectedness measure	Quantile regression	Controlling for institutional ownership
	(1)	(2)	(3)	(4)	(5)	(6)
Independent directors' connectedness	0.053***	0.269**	0.544***	0.050**	0.060**	0.053***
	(0.021)	(0.112)	(0.089)	(0.021)	(0.024)	(0.020)
All controls	YES	YES	YES	YES	YES	YES
Observations	8434	8434	8305	8434	8434	8434
Pseudo $R^{2/}$ R^2	0.504	0.338	0.228	0.504	0.498	0.504
Year FE	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES

This table report robustness tests results. For the purpose of comparison, the baseline regression result shown in Table 6.2 is reported here in column (1). Columns (2) and (3) are estimated using logit model; columns (4) and (6) are estimated using OLS regression; and column (5) is estimated using quantile regression. In columns (1), (4), (5), and (6) the dependent variable is *Corporate culture* measured as the sum of the four corporate culture dimensions scores based on the CVF: *Compete, Create, Collaborate,* and *Control.* Columns (2) and (3) reclassify strong corporate culture to be in the top 25% based on the dimensions of the CVF and Li et al. (2021), respectively. Thus, in these two columns *Strong cultureCVF/Strong cultureLietal* is a dummy variable that equals one for a firm whose strong culture score is in the top quartile across all firms in a particular year, and zero otherwise. Column (4) uses alternative measure for *Independent directors' connectedness* where I additionally include year and industry fixed effects in the second step of constructing the connectedness measure. I include *Institutional ownership* as an additional control variable in column (6). All models include the same set of controls as in Table 6.2. Definitions of all variables are included in Appendix Table A. All models include year and industry fixed effects, where industry fixed effects are based on Fama-French 48 industry classification. Firm variables are winsorised at the 1st and 99th percentiles. Robust standard errors are in parentheses and are clustered at the firm level. ***, **, and * indicates significance at the 1%, 5%, and 10% level, respectively.

This estimation method assesses how explanatory (independent) variables impact the whole distribution of the response (dependent) variable (Koenker and Hallock 2001). The result holds for this estimation method, suggesting that the coefficient estimated by the OLS model is accurate and not driven by a particular quantile.

Lastly, recent literature reveals that institutional ownership could affect corporate culture, specially Compete (Andreou et al. 2022). Thus, as a robustness check, I control for *Institutional ownership* and report the results in column (6) in Table 6.3. Again, the coefficient estimated in column (6) is mostly comparable to that in column (1).

6.4.3. Endogeneity

While the results thus far are consistent with research hypothesis H5, which proposes a significant association between independent directors' connectedness and corporate culture, endogeneity may still exist due to omitted variables bias or reverse causality (Abdallah et al. 2015). While it is challenging to alleviate endogeneity entirely, I run several endogeneity tests and present their results next. First, I re-estimate the baseline regression using lagged variables. Second, I employ two alternative matching estimation techniques, namely Propensity Score Matching (PSM) and entropy balancing to deal with the omitted variables issue. Then, to resolve possible endogenous matching between independent directors and firm, I examine whether well-connected independent directors are more likely to join firm due to its corporate culture.

6.4.3.1. Lag regressions

It could be debated that firms with a stronger corporate culture may attract independent directors with better connections. Thus, the previous findings could be subject to reverse causality. To mitigate the concern of this endogeneity issue I run a one-year lag regression. The results are presented in Table 6.4 column (1). Consistent with Table 6.2 for the baseline results, *Independent directors' connectedness* has a positive and statistically significant association, at the 5% level, with corporate culture. It also could be argued that a one-year lag might not resolve the reverse causality concern as the key variables of interest are mostly stable over time. Thus, to address this issue further, I regress *Corporate culture* on the third-lag of *Independent directors' connectedness*. Amin et al. (2020) note that the three-year lag distance provides more robust evidence against the reverse causality. Column (2) in

Table 6.4 continues to reveal findings similar to those in Table 6.2. Although the statistical significance reduces to 10%, the positive and economic significance of *Independent directors' connectedness* on *Corporate culture* are comparable to the baseline results. Overall, these two lag regressions imply that my results are unlikely to be driven by reverse causality.[50]

Table 6.4: Endogeneity: Lag regressions

Variables	Dependent variable: *Corporate culture*	
	(1)	(2)
Independent directors' connectedness $_{t-1}$	0.046**	
	(0.023)	
Independent directors' connectedness $_{t-3}$		0.049*
		(0.027)
All controls $_{t-1}$	YES	YES
Observations	6174	4201
R-squared	0.517	0.513
Year FE	YES	YES
Industry FE	YES	YES

This table reports the results of the lag regression analyses. The dependent variable is *Corporate culture* measured as the sum of the four corporate culture dimensions scores based on the CVF: *Compete, Create, Collaborate,* and *Control*. The main independent variable is the *Independent directors' connectedness,* which is the residual obtained from a regression of the natural logarithm of aggregate networks on the natural logarithms of firm size, board size, firm age, number of analysts (*Analyst coverage*) and institutional ownership. All models include the same set of controls as in Table 6.2. Definitions of all variables are included in Appendix Table A. In column (1) the independent variables are lagged by 1 year. In column (2) *Independent directors' connectedness* is lagged by 3 years. All models include year and industry fixed effects, where industry fixed effects are based on Fama-French 48 industry classification. Firm variables are winsorised at the 1st and 99th percentiles. Robust standard errors are in parentheses and are clustered at the firm level. ***, **, and * indicates significance at the 1%, 5%, and 10% level, respectively.

6.4.3.2. Propensity score matching (PSM)

It could be claimed that the relationship between independent directors' connectedness and corporate culture may be spurious due to omitted variables that are not controlled for in the baseline regression model. To mitigate this endogeneity issue, I utilise PSM (Balsam et al. 2017; Chang and Wu 2020). The purpose of this test is to compare firms'

[50] As a further robustness test, I perform the one-year lag regression for the robustness tests that are introduced in Section 6.4.2. The results are presented in Table A6.2 in the Appendix, and they continue to show similar results to Table 6.3, which are consistent with the baseline findings on independent directors' connectedness and corporate culture.

strong corporate culture in a treatment group against a control group, where the treatment group contains firms with independent directors with large connections, that is *Independent directors' connectedness* is higher than the industry mean, and the control group comprises firms with independent directors with low connections.[51] Following the literature, propensity score matching is a two-step process. The first step is to use a logit model to determine the propensity score for a firm to be part of the treatment group. The dependent variable in this logit model is independent directors with large connections and the independent variables are the same controls used in equation (6.1) with year and industry fixed effects included. Column (1) in Panel A of Table 6.5 shows the estimation results of the pre-matched logit regression in which different firm characteristics determine the presence of independent directors with large connections. As can be seen, older firms and (firms with a high leverage ratio) are more (less) likely to have independent directors with large connections.

In the second step, I use the results of the pre-match models and use the nearest-neighbour algorithm with no replacement and a calliper of 1% to create a matched sample. Specifically, each firm-year with independent directors with large connections (the treatment group) is matched with a firm-year with independent directors with low connections (the control group) with the nearest propensity score. I re-estimate the logit model of the first step for the post-matched sample to verify that there are no distinguishable differences between the treatment and the control groups across the observable characteristics.

The post-match estimation output is shown in column (2) in Panel A of Table 6.5 and displays no statistically significant results for any of the coefficients, confirming that there are no significant differences between the two groups. Furthermore, the magnitudes of the coefficients in the post-match columns are lower than those in the pre-match columns, as is the pseudo-R-squared. Thus, the results indicate that the propensity score matching mostly eliminates any distinguishable differences other than the differences related to independent directors' connectedness.

[51] Due to the sample distribution of *Independent directors' connectedness* in Table 6.1, and as a further robustness test, I rerun the PSM analysis using the industry median as an alternative threshold for defining the indicator variable. The results are qualitatively similar to those when using the mean as a threshold.

Table 6.5: Endogeneity: Propensity score matching (PSM)

Panel A. Propensity score matching estimates (logit model)

	Independent directors' connectedness (dummy)	*Independent directors' connectedness (dummy)*
	(1)	(2)
Firm size	-0.051**	-0.023
	(0.022)	(0.025)
Leverage	-0.629***	0.089
	(0.149)	(0.166)
ROA	0.117	0.018
	(0.292)	(0.322)
Firm age	0.006***	-0.002
	(0.002)	(0.002)
Board size	-0.017	0.013
	(0.015)	(0.016)
Board independence	0.036***	-0.002
	(0.002)	(0.002)
Board busyness	0.025***	-0.004
	(0.003)	(0.003)
Observations	8408	6543
Pseudo R^2	0.051	0.002
Year FE	YES	YES
Industry FE	YES	YES

Panel B. Propensity score matching estimator

	Firm-year obs. With high connections	Firm-year obs. With low connections	Firm-year obs. With high connections	Firm-year obs. With low connections			
	Obs1	Obs2	Mean1	Mean2	Diff	S.E.	T-stat
Corporate culture	3273	3273	4.446	4.365	0.082***	0.016	- 5.050

Panel C. Independent directors' connectedness and firms' strong corporate (PSM matched sample)

Variables	Dependent variable: *Corporate culture*
	(5)
Independent directors' connectedness (dummy)	0.060***
	(0.021)
All controls	YES
Observations	6546
R-squared	0.505
Year FE	YES
Industry FE	YES

This table reports the results of the propensity score matching analyses. Panel A shows the results of the logit analysis. The dependent variable of this logit model is *Independent directors' connectedness (dummy),* which is an indicator variable that equals 1 if the firm's independent directors' connectedness measure is higher than the industry mean and 0 otherwise. The main independent variables of the logit model are the same set of controls as in Table 6.2, and they also included in Panel C as additional controls. Panel B presents the differences in corporate strong culture based on propensity score matching of a firm with a large/low independent directors' connectedness. Panel C reports the results of the baseline OLS estimation of equation (6.1) for the new matched sample. The dependent variable in this panel is *Corporate culture* measured as the sum of the four corporate culture dimensions scores based on the CVF: *Compete, Create, Collaborate,* and *Control.* The independent variable is *Independent directors' connectedness (dummy).* Definitions of all variables are included in Appendix Table A. All models in Panels A and C include year and industry fixed effects, where industry fixed effects are based on Fama-French 48 industry classification. Firm variables are winsorised at the 1st and 99th percentiles. Robust standard errors are in parentheses. ***, **, and * indicates significance at the 1%, 5%, and 10% level, respectively.

Panel B of Table 6.5 reports the results of the propensity score matching estimates for the average corporate culture for the treatment group (firms with independent directors with high connections) and the control group (independent directors with low connections). On average, firms with independent directors with high connections have stronger corporate culture than those with independent directors with low connections. This difference is statistically significant at the 1% level as indicated by the t-statistics.

As a last test, I re-run model (6.1) to examine independent directors' connectedness on firms' strong culture for the newly matched sample. The results are presented in Panel C of Table 6.5. Consistent with the findings reported in earlier sub-sections, the test reveals that the coefficient estimate on *Independent directors' connectedness* is positive and significant at the 1% level, indicating a positive association between connectedness and firms' corporate cultures. Consequently, the results of the PSM alleviate potential endogeneity concerns of omitted variables and corroborate the main findings shown in Table 6.2.

6.4.3.3. Entropy balancing

The second matching technique to help tackle the endogeneity issue is entropy balancing.[52] Similar to the PSM described above, entropy balancing requires a binary variable to identify the treatment effect. I use the independent directors with connections larger than the industry mean as the indicator variable.[53]

I balance the sample by including the same set of controls that I use in the baseline regression as covariates. I report the results in Table A6.3 in the Appendix to conserve space. Panel A in Table A6.3 reports the distribution of covariates between the treatment and control groups before the entropy balancing. Panel B reveals that the entropy balancing successfully weights the observations and removes the differences between the two groups as documented in the almost identical values of the mean, variance, and skewness of the covariates. This

[52] The advantages of using this relatively novel matching technique in this thesis are discussed thoroughly in Chapter 4, Section 4.4.3.3.

[53] Following the robustness test for the PSM, I perform entropy balancing using the alternative threshold to determine independent directors with large connections (i.e., industry median). The results hold for this further test.

evidence is demonstrating that the entropy balancing is better than the PSM in removing any differences between the control and the treatment group in terms of firm characteristics.

Most importantly, I re-estimate the baseline regression model defined in equation (6.1) for the entropy-balanced weighted sample and report the results in Table 6.6 Panel A. As shown, the finding for the role of *Independent directors' connectedness* is similar to that presented in Table 6.2, plus the significance level is enhanced when using entropy balancing, similar to the PSM. The result continues to validate the positive association between independent directors' connectedness and corporate culture.

6.4.3.4. Endogenous director-company matching

According to Hermalin and Weisbach (2003), a firm's board of directors could be endogenously determined. As it could be argued that firms with a corporate culture may attract independent directors with better connections (as in section 6.4.3.1 for the lag regressions), I additionally test this notion by examining whether well-connected independent directors are more likely to join firms based on the firms' corporate culture. In this regard, I closely follow Fang et al. (2021) and regress changes in independent directors' connectedness from year t-1 to t (Δ *independent directors' connectedness*) on the lagged values of *Corporate culture* and all the other controls in equation (6.1). I use the one-year lagged values of *Corporate culture* because it is recognisable by the independent directors who consider joining or leaving the firm. In Table 6.6, Panel B, I observe that the coefficient on lagged *Corporate culture* is not significant. [54] Thus, there is no evidence that well-connected directors are more likely to join firm based on its corporate culture.[55]

[54] It could be argued that corporate culture is persistent or moves slowly over time (Nguyen et al. 2019). Thus, a one-year period might be insufficient to tackle the reverse causality story. I check the robustness of this test by regressing the changes in *Independent directors' connectedness* on two-, three-, four-, and five-year lagged values of the *Corporate culture*. The results remain the same, indicating that the results are unlikely to suffer from reverse causality.

[55] Although the endogenous director-company matching test and the lag regressions in Section 6.4.3.1 provide evidence that challenges the reverse causality story, it is possible that, in reality, the relationship between independent directors' connectedness and corporate culture is bi-directional. Table A6.4 in the Appendix shows a regression outcome where the dependent variable is *Independent directors' connectedness*, and the independent variable is *Corporate culture*. In this reverse regression, the coefficient on *Corporate culture* is positive and statistically significant at the1% level. I also conduct the reverse regression using one-year lagged value of *Corporate culture*, and the result remains consistent. Thus, the evidence demonstrates that a firm's culture is influenced by independent directors' connectedness and at the same time firms with better connections on the board have stronger cultures

Table 6.6: Further endogeneity checks

Panel A. Alternative matching technique: Entropy balancing	
	Dependent variable: *Corporate culture*
	(1)
Independent directors' connectedness (dummy)	0.066***
	(0.011)
All controls	YES
Observations	8434
R-squared	0.501
Year FE	YES
Industry FE	YES
Panel B. Determinants of changes in independent director networks	
	Dependent variable: Δ *Independent directors' connectedness*
	(1)
Corporate culture $_{t-1}$	0.007
	(0.007)
Firm size $_{t-1}$	-0.005
	(0.003)
Leverage $_{t-1}$	-0.002
	(0.022)
ROA $_{t-1}$	-0.188***
	(0.046)
Firm age $_{t-1}$	0.000
	(0.00)
Board size $_{t-1}$	0.016***
	(0.002)
Board independence $_{t-1}$	-0.002***
	(0.000)
Board busyness $_{t-1}$	-0.001***
	(0.000)
Constant	1.344***
	(0.043)
Observations	6174
R-squared	0.024
Year FE	YES
Industry FE	YES

This table presents further endogeneity tests. Panel A reports the results of regression estimating the relations between independent directors' connectedness and firms' culture using the entropy balancing weighted sample. The dependent variable in this panel is *Corporate culture* measured as the sum of the four corporate culture dimensions scores based on the CVF: *Compete, Create, Collaborate,* and *Control.* The independent variable is *Independent directors' connectedness (dummy),* which is an indicator variable that equals 1 if the firm's independent directors' connectedness measure is higher than the industry mean and 0 otherwise. The dependent variable in Panel B is Δ *Independent directors' connectedness* from year t-1 to t. The main independent variable of interest is the lagged *Corporate culture.* Additional variables are the same set of controls as in Table 6.2. Definitions of all variables are included in Appendix Table A. All models in Panels A and B include year and industry fixed effects, where industry fixed effects are based on Fama-French 48 industry classification. Continuous variables are winsorised at the 1st and 99th percentiles. Robust standard errors are in parentheses. ***, **, and * indicates significance at the 1%, 5%, and 10% level, respectively.

because a strong culture might have attracted independent directors to join them. But as shown in Table 6.6, corporate culture does not have influence on the change of BOD structure with regard to attracting more connected independent directors.

6.5. Further tests

6.5.1. Channel analysis

In the previous sections, I find that independent directors' connectedness matters for firms' corporate culture. In addition, I perform robustness and endogeneity tests to confirm this relationship. Overall, the robustness tests confirm the baseline results, and the results are unlikely to be attributed to endogeneity concerns. In this section, I test whether the impact of independent directors' connectedness on corporate culture stems from the monitoring channel or advising channel. The reviewed literature suggests that well-connected directors have greater incentives to monitor the board to protect their reputation, and thus might benefit firm governance and performance (Fama and Jensen 1983; Eisenhardt 1989; Hillman and Dalziel 2003; Intintoli et al. 2018). In addition, they have greater access to information and resources. Thus, they are better at providing advice and knowledge that would reflect positively on firm operations and outcomes (Hillman et al. 2000; Hillman and Dalziel 2003; Hillman et al. 2009; Anderson et al. 2011; Larcker et al. 2013; Fang et al. 2021). On the other hand, connected boards might imply busy directors and thus they would not have enough time to effectively monitor the board. In addition, there might be some exchanged personal favours of the interlocked relationship, which may hamper effective monitoring. This consequently would lead to poor firm performance (Westphal and Zajac 1997; Faleye et al. 2011; Larcker et al. 2013; Zona et al. 2018; Amin et al. 2020).

A further key argument from the literature is that firms with complex operations require more advice from their boards (Coles et al. 2008; Anderson et al. 2011). This is indeed the case since the empirical evidence suggests that the influence from director connectedness is stronger for firms' financial performance when firms that require more monitoring and more advising (Chang and Wu 2020). Also, directors' connections impact firms' social performance through their positive effect on firms' CSR activities, when there is a higher need for advising (Amin et al. 2020). In this section, I complement the literature by investigating whether independent directors' connectedness influences firms' culture under situations when the firm has higher requirements for board monitoring or advising.

6.5.1.1. Monitoring channel

The agency theory (Jensen and Meckling 1976) argues that the vital role of the board of directors is to monitor the firm's executives on behalf of the shareholders, thereby

alleviating the agency conflict that might arise (Fama and Jensen 1983; Eisenhardt 1989; Hillman and Dalziel 2003). In this matter, Intintoli et al. (2018) state that directors' reputations are enhanced by their connections to the boards of other firms compared to directors that are not connected. The associated reputational risk means they have greater motivations to protect and maintain their reputations, making them more incentivised to monitor the boards they participate with effectively, and improve the firm's governance performance. As a firm's corporate culture can be interpreted as a social outcome and a crucial determinant of firm operations and performance (Li et al. 2021; Graham et al. 2022), I postulate that independent directors' connectedness would be more influential on the firm's culture when the firm has higher monitoring needs.

To test this proposition, and following the literature closely (e.g., Chang and Wu 2020), I consider two proxies that indicate agency conflicts. The first proxy is the firms' E-index, which is the entrenchment index of Bebchuk et al (2009). The E-index is calculated based on six provisions available on the IRRC database: staggered board; limits to shareholder bylaw amendments; supermajority requirements for mergers; supermajority requirements for charter amendments; poison pills; and golden parachute. The *E-index* is the sum of these provisions, where the presence of each provision equals 1 and 0 otherwise. A higher *E-index* indicates poorer governance, and therefore higher monitoring needs. The second proxy obtained from BoardEx data is CEO duality, which is known to hinder firm governance and exacerbate agency conflicts (Fama and Jensen 1983). *CEO duality* is an indicator variable that takes the value of 1 if the CEO is also the chairman of the firm and 0 otherwise. To capture the influence of independent directors' connectedness on firms' culture under the higher monitoring needs, I interact these two proxies with the connectedness variable. If the impact of director connectedness on corporate culture occurs via a monitoring mechanism, we might expect a relatively stronger effect in those firms that would benefit more greatly from more effective monitoring. Hence, the interaction term should enter the equation with a positive and significant coefficient.

The results are presented in Panel A of Table 6.7. In both columns (1) and (2), the baseline regression results hold. *Independent directors' connectedness* has a positive association with *Corporate culture*, significant at the 5% level or better. The coefficients estimated on both agency proxies are insignificant. More importantly to this analysis, the two interaction terms with *Independent directors' connectedness* are also not significant.

Table 6.7: Testing channels

Panel A. Monitoring channel

Variables	Dependent variable: *Corporate culture*	
	(1)	(2)
Independent directors' connectedness	0.061**	0.056***
	(0.029)	(0.021)
E-index	-0.006	
	(0.013)	
Independent directors' connectedness × E-index	-0.003	
	(0.009)	
CEO duality		-0.023
		(0.020)
Independent directors' connectedness × CEO duality		-0.020
		(0.031)
All controls	YES	YES
Observations	8434	8434
R-squared	0.504	0.504
Year FE	YES	YES
Industry FE	YES	YES

Panel B. Advising channel

	Dependent variable: *Corporate culture*	
	(1)	(2)
Independent directors' connectedness	0.022	0.068***
	(0.037)	(0.022)
Degree of diversification	-0.003	
	(0.004)	
Independent directors' connectedness × Degree of diversification	0.005	
	(0.005)	
Complexity		-0.047
		(0.049)
Independent directors' connectedness × Complexity		0.054**
		(0.026)
All controls	YES	YES
Observations	8434	8434
R-squared	0.505	0.507
Year FE	YES	YES
Industry FE	YES	YES

This table reveals the results of the channel analysis. Panel A reports the effect of monitoring role of independent directors' connectedness, while Panel B reports the effect of their advising role. The dependent variable is *Corporate culture* measured as the sum of the four corporate culture dimensions scores based on the CVF: *Compete, Create, Collaborate,* and *Control. Independent directors' connectedness* is the residual obtained from a regression of the natural logarithm of aggregate networks on the natural logarithm of firm size, board size, firm age, number of analysts and institutional ownership. *E-index* is the entrenchment index of Bebchuk et al. (2009). *CEO duality* is an indicator variable that takes the value of 1 if the CEO is the chairman of the firm and 0 otherwise. *Degree of diversification* is the number of business segments that the firm operates in. *Complexity* is a factor score of four proxy variables of complexity: *Firm size; Firm age; Leverage*; and *Degree of diversification*. All models include the same set of controls as in Table 6.2. Definitions of all variables are included in Appendix Table A. All models include year and industry fixed effects, where industry fixed effects are based on Fama-French 48 industry classification. Firm variables are winsorised at the 1st and 99th percentiles. Robust standard errors are in parentheses and are clustered at the firm level. ***, **, and * indicates significance at the 1%, 5%, and 10% level, respectively.

These results imply that the positive impact of independent directors' connectedness on corporate culture does not seem to stem from their monitoring contributions.

6.5.1.2. Advising channel

Social networks provide superior access to private information (Haythornthwaite 1996). The resource dependence theory postulates that organizations depend on the external environment to gain information about financial and physical resources (Pfeffer and Salancik 1978,2003). Well-connected directors can act as hubs to enhance the quality of information transmission (Jackson et al. 2017). In addition, they can be a vital resource to have better access to information about other companies' corporate cultures and hierarchies, industry trends, as well as new regulations (Pfeffer and Salancik 1978; Hillman et al. 2000; Hillman et al. 2009; Anderson et al. 2011; Larcker et al. 2013). The literature also documents that the informational and advising advantage of connected directors is more effective in complex firms and firms with higher advising needs (Coles et al. 2008; Amin et al. 2020; Chang and Wu 2020). Thus, following the previous argument that a firm's corporate culture is a social outcome and a crucial determinant of its operational success (Li et al. 2021), I investigate whether connected directors influence corporate culture. Specifically, I postulate that this effect operates via an advising channel, such that the effect of independent directors' connectedness on culture could be relatively more influential on the firm's culture in particular firms that have higher advising needs.

To test this proposition, I consider two proxies that indicate a firm's higher need for advising: (1) the firm's *Degree of diversification*, following Chang and Wu (2020), which is the number of business segments that the firm operates in; and (2) the firm's *Complexity*, following Coles et al. (2008) and Amin et al. (2020), which is a factor score (the linear combination of standard normal values) of four firm variables that indicate complexity. These variables are *Firm size*; *Firm age*; *Leverage*; and *Degree of diversification* (the number of business segments). To capture the influence of independent directors' connectedness on firms' culture under the higher advising needs, I interact these two proxies with the connectedness variable. If connected directors influence corporate culture through their expertise, resources, or an informational advantage, we should expect the relationship to be stronger for those firms that would most benefit from advice such that the coefficient estimate on the interaction term would be positive and significant.

The results are presented in Panel B of Table 6.7. In column (1), the coefficients on *Independent directors' connectedness, Degree of diversification*, and the interaction term between them are insignificant, which suggests no influence from independent directors' connectedness on a firm's corporate culture when controlling for the number of segments that the firm operates in. However, when utilising a more inclusive variable to measure firm complexity, the results are significant. In column (2), the baseline regression results are supported. *Independent directors' connectedness* has a positive and significant association with *Corporate culture*. In addition, the coefficient on the variable of interest *Independent directors' connectedness* × *Complexity* is positive and statistically significant at the 5% level, which suggests that independent directors' connectedness is relatively more influential on firms' culture for those firms that require more advice due to the complex nature of their operations.

6.5.2. The net effect: Board connectedness, corporate culture, and firm value

So far, the results in previous sub-sections indicate that there is a robust, positive, and significant association between independent directors' connectedness and corporate culture. In addition, this positive influence is particularly significant in firms with larger requirements for advice from independent directors. In this section, I focus on the implications of independent directors' connectedness and corporate culture on firm value. The previous literature documents that directors' connectedness (Amin et al. 2020; Chang and Wu 2020) and corporate culture (Guiso et al. 2015b; Li et al. 2021; Andreou et al. 2022) significantly impacts firm performance. Therefore, I test whether independent directors' connectedness intensifies the increase in firm value from a firm's corporate culture. To test the joint impact of independent directors' connectedness and the firm's strong culture on value, I run the following regression:

$$Firm\ value_{i,t+1} = \alpha + \beta_1\ Independent\ directors'\ connectedness_{i,t} + \beta_2\ Corporate\ culture_{i,t} + \beta_3\ Independent\ directors'\ connectedness_{i,t} \times Corporate\ culture_{i,t\ 1} + \gamma Z_{i,t} + Year_t + Industry_i + \varepsilon_{i,t} \quad (6.2)$$

where *Firm value* is measured by two proxies: *Tobin's Q* and *ROA. Tobin's Q* is measured as the book value of assets plus the market value of common equity minus the book value of

common equity, all of which are divided by the book value of total assets. *ROA* is measured as the earnings before interest, taxes, depreciation, and amortisation divided by total assets. Following Andreou et al. (2022), these two variables are one-year ahead compared to the independent variables. These lagged values help in alleviating the endogeneity issue, and it captures the impact of independent directors' connectedness and strong culture on future firm performance, which is the purpose of this analysis. The regression includes the same set of other firm characteristics as in model (6.1). Full definitions of all variables are presented in Appendix Table A. $Year_t$ and $Industry_i$ are firm and industry fixed effects respectively. Firm variables are winsorised at the 1% and 99% levels to reduce the impact of any extreme values. Robust standard errors are clustered at the firm level.

Continuing the intention of the previous sub-section 6.5.1, which investigates the monitoring and advising channels for the effect of independent directors' connectedness on firms' strong cultures, in this sub-section I divide the sample into sub-groups of firms that highlight their higher or lower monitoring or advising needs. To measure monitoring needs, I use factor score as it represents a comprehensive indicator of a combination of several variables signifying the severity of agency issues (Faleye et al. 2011). In particular, monitoring requirements are captured by a factor score of three proxies: free cash flow; analyst coverage; and institutional ownership (Faleye et al. 2011). *High monitoring needs* is a dummy variable equals 1 when the factor score of these three variables is above the sample median and zero otherwise. Using the *Complexity* score (previously defined in Section 6.5.1.2), I construct *High advising needs*, *which* is a dummy variable that equals 1 when firms' complexity scores are above the sample median and zero otherwise (Chang and Wu 2020).

The results are presented in Table 6.8, where Panel A reports the evidence for Tobin's Q and Panel B reports the evidence for ROA as alternative measures of future firm performance. Column (1) in both panels reveals the analysis of the full sample, whereas columns (2) and (3) divide the sample based on high and low monitoring needs, and columns (4) and (5) divide the sample based on high and low advising needs. In Panel A, the coefficient on *Corporate culture* is positive and mostly significant at the 5% level or better, suggesting that a stronger corporate culture is associated with better market performance measured using Tobin's Q. This evidence is consistent with the previous two studies that

demonstrate the effectiveness of corporate culture on the firm's performance (Li et al. 2021; Graham et al. 2022).

Alternatively, the coefficient on *Independent directors' connectedness* is insignificant in all columns, except column (4), where it shows a negative relationship statistically significant at the 5% level, suggesting a negative association with Tobin's Q when firms are requiring more advising needs. Surprisingly, this is in contrast to the prior literature that documents a positive influence of directors' networks on value when firms have complex operations.

However, more importantly, in column (4) the interaction term *Independent directors' connectedness* × *Corporate culture* has an estimated coefficient that is positive and statistically significant at the 5% level. This suggests that complex firms with a corporate culture influenced by the well-connected independent directors appear to benefit from higher future Tobin's Q. This evidence adds to that presented earlier in Table 6.6 Panel B on the role of independent directors' connectedness in increasing firms' cultures for those firms that have complex operations.

In panel B, adopting firms' accounting performance using *ROA* as an alternative performance metric, the coefficient estimated on *Corporate culture* is insignificant. Consistent with Panel A, the coefficient on *Independent directors' connectedness* is negative and statistically significant at the 1% level in column (4), the sub-sample of firms with high advising needs. This result is also found in column (3) for the subsample of firms with low monitoring needs. However, similar to Panel A, the coefficients on the interactions between *Independent directors' connectedness* and *Corporate culture* are most relevant for this analysis. In columns (3) and (4), this coefficient estimate is positive and statistically significant at the 1% level.

The result in column (3) reveals evidence concerning the monitoring channel. However, this result might be interpreted with caution, since it contrasts with the theoretical expectations. It suggests that independent directors' connectedness and corporate culture interact to benefit firms' ROA in those firms with a lower need for monitoring. More consistent with my expectations, the result in column (4) supports the other evidence that

independent directors' connectedness and corporate culture combine to provide value in those firms that are more complex and require a more advising role from directors.

Table 6.8: Independent directors' connectedness, strong corporate culture, and firm value

Panel A. Dependent variable: *Tobin's Q* $_{t+1}$

	Full sample	High monitoring needs	Low monitoring needs	High advising needs	Low advising needs
	(1)	(2)	(3)	(4)	(5)
Independent directors' connectedness $_t$	0.037	0.061	-0.081	-0.633**	0.343
	(0.268)	(0.296)	(0.439)	(0.27)	(0.403)
Corporate culture $_t$	0.213***	0.126*	0.285***	0.131**	0.226***
	(0.052)	(0.074)	(0.066)	(0.054)	(0.085)
Independent directors' connectedness $_t$ × *Corporate culture* $_t$	0.016	0.006	0.043	0.184***	-0.058
	(0.064)	(0.069)	(0.107)	(0.068)	(0.092)
All controls	YES	YES	YES	YES	YES
Observations	6174	3120	3054	3162	3012
R-squared	0.418	0.401	0.472	0.489	0.407
Year FE	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES

Panel B. Dependent variable: *ROA* $_{t+1}$

	Full sample	High monitoring needs	Low monitoring needs	High advising needs	Low advising needs
	(1)	(2)	(3)	(4)	(5)
Independent directors' connectedness $_t$	-0.006	0.003	-0.022**	-0.026***	-0.005
	(0.006)	(0.008)	(0.009)	(0.009)	(0.009)
Corporate culture $_t$	0.001	0.001	0.000	0.001	0.000
	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
Independent directors' connectedness $_t$ × *Corporate culture* $_t$	0.001	-0.001	0.005***	0.007***	0.001
	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
All controls	YES	YES	YES	YES	YES
Observations	6174	3120	3054	3162	3012
R-squared	0.725	0.741	0.712	0.716	0.738
Year FE	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES

This table reports the regression results for the implications of independent directors' connectedness and culture on firm value for the full sample (column (1)) and for samples split based on the degree of demand for board monitoring (columns (2) and (3)) and advising (columns (4) and (5)). In Panel A the dependent variable is *Tobin's Q*, which is measured as the book value of assets plus the market value of common equity minus the book value of common equity, all of which are divided by the book value of total assets. In panel B, the dependent variable is *ROA,* measured as the earnings before interest, taxes, depreciation, and amortisation divided by total assets (AT). *Monitoring needs* a factor score of three proxies: *Free cash flow*; *Analyst coverage*; and *Institutional ownership*. *Advising need* (*Complexity*) is a factor score of four proxy variables of complexity: *Firm size*; *Firm age*; *Leverage*; and *Degree of diversification*. Firms are assigned to the High (Low) group if the degree of a given proxy is above (below) the sample median. Independent variables include *Independent directors' connectedness, Corporate culture*, the interaction term between the two, as well as the same set of controls introduced in Table 6.2. Definitions of all variables are included in Appendix Table A. All models include year and industry fixed effects, where industry fixed effects are based on Fama-French 48 industry classification. Firm variables are winsorised at the 1st and 99th percentiles. Robust standard errors are in parentheses and are clustered at the firm level. ***, **, and * indicates significance at the 1%, 5%, and 10% level, respectively.

Overall, the results of this section complement those of previous sections. The findings suggest that well-connected independent directors influence corporate culture, making it stronger. Furthermore, the results show that this is achieved via an advising channel such that connected directors have an informational advantage that they deliver to firms such that their impact on *Corporate culture* is relatively larger in complex firms that demand more of an advisory function from directors. Such relationships appear to provide value to these firms. These findings are consistent with the resource dependence theory (Pfeffer and Salancik 1978) on the importance of directors' connections in accessing and providing key information on the external environment (Hillman et al. 2000; Hillman et al. 2009; Anderson et al. 2011; Larcker et al. 2013), and on their relatively stronger influence for firms with specific needs for advising (Coles et al. 2008; Amin et al. 2020; Chang and Wu 2020).[56]

6.6. Conclusion

Over recent years, corporate culture has gained considerable attention in the finance literature and has been described as an important determinant of various firm outcomes. The latest literature argues that a firm's leadership is responsible for shaping its culture. Nevertheless, there is no direct study that has attempted to examine the relationship between the board of directors' characteristics and corporate culture. In this chapter, I have focused on independent directors' connectedness as their connections are known to provide monitoring and advising advantages, which could help firms in establishing and developing the corporate culture. A well-connected independent director implies superior human capital and reputation. Thus, independent directors' connectedness signifies a monitoring advantage compared to a less connected director. In addition, directors' connections could help in providing information on new regulations, market circumstances, industry trends, other companies' corporate cultures and hierarchies, and other important market information. Hence, they have an informational advantage that can enhance their advisory capacity.

[56] The results in this chapter highlight the advising benefit of independent directors' connectedness. Although the monitoring advantage is not supported in my analysis, it is challenging to separate these two mechanisms through which the impact of directors' networks and connections may operate (Amin et al. 2020). Thus, my findings should be inferred with caution as there is no perfect identification channel to relate independent directors' connectedness to corporate culture. In addition, while I test multiple indicators of the monitoring and advising channels, more investigations could be carried out to deepen our understating of the mechanisms by which connectedness might operate via corporate culture to influence corporate strategy and outcomes that are heavily reliant on monitoring and advice.

Together, I hypothesise that independent directors' connectedness is significantly associated with a firm's corporate culture.

Using a sample of 1,212 firms in the S&P 1500 index generating 8,434 firm-year observations from 2002 to 2018, the baseline regression results show that independent directors' connectedness positively and significantly influences a firm's culture. In a supplementary analysis, the results reveal that independent directors' connectedness has a stronger influence in fostering a firm's creative or collaborative culture compared to competitive and control cultures. Furthermore, the results of the main regression are maintained when challenged against a range of robustness and endogeneity tests. These tests include alternative measures, alternative estimation models, and tests to mitigate omitted variables and reverse causality concerns.

To deepen our understanding of the role of director connectedness on corporate culture, I perform a set of analyses to investigate the channels through which this influence might occur: the monitoring or advising channels. I first show that the positive influence of independent directors' connectedness on corporate culture is most significant when firms are complex and in relatively greater need of the advisory role provided by independent directors. I then observe that these relationships generate greater firm value (Tobin's Q and ROA). In contrast, the potential monitoring advantage coming from the reputational risk of independent directors' connectedness is not supported in this study.

This chapter is the first examination of the link between independent director connectedness and corporate culture. Overall, my study offers preliminary evidence on the role of the board of directors, and their characteristics, in establishing and promoting the culture and its effect on the firm's value. Thus, it provides significant implications for both business and academic communities. In the media, firms' CEOs and directors increasingly mention corporate culture as one of their major priorities. However, the scholarly evidence that confirms such claims is limited, but growing. My study sheds light on how well-connected directors influence the firm's culture and how this relationship could positively impact the firm's value.

Chapter 7: Conclusion

7.1. Main empirical findings and contributions

The main theme of this thesis is corporate culture. Although there is no preferred theoretical framework for corporate culture in the literature, my work relies on the Competing Values Framework (CVF) to identify and measure corporate culture. Three firm-related matters are investigated. The first empirical study examines the impact of corporate culture on CEO compensation; the second elaborates on the impact of corporate culture on cash holdings; and the third takes a new angle and examines if independent directors' connectedness has a role in influencing corporate culture. The selection of these topics is based on gaps identified in the existing literature. In **Chapters 4** and **5**, previous literature has provided several firm- and governance-level determinants of CEO pay and cash holdings. Yet, the prior research has drawn little attention to how corporate culture, as an intangible and important asset, would impact these two issues. As the first two empirical studies uncover interesting findings, **Chapter 6** seems to follow naturally to look at what derives such corporate culture. Thus, it investigates whether independent directors' connectedness has a role in determining the corporate culture in their firms. The focus on independent directors' connectedness is built upon the extant literature that finds this feature is a vital mechanism that determines many firm policies and outcomes.

In **Chapter 4,** I examine the impact of corporate culture on CEO compensation. I argue that the relationship between corporate culture dimensions and their associated preferences towards risk matters when the firm sets its CEO's compensation and whether this is done to induce risk-taking. The results reveal that firms with a competitive culture, which encourages competitiveness and risk-taking, require larger equity and lower cash-based incentives to encourage risk-taking behaviour by the CEO and to align the interests of the CEO with those of shareholders to achieve growth. The results remain consistent after addressing multiple robustness and endogeneity tests. Furthermore, I examine the impact of corporate culture on CEO incentives and pay-performance sensitivity (PPS). In general, the PPS tests add to the theoretical arguments and empirical evidence by demonstrating that competitive culture (and creative in a few model specifications) optimally structure CEO

incentives to match these risk-taking preferences and ensure that these plans are directly linked and sensitive to firm performance.

In **Chapter 5**, I investigate the association between corporate culture and firms' cash holdings. I test two competing hypotheses by elaborating on the informational environment in each of the cultural dimensions and the role of information asymmetry between the firm's directors and shareholders on cash holdings. The empirical evidence supports the *monitoring cost hypothesis.* Precisely, the baseline regression results show that corporate culture dimensions with low information asymmetry (i.e., *Compete, Create*, and *Collaborate*) have higher cash holdings. The findings remain significant after implementing several robustness and endogeneity tests. Moreover, I examine whether the precautionary motive, as an alternative theoretical explanation, drives the results. The findings rule out the argument that firms hold more cash as a precautionary motive and corroborate the *monitoring cost hypothesis* on the role of information asymmetry on cash holdings. Finally, I test the joint impact of corporate culture and cash holdings on the firm ROA. The results demonstrate that competitive and creative cultures accumulate more cash holdings and when they do, they use the excess cash in a way that enhances the firm future profitability.

In **Chapter 6,** I study the influence of independent directors' connectedness on corporate culture. A connected independent director implies superior human capital and reputation, and thus they signify a monitoring advantage. As well, directors' connections could help in providing information on new regulations, industry trends, other companies' corporate culture and hierarchies, and vital market information. Meanwhile, the literature emphasises the instrumental role of the firm's leadership in building an effective and strong corporate culture. Thus, I conjecture whether independent directors' connectedness is significantly associated with firms' corporate culture. I find that independent directors' connectedness has a positive and significant impact on firms' corporate culture. The original finding remains robust to additional robustness and endogeneity checks. I then test whether the impact of independent directors' connectedness on corporate culture stems from the monitoring and/or advising channel. I demonstrate that independent directors' connectedness is more influential for corporate culture when those firms require more advice, consistent with the advising channel. Lastly, I show that the joint impact of independent directors' connectedness and corporate culture is positive and significant for firms' Tobin's Q and ROA when those firms require high advising.

My study contributes to four strands of the literature. First, I complement the growing studies that apply Quantitative Textual Analysis (QTA) in finance literature (e.g., Loughran and McDonald 2011,2016; Li et al. 2021). Second, I add to the nascent literature that employs the CVF to measure corporate culture (Fiordelisi and Ricci 2014; Fiordelisi et al. 2019; Nguyen et al. 2019; Barth and Mansouri 2021; Chen et al. 2021a; Wang et al. 2021; Andreou et al. 2022; Fang et al. 2023). Third, and most important, I contribute new applications to the literature that investigate the role of corporate culture for corporate finance and decision-making. In particular, in **Chapter 4**, I show the significant role of corporate culture in explaining CEO compensation structure. In **Chapter 5**, I reveal the impact of corporate culture on cash holdings. My study differs from the literature as it focuses on corporate culture, distinct from the traditional firm and governance characteristics that are heavily examined in both the CEO compensation and cash holdings literatures. Fourth, and perhaps providing more innovation, I add to the limited literature on the determinants of corporate culture by assessing whether the board of directors help in building the firm's corporate culture. **Chapter 6** offers the first evidence on the role of the board of directors, and their characteristics, in establishing and promoting the corporate culture, an important firm intangible asset that has only recently been the focus of research in corporate finance and is shown to have some influence on economic outcomes.

7.2. Research implications, limitations, and suggestions for future research

The empirical evidence in this thesis has several implications for multiple stakeholders including academic research, firms, shareholders, and regulatory bodies. In terms of academic research, the thesis adds to the growing literature on corporate culture and contributes additional evidence that emphasises the prominence of corporate culture on firm policies and decision-making. Regarding firms and shareholders, my findings show that values incorporated in some cultural dimension in the CVF influence CEO compensation plans and determine cash holdings levels. By extension, the evidence suggests that these two outcomes are directly linked to firm performance and shareholders' wealth. In addition, my study offers the first examination of the influence of independent director connectedness in promoting and enhancing a corporate culture that positively reflects on the firm value. Thus, firms' directors might benefit from establishing a corporate culture that would help in setting

policies in a more effective way for serving firms' outcomes and protecting shareholders' wealth. Another important practical implication for policymakers is that different corporate cultures have different values (for example, this research has focused on risk-taking preferences in **Chapter 4** and information asymmetry in **Chapter 5**). These values have implications on firms' outcomes that are directly linked to shareholders' wealth. Thus, regulations should consider corporate culture as one of their major priorities when developing business guidelines.

I acknowledge two limitations in my study. First, in my work, I rely on the CVF to establish the theoretical background of corporate culture. This framework is theoretically established in the management literature and the findings of my research show that the CVF is a valid and effective perspective in explaining corporate culture and its influence on firms' outcomes. Yet, this framework includes only practical values that directly impact firms' operations and performance. Other work suggests that more sentimental cultural values are crucial determinants of firms' policies, such as integrity and respect (Guiso et al. 2015b). In addition, as I discuss in Chapter 2, there are some critiques of the construct of the CVF. Thus, a more comprehensive and nuanced approach to conceptualise and define corporate culture is crucially important to enhance this stream of literature (Hartnell et al. 2011; Chatman and O'Reilly 2016). For example, incorporating a corporate culture measure that includes both practical and sentimental values would provide a broader overview of the matter examined with respect to corporate culture. To measure corporate culture values and beliefs comprehensively, recent work suggests integrating advanced data technologies, such as Artificial Intelligence (AI) and Natural Language Processing (NLP) (Chatman and Choi 2022; Gorton et al. 2022). As a practical example of this novel technology, and a signal of potential future improvements, Li et al. (2021) utilise sophisticated machine learning techniques to construct their corporate culture measure.

Another limitation concerning the CVF is that the dictionary used in this thesis, which follows the same approach as other studies, to measure the cultural dimensions is not yet empirically validated. Thus, as the research on corporate culture in the finance field is developing, a more clearly defined, theoretically motivated, and empirically validated dictionary is a necessity for future studies to avoid such criticisms of empirical application. The working paper by Andreou et al. (2020) provides a rigorous treatment of this issue by designing a new collection of keywords for the CVF, which is based on the OCAI rather than

an arbitrary bag-of-words formed from literal definitions form a dictionary. Furthermore, they also work hard to validate their new dictionary for empirical application. Hence, utilising a more relevant and validated textual measure of corporate culture would suggest the need to compare the robustness of the existing bag-of-words and could provide a more robust grounding for research on corporate finance in the future.

The second limitation is related to endogeneity. The research on corporate finance and governance generally suffers from endogeneity problems of reverse causality and omitted variable bias. I attempt to address these issues by performing several endogeneity tests. Yet, the effect of endogeneity cannot be entirely ruled out in my research.

Apart from these limitations, I offer some potential directions for future work. First, my study covers the period before COVID-19. This global pandemic has redefined the way corporations usually operate. Thus, it would be interesting to examine the resilience of corporate culture during this phenomenon, and how firms with specific cultures shape their policies as a response to this pandemic. Second, in **Chapter 4**, I focussed on the CEO compensation structure. Potential future work could elaborate on the pay-for-performance sensitivity by specifically examining the role of corporate culture on the sensitivity of CEO wealth to stock price (Delta) and stock returns volatility (Vega). Third, in **Chapter 5**, I analysed the role of corporate culture on the *level* of cash holdings. An extended future work could look at the *value* of cash holdings. Drobetz et al. (2010) document that cash holdings are more valuable when firms have low information asymmetries. Therefore, it is worth investigating whether the corporate culture's informational environment plays a role in influencing the value of cash holdings. Fourth, as this thesis provides evidence of the impact of corporate culture on firms' policies and on the role of the board of directors' connectedness in shaping the firm's culture, future work in these streams of research would be interesting. It is worth examining whether corporate culture influences firm policies other than CEO compensation and cash holdings. In addition, future work could investigate the implications of other board of directors' characteristics on establishing and promoting a specific corporate culture. The fifth and final recommendation is related to the identification tests. Throughout my thesis I use two matching techniques to deal with omitted variable bias: Propensity Score Matching and Entropy Balancing. Recently, there has been increasing interest in a newly developed and more robust identification test known as the Coarsened

Exact Matching technique. Thus, future work could benefit from application of this method to enhance the analysis.

References

Abdallah, W., Goergen, M. and O'Sullivan, N. 2015. Endogeneity: How failure to correct for it can cause wrong inferences and some remedies. *British Journal of Management* 26(4), pp. 791-804.

Adams, R. B. and Ferreira, D. 2009. Women in the boardroom and their impact on governance and performance. *Journal of Financial Economics* 94(2), pp. 291-309.

Adler, P. S. and Kwon, S.-W. 2002. Social capital: Prospects for a new concept. *Academy of Management Review* 27(1), pp. 17-40.

Aggarwal, R. K. and Samwick, A. A. 1999. The other side of the trade-off: The impact of risk on executive compensation. *Journal of Political Economy* 107(1), pp. 65-105.

Akbas, F., Meschke, F. and Wintoki, M. B. 2016. Director networks and informed traders. *Journal of Accounting and Economics* 62(1), pp. 1-23.

Al-Najjar, B. 2013. The financial determinants of corporate cash holdings: Evidence from some emerging markets. *International business review* 22(1), pp. 77-88.

Alessandri, T. M. and Pattit, J. M. 2014. Drivers of R&D investment: The interaction of behavioral theory and managerial incentives. *Journal of Business Research* 67(2), pp. 151-158.

Allayannis, G. and Weston, J. P. 2001. The use of foreign currency derivatives and firm market value. *The Review of Financial Studies* 14(1), pp. 243-276.

Almeida, H., Campello, M. and Weisbach, M. S. 2004. The cash flow sensitivity of cash. *The Journal of Finance* 59(4), pp. 1777-1804.

Amess, K., Banerji, S. and Lampousis, A. 2015. Corporate cash holdings: Causes and consequences. *International Review of Financial Analysis* 42, pp. 421-433.

Amin, A., Chourou, L., Kamal, S., Malik, M. and Zhao, Y. 2020. It's who you know that counts: Board connectedness and CSR performance. *Journal of Corporate Finance* 64, p. 101662.

Anderson, N., Potočnik, K. and Zhou, J. 2014. Innovation and creativity in organizations: A state-of-the-science review, prospective commentary, and guiding framework. *Journal of Management* 40(5), pp. 1297-1333.

Anderson, R. C., Reeb, D. M., Upadhyay, A. and Zhao, W. 2011. The economics of director heterogeneity. *Financial Management* 40(1), pp. 5-38.

Andreou, P. C., Fiordelisi, F., Harris, T. and Philip, D. 2022. Institutional ownership and firms' thrust to compete. *British Journal of Management* 33(3), pp. 1346-1370.

Andreou, P. C., Harris, T., Philip, D. and Zhang, W. 2020. The OCAI textual measure of organizational culture. *Available at SSRN 3625894*,

Antonczyk, R. C. and Salzmann, A. J. 2014. Overconfidence and optimism: The effect of national culture on capital structure. *Research in International Business and Finance* 31, pp. 132-151.

Armstrong, C. S. and Larcker, D. F. 2009. Discussion of "The impact of the options backdating scandal on shareholders" and "Taxes and the backdating of stock option exercise dates". *Journal of Accounting and Economics* 47(1-2), pp. 50-58.

Bae, S. C., Chang, K. and Kang, E. 2012. Culture, corporate governance, and dividend policy: International evidence. *Journal of Financial Research* 35(2), pp. 289-316.

Baldwin, J. R., Faulkner, S. L., Hecht, M. L. and L., L. S. 2006. *Redefining culture: Perspectives across disciplines*. New Jersey: Lawrence Erlbaum.

Balsam, S., Kwack, S. Y. and Lee, J. Y. 2017. Network connections, CEO compensation and involuntary turnover: The impact of a friend of a friend. *Journal of Corporate Finance* 45, pp. 220-244.

Band, D. 1992. Corporate governance: Why agency theory is not enough. *European Management Journal* 10(4), pp. 453-459.

Barth, A. and Mansouri, S. 2021. Corporate culture and banking. *Journal of Economic Behavior & Organization* 186, pp. 46-75.

Bates, T. W., Chang, C.-H. and Chi, J. D. 2018. Why has the value of cash increased over time? *Journal of Financial and Quantitative Analysis* 53(2), pp. 749-787.

Bates, T. W., Kahle, K. M. and Stulz, R. M. 2009. Why do US firms hold so much more cash than they used to? *The Journal of Finance* 64(5), pp. 1985-2021.

Bebchuk, L., Cohen, A. and Ferrell, A. 2009. What matters in corporate governance? *The Review of Financial Studies* 22(2), pp. 783-827.

Bebchuk, L. A., Fried, J. and Walker, D. 2002. Managerial power and rent extraction in the design of executive compensation. National bureau of economic research Cambridge, Mass., USA.

Bebchuk, L. A. and Fried, J. M. 2003. Executive compensation as an agency problem. *Journal of Economic Perspectives* 17(3), pp. 71-92.

Bebchuk, L. A. and Fried, J. M. 2009. *Pay without performance: The unfulfilled promise of executive compensation*. Harvard University Press.

Bergh, D. D., Ketchen Jr, D. J., Orlandi, I., Heugens, P. P. and Boyd, B. K. 2019. Information asymmetry in management research: Past accomplishments and future opportunities. *Journal of Management* 45(1), pp. 122-158.

Bertrand, M. and Mullainathan, S. 2001. Are CEOs rewarded for luck? The ones without principals are. *The Quarterly Journal of Economics* 116(3), pp. 901-932.

Biggerstaff, L., Cicero, D. C. and Puckett, A. 2015. Suspect CEOs, unethical culture, and corporate misbehavior. *Journal of Financial Economics* 117(1), pp. 98-121.

Billings, M. B., Klein, A. and Shi, Y. C. 2022. Investors' response to the# MeToo movement: does corporate culture matter? *Review of Accounting Studies* 27(3), pp. 897-937.

Bizjak, J., Lemmon, M. and Whitby, R. 2009. Option backdating and board interlocks. *The Review of Financial Studies* 22(11), pp. 4821-4847.

Boyd, B. 1990. Corporate linkages and organizational environment: A test of the resource dependence model. *Strategic management journal* 11(6), pp. 419-430.

Brick, I. E., Palmon, O. and Wald, J. K. 2006. CEO compensation, director compensation, and firm performance: Evidence of cronyism? *Journal of Corporate Finance* 12(3), pp. 403-423.

Brown, R. and Sarma, N. 2007. CEO overconfidence, CEO dominance and corporate acquisitions. *Journal of Economics and Business* 59(5), pp. 358-379.

Bryan, S., Hwang, L. and Lilien, S. 2000. CEO stock-based compensation: An empirical analysis of incentive-intensity, relative mix, and economic determinants. *The journal of Business* 73(4), pp. 661-693.

Bryan, S., Nash, R. and Patel, A. 2015. The effect of cultural distance on contracting decisions: The case of executive compensation. *Journal of Corporate Finance* 33, pp. 180-195.

Cai, Y. and Sevilir, M. 2012. Board connections and M&A transactions. *Journal of Financial Economics* 103(2), pp. 327-349.

Cameron, K. S. and Quinn, R. E. 2011. *Diagnosing and changing organizational culture: Based on the competing values framework*. John Wiley & Sons.

Cameron, K. S., Quinn, R. E., DeGraff, J. and Thakor, A. V. 2006. *Competing values leadership: Creating value in organizations*. Edward Elgar Publishing, Incorporated.

Cameron, K. S., Quinn, R. E., DeGraff, J. and Thakor, A. V. 2022. *Competing values leadership*. Edward Elgar Publishing.

Campbell, J. P. 1977. On the nature of organizational effectiveness. In: Pennings, P.S.G.J.M. ed. *New perspectives on organizational effectiveness*. Vol. 13. San Francisco, CA: Jossey-Bass, pp. 13–55.

Carrasco, A., Francoeur, C., Labelle, R., Laffarga, J. and Ruiz-Barbadillo, E. 2015. Appointing women to boards: is there a cultural bias? *Journal of Business Ethics* 129(2), pp. 429-444.

Cashman, G. D., Gillan, S. L. and Jun, C. 2012. Going overboard? On busy directors and firm value. *Journal of Banking & Finance* 36(12), pp. 3248-3259.

Chang, C.-H. and Wu, Q. 2020. Board networks and corporate innovation. *Management Science*, pp. 1-37.

Chatman, J. A. and Choi, A. 2022. Measuring organizational culture: Converging on definitions and approaches to advance the paradigm.*Handbook of Research Methods for Organisational Culture*. Edward Elgar Publishing Ltd, pp. 92-107.

Chatman, J. A. and O'Reilly, C. A. 2016. Paradigm lost: Reinvigorating the study of organizational culture. *Research in Organizational Behavior* 36, pp. 199-224.

Chemmanur, T. J., Cheng, Y. and Zhang, T. 2013. Human capital, capital structure, and employee pay: An empirical analysis. *Journal of Financial Economics* 110(2), pp. 478-502.

Chen, H., Francis, B. B., Hasan, T. and Wu, Q. 2021a. Does corporate culture impact audit pricing? Evidence from textual analysis. *Journal of Business Finance & Accounting*,

Chen, H. C., Chou, R. K. and Lu, C.-L. 2021b. Misvaluation and the corporate propensity to hold cash. *Journal of Corporate Finance* 70, p. 102076.

Chen, J., Ezzamel, M. and Cai, Z. 2011. Managerial power theory, tournament theory, and executive pay in China. *Journal of Corporate Finance* 17(4), pp. 1176-1199.

Chen, J., Goergen, M., Leung, W. S. and Song, W. 2019a. CEO and director compensation, CEO turnover and institutional investors: Is there cronyism in the UK? *Journal of Banking & Finance* 103, pp. 18-35.

Chen, J., Leung, W. S. and Evans, K. P. 2016. Are employee-friendly workplaces conducive to innovation? *Journal of Corporate Finance* 40, pp. 61-79.

Chen, J., Song, W. and Goergen, M. 2019b. Passing the dividend baton: the impact of dividend policy on new CEOs' initial compensation. *Journal of Corporate Finance* 56, pp. 458-481.

Chen, Y., Dou, P. Y., Rhee, S. G., Truong, C. and Veeraraghavan, M. 2015. National culture and corporate cash holdings around the world. *Journal of Banking and Finance* 50, pp. 1-18.

Chen, Y. R. 2008. Corporate governance and cash holdings: Listed new economy versus old economy firms. *Corporate Governance: An International Review* 16(5), pp. 430-442.

Cheng, I. H., Hong, H. and Scheinkman, J. A. 2015. Yesterday's heroes: compensation and risk at financial firms. *The Journal of Finance* 70(2), pp. 839-879.

Chhaochharia, V. and Grinstein, Y. 2009. CEO compensation and board structure. *The Journal of Finance* 64(1), pp. 231-261.

Chiu, P.-C., Teoh, S. H. and Tian, F. 2013. Board interlocks and earnings management contagion. *The Accounting Review* 88(3), pp. 915-944.

Choi, H.-S., Ferris, S. P., Jayaraman, N. and Sabherwal, S. 2013. Overconfidence, corporate governance, and global CEO turnover.*Advances in Financial Economics*. Emerald Group Publishing Limited, pp. 101-138.

Chordia, T., Roll, R. and Subrahmanyam, A. 2011. Recent trends in trading activity and market quality. *Journal of Financial Economics* 101(2), pp. 243-263.

Chung, K. H., Kim, J. C., Kim, Y. S. and Zhang, H. 2015. Information asymmetry and corporate cash holdings. *Journal of Business Finance and Accounting* 42(9-10), pp. 1341-1377.

Coles, J. L., Daniel, N. D. and Naveen, L. 2006. Managerial incentives and risk-taking. *Journal of Financial Economics* 79(2), pp. 431-468.

Coles, J. L., Daniel, N. D. and Naveen, L. 2008. Boards: Does one size fit all? *Journal of Financial Economics* 87(2), pp. 329-356.

Conyon, M. J., Hass, L. H., Peck, S. I., Sadler, G. V. and Zhang, Z. 2019a. Do compensation consultants drive up CEO pay? Evidence from UK public firms. *British Journal of Management* 30(1), pp. 10-29.

Conyon, M. J., Haß, L. H., Vergauwe, S. and Zhang, Z. 2019b. Foreign experience and CEO compensation. *Journal of Corporate Finance* 57, pp. 102-121.

Core, J. E., Holthausen, R. W. and Larcker, D. F. 1999. Corporate governance, chief executive officer compensation, and firm performance. *Journal of Financial Economics* 51(3), pp. 371-406.

Crémer, J. 1993. Corporate culture and shared knowledge. *Industrial and Corporate Change* 2(3), pp. 351-386.

Cumming, D. J., Köchling, G., Neukirchen, D. and Posch, P. N. 2022. Does corporate culture influence IPO pricing? *Available at SSRN 4032543*,

Dai, Y., Rau, P. R., Stouraitis, A. and Tan, W. 2020. An ill wind? Terrorist attacks and CEO compensation. *Journal of Financial Economics* 135(2), pp. 379-398.

Daily, C. M., Johnson, J. L., Ellstrand, A. E. and Dalton, D. R. 1998. Compensation committee composition as a determinant of CEO compensation. *Academy of Management Journal* 41(2), pp. 209-220.

Dalziel, T., Gentry, R. J. and Bowerman, M. 2011. An integrated agency–resource dependence view of the influence of directors' human and relational capital on firms' R&D spending. *Journal of Management Studies* 48(6), pp. 1217-1242.

Datta, S., Doan, T. and Toscano, F. 2023. Top executive gender, corporate culture, and the value of corporate cash holdings. *Journal of Financial Stability* 67, p. 101154.

Davidson, R., Dey, A. and Smith, A. 2015. Executives'"off-the-job" behavior, corporate culture, and financial reporting risk. *Journal of Financial Economics* 117(1), pp. 5-28.

De Long, D. W. and Fahey, L. 2000. Diagnosing cultural barriers to knowledge management. *Academy of Management Perspectives* 14(4), pp. 113-127.

Dittmann, I., Yu, K.-C. and Zhang, D. 2017. How important are risk-taking incentives in executive compensation? *Review of Finance* 21(5), pp. 1805-1846.

Dittmar, A. and Mahrt-Smith, J. 2007. Corporate governance and the value of cash holdings. *Journal of Financial Economics* 83(3), pp. 599-634.

Dittmar, A., Mahrt-Smith, J. and Servaes, H. 2003. International corporate governance and corporate cash holdings. *Journal of Financial and Quantitative Analysis* 38(1), pp. 111-133.

Dodd, O., Frijns, B. and Garel, A. 2019. Cultural diversity in the boardroom and corporate social performance. *Available at SSRN 3389707*,

Doidge, C., Karolyi, G. A. and Stulz, R. M. 2007. Why do countries matter so much for corporate governance? *Journal of Financial Economics* 86(1), pp. 1-39.

Dowling, M. and Aribi, Z. A. 2013. Female directors and UK company acquisitiveness. *International Review of Financial Analysis* 29, pp. 79-86.

Drobetz, W., Grüninger, M. C. and Hirschvogl, S. 2010. Information asymmetry and the value of cash. *Journal of Banking and Finance* 34(9), pp. 2168-2184.

Dudley, E. and Zhang, N. 2016. Trust and corporate cash holdings. *Journal of Corporate Finance* 41, pp. 363-387.

Edmans, A. and Gabaix, X. 2011. The effect of risk on the CEO market. *The Review of Financial Studies* 24(8), pp. 2822-2863.

Edmans, A., Gabaix, X. and Jenter, D. 2017. Executive compensation: A survey of theory and evidence.*The handbook of the economics of corporate governance*. Vol. 1. Elsevier, pp. 383-539.

Edmans, A., Gabaix, X. and Landier, A. 2009. A multiplicative model of optimal CEO incentives in market equilibrium. *The Review of Financial Studies* 22(12), pp. 4881-4917.

Eisenhardt, K. M. 1989. Agency theory: An assessment and review. *Academy of Management Review* 14(1), pp. 57-74.

El Kalak, I. and Tosun, O. K. 2022. ETF ownership and corporate cash holdings. *European Financial Management*,

Faleye, O., Hoitash, R. and Hoitash, U. 2011. The costs of intense board monitoring. *Journal of Financial Economics* 101(1), pp. 160-181.

Fama, E. F. and Jensen, M. C. 1983. Separation of ownership and control. *The Journal of Law and Economics* 26(2), pp. 301-325.

Fama, E. F. and MacBeth, J. D. 1973. Risk, return, and equilibrium: Empirical tests. *Journal of Political Economy* 81(3), pp. 607-636.

Fang, X., Pittman, J. and Zhao, Y. 2021. The importance of director external social networks to stock price crash risk. *Contemporary Accounting Research* 38(2), pp. 903-941.

Fang, Y., Fiordelisi, F., Hasan, I., Leung, W. S. and Wong, G. 2023. Corporate culture and firm value: Evidence from crisis. *Journal of Banking & Finance* 146, p. 106710.

Fauver, L., McDonald, M. B. and Taboada, A. G. 2018. Does it pay to treat employees well? International evidence on the value of employee-friendly culture. *Journal of Corporate Finance* 50, pp. 84-108.

Fernandes, N., Ferreira, M. A., Matos, P. and Murphy, K. J. 2013. Are US CEOs paid more? New international evidence. *The Review of Financial Studies* 26(2), pp. 323-367.

Ferreira, M. A. and Vilela, A. S. 2004. Why do firms hold cash? Evidence from EMU countries. *European Financial Management* 10(2), pp. 295-319.

Ferris, S. P., Jagannathan, M. and Pritchard, A. C. 2003. Too busy to mind the business? Monitoring by directors with multiple board appointments. *The Journal of Finance* 58(3), pp. 1087-1111.

Ferris, S. P., Javakhadze, D. and Rajkovic, T. 2017. CEO social capital, risk-taking and corporate policies. *Journal of Corporate Finance* 47, pp. 46-71.

Ferris, S. P., Jayaraman, N. and Sabherwal, S. 2013. CEO overconfidence and international merger and acquisition activity. *Journal of Financial and Quantitative Analysis* 48(1), pp. 137-164.

Ferris, S. P., Jayaraman, N. and Zhang, T. 2022. A clash of cultures: The governance and valuation effects of corporate cultural distance. *Journal of Business Finance & Accounting* 49(9-10), pp. 1696-1735.

Fich, E. and White, L. J. 2003. CEO compensation and turnover: The effects of mutually interlocked boards. *Wake Forest Law Review* 38, pp. 935-959.

Fich, E. M. and Shivdasani, A. 2006. Are busy boards effective monitors? *The Journal of Finance* 61(2), pp. 689-724.

Fich, E. M. and White, L. J. 2005. Why do CEOs reciprocally sit on each other's boards? *Journal of Corporate Finance* 11(1-2), pp. 175-195.

Financial Stability Board. 2014. *Guidance on supervisory interaction with financial Institutions on risk Culture: A framework for assessing risk culture.* Available at: https://www.fsb.org/wp-content/uploads/140407.pdf [Accessed: 28/10/2022].

Fiordelisi, F., Renneboog, L., Ricci, O. and Stentella Lopes, S. 2019. Creative corporate culture and innovation. *Journal of International Financial Markets, Institutions & Money* 63,

Fiordelisi, F. and Ricci, O. 2014. Corporate culture and CEO turnover. *Journal of Corporate Finance* 28, pp. 66-82.

Fiordelisi, F. and Ricci, O. 2021. Corrigendum to "Corporate culture and CEO turnover"[Journal of Corporate Finance, 28 (2014) 66–82]. *Journal of Corporate Finance* 70, p. 102064.

Flatt, S. J. and Kowalczyk, S. J. 2008. Creating competitive advantage through intangible assets: The direct and indirect effects of corporate culture and reputation. *Journal of Competitiveness Studies* 16(1/2), p. 13.

Florackis, C. and Sainani, S. 2018. How do chief financial officers influence corporate cash policies? *Journal of Corporate Finance* 52, pp. 168-191.

Fracassi, C. and Tate, G. 2012. External networking and internal firm governance. *The Journal of Finance* 67(1), pp. 153-194.

Fresard, L. 2010. Financial strength and product market behavior: The real effects of corporate cash holdings. *The Journal of Finance* 65(3), pp. 1097-1122.

Frijns, B., Dodd, O. and Cimerova, H. 2016. The impact of cultural diversity in corporate boards on firm performance. *Journal of Corporate Finance* 41, pp. 521-541.

Frydman, C. and Saks, R. E. 2010. Executive compensation: A new view from a long-term perspective, 1936–2005. *The Review of Financial Studies* 23(5), pp. 2099-2138.

Gabaix, X. and Landier, A. 2008. Why has CEO pay increased so much? *The Quarterly Journal of Economics* 123(1), pp. 49-100.

Gallemore, J. and Labro, E. 2015. The importance of the internal information environment for tax avoidance. *Journal of Accounting and Economics* 60(1), pp. 149-167.

Gao, H. and Li, K. 2015. A comparison of CEO pay–performance sensitivity in privately-held and public firms. *Journal of Corporate Finance* 35, pp. 370-388.

Giannetti, M. and Zhao, M. 2019. Board ancestral diversity and firm-performance volatility. *Journal of Financial and Quantitative Analysis* 54(3), pp. 1117-1155.

Goergen, M. and Renneboog, L. 2011. Managerial compensation. *Journal of Corporate Finance* 17(4), pp. 1068-1077.

Gomez-Mejia, L. R., Neacsu, I. and Martin, G. 2019. CEO risk-taking and socioemotional wealth: The behavioral agency model, family control, and CEO option wealth. *Journal of Management* 45(4), pp. 1713-1738.

Gordon, G. G. 1991. Industry determinants of organizational culture. *Academy of Management Review* 16(2), pp. 396-415.

Gorton, G. B., Grennan, J. and Zentefis, A. K. 2022. Corporate culture. *Annual Review of Financial Economics* 14, pp. 535-561.

Graham, J. R., Grennan, J., Harvey, C. R. and Rajgopal, S. 2022. Corporate culture: Evidence from the field. *Journal of Financial Economics* 146(2), pp. 552-593.

Grieser, W., Li, R. and Simonov, A. 2017. Integrity, creativity, and corporate culture. *Available at SSRN 2741049*,

Griffin, D., Guedhami, O., Kwok, C. C., Li, K. and Shao, L. 2017. National culture: The missing country-level determinant of corporate governance. *Journal of International Business Studies* 48(6), pp. 740-762.

Guay, W. R. 1999. The sensitivity of CEO wealth to equity risk: an analysis of the magnitude and determinants. *Journal of Financial Economics* 53(1), pp. 43-71.

Guiso, L., Sapienza, P. and Zingales, L. 2006. Does culture affect economic outcomes? *Journal of Economic Perspectives* 20(2), pp. 23-48.

Guiso, L., Sapienza, P. and Zingales, L. 2015a. Corporate culture, societal culture, and institutions. *American Economic Review* 105(5), pp. 336-339.

Guiso, L., Sapienza, P. and Zingales, L. 2015b. The value of corporate culture. *Journal of Financial Economics* 117(1), pp. 60-76.

Hainmueller, J. 2012. Entropy balancing for causal effects: A multivariate reweighting method to produce balanced samples in observational studies. *Political analysis* 20(1), pp. 25-46.

Han, S. and Qiu, J. 2007. Corporate precautionary cash holdings. *Journal of Corporate Finance* 13(1), pp. 43-57.

Harford, J. 1999. Corporate cash reserves and acquisitions. *The Journal of Finance* 54(6), pp. 1969-1997.

Harford, J., Mansi, S. A. and Maxwell, W. F. 2008. Corporate governance and firm cash holdings in the US. *Journal of Financial Economics* 87(3), pp. 535-555.

Hartnell, C. A., Ou, A. Y. and Kinicki, A. 2011. Organizational culture and organizational effectiveness: A meta-analytic investigation of the competing values framework's theoretical suppositions. *Journal of Applied Psychology* 96(4), pp. 677-694.

Hartzell, J. C. and Starks, L. T. 2003. Institutional investors and executive compensation. *The Journal of Finance* 58(6), pp. 2351-2374.

Haythornthwaite, C. 1996. Social network analysis: An approach and technique for the study of information exchange. *Library & information science research* 18(4), pp. 323-342.

He, Z. and Wintoki, M. B. 2016. The cost of innovation: R&D and high cash holdings in US firms. *Journal of Corporate Finance* 41, pp. 280-303.

Herbig, P. and Dunphy, S. 1998. Culture and innovation. *Cross Cultural Management: An International Journal* 5(4), pp. 13-21.

Hermalin, B. E. 2013. Leadership and Corporate Culture. In: Robert, G. and John, R. eds. *The Handbook of Organizational Economics*. Princeton: Princeton University Press, pp. 432-478.

Hermalin, B. E. and Weisbach, M. S. 2003. Boards of directors as an endogenously determined institution: A survey of the economic literature. *Economic Policy Review* 9(1), pp. 7–26.

Hillman, A. J., Cannella, A. A. and Paetzold, R. L. 2000. The resource dependence role of corporate directors: Strategic adaptation of board composition in response to environmental change. *Journal of Management Studies* 37(2), pp. 235-256.

Hillman, A. J. and Dalziel, T. 2003. Boards of directors and firm performance: Integrating agency and resource dependence perspectives. *Academy of Management Review* 28(3), pp. 383-396.

Hillman, A. J., Withers, M. C. and Collins, B. J. 2009. Resource dependence theory: A review. *Journal of Management* 35(6), pp. 1404-1427.

Hirshleifer, D. and Suh, Y. 1992. Risk, managerial effort, and project choice. *Journal of Financial Intermediation* 2(3), pp. 308-345.

Hofstede, G. 1980. Culture and organizations. *International Studies of Management & Organization* 10(4), pp. 15-41.

Hofstede, G. 1983. Dimensions of national cultures in fifty countries and three regions. *Expiscations in Cross-Cultural Psychology*, pp. 335-355.

Hofstede, G. 1984. *Culture's consequences: International differences in work-related values*. London: Sage Publications.

Hofstede, G. 1991. *Cultures and organizations: Software of the mind*. 1 ed. New York,NY: McGraw-Hill.

Hofstede, G. 2001. *Culture's consequences: Comparing values, behaviors, institutions and organizations across nations*. Sage Publications.

Hofstede, G. 2010. The GLOBE debate: Back to relevance. *Journal of International Business Studies* 41(8), pp. 1339-1346.

Hofstede, G. and Bond, M. H. 1988. The Confucius connection: From cultural roots to economic growth. *Organizational Dynamics* 16(4), pp. 5-21.

Hofstede, G., Neuijen, B., Ohayv, D. D. and Sanders, G. 1990. Measuring organizational cultures: A qualitative and quantitative study across twenty cases. *Administrative Science Quarterly*, pp. 286-316.

Hoi, C. K. S., Wu, Q. and Zhang, H. 2019. Does social capital mitigate agency problems? Evidence from Chief Executive Officer (CEO) compensation. *Journal of Financial Economics* 133(2), pp. 498-519.

Hsieh, N.-h., Lange, B., Rodin, D. and Wolf-Bauwens, M. L. 2018. Getting clear on corporate culture: conceptualisation, measurement and operationalisation. *Journal of the British Academy* 6(s1), pp. 155-184.

Huang, W. and Mazouz, K. 2018. Excess cash, trading continuity, and liquidity risk. *Journal of Corporate Finance* 48, pp. 275-291.

Humphries, S. A. and Whelan, C. 2017. National culture and corporate governance codes. *Corporate Governance: The International Journal of Business in Society* 17(1), pp. 152-163.

Intintoli, V. J., Kahle, K. M. and Zhao, W. 2018. Director connectedness: Monitoring efficacy and career prospects. *Journal of Financial and Quantitative Analysis* 53(1), pp. 65-108.

Iyer, S. R., Sankaran, H. and Zhang, Y. 2020. Do Well-Connected Boards Invest Optimally in R&D Activities? *Journal of Financial Research* 43(4), pp. 895-932.

Jackson, M. O., Rogers, B. W. and Zenou, Y. 2017. The economic consequences of social-network structure. *Journal of Economic Literature* 55(1), pp. 49-95.

Jensen, M. C. 1986. Agency costs of free cash flow, corporate finance, and takeovers. *The American economic review* 76(2), pp. 323-329.

Jensen, M. C. and Meckling, W. H. 1976. Theory of the firm: Managerial behavior, agency costs, and ownership structure. *Journal of Financial Economics* 3(4), pp. 305-360.

Jensen, M. C. and Murphy, K. J. 1990. Performance pay and top-management incentives. *Journal of Political Economy* 98(2), pp. 225-264.

Jensen, M. C., Murphy, K. J. and Wruck, E. G. 2004. Remuneration: Where we've been, how we got to here, what are the problems, and how to fix them. Available at: SSRN: https://ssrn.com/abstract=561305 or http://dx.doi.org/10.2139/ssrn.561305.

Jiang, F., Kim, K. A., Ma, Y., Nofsinger, J. R. and Shi, B. 2019. Corporate culture and investment–cash flow sensitivity. *Journal of Business Ethics* 154(2), pp. 425-439.

John, K., Mehran, H. and Qian, Y. 2010. Outside monitoring and CEO compensation in the banking industry. *Journal of Corporate Finance* 16(4), pp. 383-399.

Karolyi, G. A. 2016. The gravity of culture for finance. *Journal of Corporate Finance* 41, pp. 610-625.

Kashefi-Pour, E., Amini, S., Uddin, M. and Duxbury, D. 2020. Does cultural difference affect investment–cash flow sensitivity? Evidence from OECD countries. *British Journal of Management* 31(3), pp. 636-658.

Keynes, J. 1936. *The general theory of employment, interest and money*. New York: Harcourt, Brace.

Kim, C.-S., Mauer, D. C. and Sherman, A. E. 1998. The determinants of corporate liquidity: Theory and evidence. *Journal of Financial and Quantitative Analysis* 33(3), pp. 335-359.

Koenker, R. and Hallock, K. F. 2001. Quantile regression. *Journal of Economic Perspectives* 15(4), pp. 143-156.

Kolasinski, A. C. and Li, X. 2013. Can strong boards and trading their own firm's stock help CEOs make better decisions? Evidence from acquisitions by overconfident CEOs. *Journal of Financial and Quantitative Analysis* 48(4), pp. 1173-1206.

Krippendorff, K. 1989. Content analysis. In: Barnouw, E. et al. eds. *International encyclopedia of communication*. Vol. 1. New York: Oxford University Press, pp. 403-407.

Krippendorff, K. 2004. *Content analysis: an introduction to its methodology*. Sage.

Kuang, Y. F. and Lee, G. 2017. Corporate fraud and external social connectedness of independent directors. *Journal of Corporate Finance* 45, pp. 401-427.

Larcker, D. F., So, E. C. and Wang, C. C. 2013. Boardroom centrality and firm performance. *Journal of Accounting and Economics* 55(2-3), pp. 225-250.

Li, K., Griffin, D., Yue, H. and Zhao, L. 2013. How does culture influence corporate risk-taking? *Journal of Corporate Finance* 23, pp. 1-22.

Li, K., Mai, F., Shen, R. and Yan, X. 2021. Measuring corporate culture using machine learning. *The Review of Financial Studies* 34(7), pp. 3265-3315.

Linnenluecke, M. K. and Griffiths, A. 2010. Corporate sustainability and organizational culture. *Journal of World Business* 45(4), pp. 357-366.

Loughran, T. and McDonald, B. 2011. When is a liability not a liability? Textual analysis, dictionaries, and 10-Ks. *The Journal of Finance* 66(1), pp. 35-65.

Loughran, T. and McDonald, B. 2016. Textual analysis in accounting and finance: A survey. *Journal of Accounting Research* 54(4), pp. 1187-1230.

Low, A. 2009. Managerial risk-taking behavior and equity-based compensation. *Journal of Financial Economics* 92(3), pp. 470-490.

Malmendier, U. and Tate, G. 2008. Who makes acquisitions? CEO overconfidence and the market's reaction. *Journal of Financial Economics* 89(1), pp. 20-43.

McConnell, J. J. and Servaes, H. 1990. Additional evidence on equity ownership and corporate value. *Journal of Financial Economics* 27(2), pp. 595-612.

McMullin, J. L. and Schonberger, B. 2020. Entropy-balanced accruals. *Review of Accounting Studies* 25(1), pp. 84-119.

Mehran, H. 1995. Executive compensation structure, ownership, and firm performance. *Journal of Financial Economics* 38(2), pp. 163-184.

Meyer, J. W. and Rowan, B. 1977. Institutionalized organizations: Formal structure as myth and ceremony. *American Journal of Sociology* 83(2), pp. 340-363.

Mikkelson, W. H. and Partch, M. M. 2003. Do persistent large cash reserves hinder performance? *Journal of Financial and Quantitative Analysis* 38(2), pp. 275-294.

Murphy, K. J. 1985. Corporate performance and managerial remuneration: An empirical analysis. *Journal of Accounting and Economics* 7(1-3), pp. 11-42.

Murphy, K. J. ed. 1999. *Executive compensation.* Amsterdam, Netherlands: Elsevier.

Myers, S. C. and Majluf, N. S. 1984. Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics* 13(2), pp. 187-221.

Myers, S. C. and Rajan, R. G. 1998. The paradox of liquidity. *The Quarterly Journal of Economics* 113(3), pp. 733-771.

Nguyen, D. D., Hagendorff, J. and Eshraghi, A. 2016. Can bank boards prevent misconduct? *Review of Finance* 20(1), pp. 1-36.

Nguyen, D. D., Hagendorff, J. and Eshraghi, A. 2018. Does a CEO's cultural heritage affect performance under competitive pressure? *The Review of Financial Studies* 31(1), pp. 97-141.

Nguyen, D. D., Nguyen, L. and Sila, V. 2019. Does corporate culture affect bank risk-taking? evidence from loan-level data. *British Journal of Management* 30(1), pp. 106-133.

Nyberg, A. J., Fulmer, I. S., Gerhart, B. and Carpenter, M. A. 2010. Agency theory revisited: CEO return and shareholder interest alignment. *Academy of Management Journal* 53(5), pp. 1029-1049.

O'Reilly, C. A., Chatman, J. and Caldwell, D. F. 1991. People and organizational culture: a profile comparison approach to assessing person-organization fit. *Academy of Management Journal* 34(3), pp. 487-516.

O'Reilly, C. A. and Chatman, J. A. 1996. Culture as social control: Corporations, cults, and commitment.

O'Reilly, C. A., Caldwell, D. F., Chatman, J. A. and Doerr, B. 2014. The promise and problems of organizational culture: CEO personality, culture, and firm performance. *Group & Organization Management* 39(6), pp. 595-625.

O'Reilly, C. A. and Chatman, J. A. 1996. Culture as social control: Corporations, cults, and commitment. In: Staw, B.M., Cummings, L.L. ed. *Research in Organizational Behavior*. Vol. 18. Greenwich: JAI Press, Inc., pp. 157-200.

Opler, T., Pinkowitz, L., Stulz, R. and Williamson, R. 1999. The determinants and implications of corporate cash holdings. *Journal of Financial Economics* 52(1), pp. 3-46.

Ozkan, A. and Ozkan, N. 2004. Corporate cash holdings: An empirical investigation of UK companies. *Journal of Banking and Finance* 28(9), pp. 2103-2134.

Pan, Y., Siegel, S. and Wang, T. Y. 2017. Corporate risk culture. *Journal of Financial and Quantitative Analysis* 52(6), pp. 2327-2367.

Pawlina, G. and Renneboog, L. 2005. Is investment-cash flow sensitivity caused by agency costs or asymmetric information? Evidence from the UK. *European Financial Management* 11(4), pp. 483-513.

Pellejero, S. and Davies, P. J. 2020. Investors Circle Largest Corporate Cash Hoard Ever. *The Wall Street Journal* December 4, 2020. Available at: https://www.wsj.com/articles/investors-circle-largest-corporate-cash-hoard-ever-11607086917 [Accessed: 11/01/2022].

Pfeffer, J. and Salancik, G. R. 1978. *The external control of organizations: A resource dependence perspective*. New York: Harper & Row.

Pfeffer, J. and Salancik, G. R. 2003. *The external control of organizations: A resource dependence perspective*. Stanford, CA: Stanford University Press.

Pinkowitz, L., Stulz, R. and Williamson, R. 2006. Does the contribution of corporate cash holdings and dividends to firm value depend on governance? A cross-country analysis. *The Journal of Finance* 61(6), pp. 2725-2751.

Prajogo, D. I. and McDermott, C. M. 2011. The relationship between multidimensional organizational culture and performance. *International Journal of Operations & Production Management* 31(7), pp. 712-735. doi: 10.1108/01443571111144823

Quinn, P. J. 2018. Shifting corporate culture: executive stock ownership plan adoptions and incentives to meet or just beat analysts' expectations. *Review of Accounting Studies* 23(2), pp. 654-685.

Quinn, R. E. and Rohrbaugh, J. 1983. A spatial model of effectiveness criteria: Towards a competing values approach to organizational analysis. *Management Science* 29(3), pp. 363-377.

Ramirez, A. and Tadesse, S. 2009. Corporate cash holdings, uncertainty avoidance, and the multinationality of firms. *International business review* 18(4), pp. 387-403.

Rau, R. 2017. Executive compensation. *Foundations and Trends® in Finance* 10(3-4), pp. 181-362.

Renneboog, L. and Zhao, Y. 2011. Us knows us in the UK: On director networks and CEO compensation. *Journal of Corporate Finance* 17(4), pp. 1132-1157.

Renneboog, L. and Zhao, Y. 2014. Director networks and takeovers. *Journal of Corporate Finance* 28, pp. 218-234.

Roberts, J., McNulty, T. and Stiles, P. 2005. Beyond agency conceptions of the work of the non-executive director: Creating accountability in the boardroom. *British Journal of Management* 16, pp. S5-S26.

Roll, R., Schwartz, E. and Subrahmanyam, A. 2009. Options trading activity and firm valuation. *Journal of Financial Economics* 94(3), pp. 345-360.

Ryan, H. E. and Wiggins, R. A. 2001. The influence of firm-and manager-specific characteristics on the structure of executive compensation. *Journal of Corporate Finance* 7(2), pp. 101-123.

Ryan, H. E. and Wiggins, R. A. 2002. The interactions between R&D investment decisions and compensation policy. *Financial Management* 31(1), pp. 5-29.

Sadri, G. and Lees, B. 2001. Developing corporate culture as a competitive advantage. *Journal of Management Development* 20(10), pp. 853-859.

Schauten, M. B., Van Dijk, D. and van der Waal, J. P. 2013. Corporate governance and the value of excess cash holdings of large European firms. *European Financial Management* 19(5), pp. 991-1016.

Schein, E. H. 1984. Coming to a new awareness of organizational culture. *Sloan Management Review* 25(2), pp. 3-16.

Schein, E. H. 1996. Culture: The missing concept in organization studies. *Administrative Science Quarterly*, pp. 229-240.

Schwartz, S. H. 1992. Universals in the content and structure of values: Theoretical advances and empirical tests in 20 countries.*Advances in Experimental Social Psychology*. Vol. 25. Elsevier, pp. 1-65.

Schwartz, S. H. 1994. Beyond individualism/collectivism: New cultural dimensions of values.

Shapira, Z. 1995. *Risk taking: A managerial perspective*. New York, NY: Russell Sage Foundation.

Simutin, M. 2010. Excess cash and stock returns. *Financial Management* 39(3), pp. 1197-1222.

Smith, C. W. and Watts, R. L. 1992. The investment opportunity set and corporate financing, dividend, and compensation policies. *Journal of Financial Economics* 32(3), pp. 263-292.

Smith Jr, C. W. and Watts, R. L. 1992. The investment opportunity set and corporate financing, dividend, and compensation policies. *Journal of Financial Economics* 32(3), pp. 263-292.

Song, W.-L. and Wan, K.-M. 2019. Does CEO compensation reflect managerial ability or managerial power? Evidence from the compensation of powerful CEOs. *Journal of Corporate Finance* 56, pp. 1-14.

Sørensen, J. B. 2002. The strength of corporate culture and the reliability of firm performance. *Administrative Science Quarterly* 47(1), pp. 70-91.

Stock, J. H. and Yogo, M. 2005. Testing for Weak Instruments in Linear IV Regression.*Andrews, DWK, Identification and Inference for Econometric Models*. New York: Cambridge University Press.

Stuart, T. E. and Yim, S. 2010. Board interlocks and the propensity to be targeted in private equity transactions. *Journal of Financial Economics* 97(1), pp. 174-189.

Stulz, R. 1990. Managerial discretion and optimal financing policies. *Journal of Financial Economics* 26(1), pp. 3-27.

Tabellini, G. 2008. Institutions and culture. *Journal of the European Economic association* 6(2-3), pp. 255-294.

Ten Have, S., Ten Have, W., Stevens, F. and Pol-Coyne, F. 2003. *Key management models: The management tools and practices that will improve your business*. Pearson Education.

Thakor, A. V. 2016. Corporate culture in banking. *FRBNY Economic Policy Review* 22, pp. 1-12.

Tosi, H. L. and Greckhamer, T. 2004. Culture and CEO compensation. *Organization Science* 15(6), pp. 657-670.

Tosi, H. L., Werner, S., Katz, J. P. and Gomez-Mejia, L. R. 2000. How much does performance matter? A meta-analysis of CEO pay studies. *Journal of Management* 26(2), pp. 301-339.

Urban, D. 2019. The effects of culture on CEO power: Evidence from executive turnover. *Journal of Banking & Finance* 104, pp. 50-69.

Van Essen, M., Otten, J. and Carberry, E. J. 2015. Assessing managerial power theory: A meta-analytic approach to understanding the determinants of CEO compensation. *Journal of Management* 41(1), pp. 164-202.

Vo, T. T. N. and Canil, J. M. 2019. CEO pay disparity: Efficient contracting or managerial power? *Journal of Corporate Finance* 54, pp. 168-190.

Wang, Y., Farag, H. and Ahmad, W. 2021. Corporate culture and innovation: A tale from an emerging market. *British Journal of Management* 32(4), pp. 1121-1140.

Westphal, J. D. and Milton, L. P. 2000. How experience and network ties affect the influence of demographic minorities on corporate boards. *Administrative Science Quarterly* 45(2), pp. 366-398.

Westphal, J. D. and Zajac, E. J. 1997. Defections from the inner circle: Social exchange, reciprocity, and the diffusion of board independence in US corporations. *Administrative Science Quarterly*, pp. 161-183.

Wilde, J. H. 2017. The deterrent effect of employee whistleblowing on firms' financial misreporting and tax aggressiveness. *The Accounting Review* 92(5), pp. 247-280.

Wintoki, M. B., Linck, J. S. and Netter, J. M. 2012. Endogeneity and the dynamics of internal corporate governance. *Journal of Financial Economics* 105(3), pp. 581-606.

Wiseman, R. M. and Gomez-Mejia, L. R. 1998. A behavioral agency model of managerial risk taking. *Academy of Management Review* 23(1), pp. 133-153.

Yermack, D. 1995. Do corporations award CEO stock options effectively? *Journal of Financial Economics* 39(2-3), pp. 237-269.

Zammuto, R. F., Gifford, B. and Goodman, E. A. 2000. Managerial ideologies, organization culture and the outcomes of innovation: A competing values perspective. In: Ashkanasy, N.M. et al. eds. *The handbook of organizational culture and climate*. Thousand Oaks, CA: Sage Publications, pp. 263-280.

Zhang, W., Cahan, S. F. and Allen, A. C. 2005. Insider trading and pay-performance sensitivity: An empirical analysis. *Journal of Business Finance & Accounting* 32(9-10), pp. 1887-1919.

Zingales, L. 2015. The "cultural revolution" in finance. *Journal of Financial Economics* 117(1), pp. 1–4.

Zona, F., Gomez-Mejia, L. R. and Withers, M. C. 2018. Board interlocks and firm performance: Toward a combined agency–resource dependence perspective. *Journal of Management* 44(2), pp. 589-618.

Appendices

Corporate culture measurement steps

The steps for scraping and parsing Edgar filings to extract the CVF dictionary keywords are as follows:

1. I use the EDGAR website (www.sec.gov) to download annual 10-K reports for all publicly traded US firms for each year from 1999 to 2019.
2. For each report, the URL path is accessed and then parsed using Python.
3. All 10-K filings details are extracted into a list of dictionaries, containing the name of each company, Central Index Key (CIK) number, type of the10-K filing, and URL to the filing.
4. The words in the reports are split into lists of words (excluding the cover page, figures, tables, and exhibits). The total size of the list is recorded, which is the total number of words in the report.
5. Using the CVF dictionary in Table 3.1, the frequency of each keyword occurring in the report is counted on condition that the word is not preceded by a negative word ['not', 'few', 'no', 'few', 'non', 'less', 'limited', 'fewer', 'lesser']. The comparison between words is not case sensitive.
6. The company name along with CIK number, year, quarter, document word count and frequency of each keyword are stored as a row in a csv file and ready for the calculation of the four corporate culture scores. Each cultural score is the frequency ratio calculated as the sum of its keywords divided by the total count of words in the 10-K report.

Table A. Variable definitions

Variable	Definition	Source
Corporate culture variables		
Collaborate	The collaboration-oriented corporate culture estimate of firm i at time t obtained using text analysis (ratio). It is calculated as the sum of synonyms for collaborate culture divided by the total number of words in a given 10-K filing. The list of words is in Table 3.1.	My own calculations using SEC- Edgar / Annual reports
Control	The control-oriented corporate culture estimate of firm i at time t obtained using text analysis (ratio) It is calculated as the sum of synonyms for control culture divided by the total number of words in a given 10-K filing. The list of words is in Table 3.1.	My own calculations using SEC- Edgar / Annual reports
Create	The creation-oriented corporate culture estimate of firm i at time t obtained using text analysis (ratio). It is calculated as the sum of synonyms for create culture divided by the total number of words in a given 10-K filing. The list of words is in Table 3.1.	My own calculations using SEC- Edgar / Annual reports
Compete	The competition-oriented corporate culture estimate of firm i at time t obtained using text analysis (ratio). It is calculated as the sum of synonyms for compete culture divided by the total number of words in a given 10-K filing. The list of words is in Table 3.1.	My own calculations using SEC- Edgar / Annual reports
Corporate culture	The sum of the CVF four corporate culture dimensions scores for each firm in each year.	My own calculations using SEC- Edgar / Annual reports.
Collaborate-dominant	A dummy variable that equals one for a firm whose collaborate culture score is in the top quartile across all firms in a certain year, and zero otherwise.	My own calculations using SEC- Edgar / Annual reports.
Control-dominant	A dummy variable that equals one for a firm whose control culture score is in the top quartile across all firms in a certain year, and zero otherwise.	My own calculations using SEC- Edgar / Annual reports.
Create-dominant	A dummy variable that equals one for a firm whose create culture score is in the top quartile across all firms in a certain year, and zero otherwise.	My own calculations using SEC- Edgar / Annual reports.
Compete-dominant	A dummy variable that equals one for a firm whose compete culture score is in the top quartile across all firms in a certain year, and zero otherwise.	My own calculations using SEC- Edgar / Annual reports.
Strong cultureCVF	A dummy variable that takes the value of 1 if the sum of a firms' four cultural dimensions of the CVF is in the top quartile across all firms in a year, and 0 otherwise	My own calculations using SEC- Edgar / Annual reports.
Implication variables		
CEO Equity incentives **(Chapter 4)**	Total equity compensation divided by total compensation (TDC1) Where total equity compensation is the equity-based compensation for a CEO in a given year, including restricted stocks and option grants using Black-Scholes.	Execucomp Restricted stocks: Before 2006 (RSTKGRNT). After 2006

		(STOCK_AWARDS_FV) Option grants: Before 2006 (OPTION_AWARDS_BLK_VALUE). After 2006 (OPTION_AWARDS_FV)
CEO Cash incentives **(Chapter 4)**	Total cash compensation divided by total compensation (TDC1) Where total cash compensation is the sum of salary and cash Bonus received by a CEO in a given year.	Execucomp (item SALARY) (item BONUS)
Cash holdings **(Chapter 5)**	Cash and short-term investments (CHE) divided by total assets (AT).	Compustat
lnCash holdings **(Chapter 5)**	The natural logarithm of the cash holdings ratio	Compustat
Independent directors' connectedness **(Chapter 6)**	The regression residual obtained from regressing the natural logarithm of aggregate director connections on the natural logarithm of firm size, board size, firm age, analyst coverage, and on institutional ownership.	My own calculations using directors' connections variable is the data "Individual Network Size" available on BoardEx

Firm characteristics

Stock return	Annual stock return [Compustat (*PRCC_F*(*t*)/*AJEX*(*t*) + *DVPSX_F*(*t*)/*AJEX*(*t*)) /(*PRCC_F*(*t-1*)/*AJEX*(*t-1*)) - 1]	Compustat
ROA	The earnings before interest, taxes, depreciation, and amortisation (EBITDA) divided by total assets (AT).	Compustat
Firm size	The natural logarithm of the book value of total assets (AT)	Compustat
Leverage	Total of short-term debt (DLC) plus long-term debt (DLTT) divided by the firm's total assets (AT).	Compustat
Firm age	The number of years since the firm appeared in CRSP.	Compustat
Tobin's Q	The book value of assets (AT) plus the market value of common equity (CSHO*PRCC_f) minus the book value of common equity (CEQ), all of which is divided by the book value of total assets (AT).	Compustat
Return volatility	The Annualized standard deviation of daily stock returns for the past year.	Compustat Daily Updates- Security Daily
Capital expenditures	The ratio of the capital expenditures (CAPX) to total assets (AT)	Compustat
Net working capital	The ratio of (working capital (WCAP) minus cash and short-term investments (CHE)) to total assets (AT)	Compustat
M/B	The ratio of (book value of total assets (AT) minus book value of common equity (CEQ) plus the market value of common equity (PRCC_F* CSHO)) to book value of total assets (AT).	Compustat

Cash flow	The ratio of operating income before depreciation, minus interest and taxes (OIBDP-XINT-TXT), to the book value of total assets (AT)	Compustat
Cash flow volatility	The standard deviation of cash flows for the previous ten years, requiring at least three observations.	Compustat
R&D investments	The ratio of the firm research and development expenditure (XRD) to total assets (AT)	Compustat
Dividend policy	A dummy variable that takes the value of 1 if the firm pays dividend in that year and 0 otherwise	Compustat
Excess cash	The residual from the cross-sectional regression of firms' cash holdings ratio on a set of firm variables. These variables are *Firm size, Leverage, M/B, ROA, Net working capital, Cash flow volatility, R&D to Sales,* and *Acquisitions to sales*	My own calculations using Compustat
Degree of diversification	The number of business segments that the firm operates in	Compustat.
Complexity	A factor score of four firm variables that indicate complexity: *Firm size; Firm age; Leverage*; and *Degree of diversification*	My own calculations using Compustat
Corporate governance characteristics		
Board size	The total number of directors on the board	BoardEx
Board independence	The number of independent directors divided by the total number of directors on the board	BoardEx
CEO duality	A dummy variable that takes the value of 1 if the CEO is the chairman of the firm and 0 otherwise.	BoardEx
Board busyness	The number of busy directors scaled by board size, where busy directors are those who hold three or more directorships.	BoardEx
Female ratio	The number of female directors on the board divided by the total number of directors on the board.	BoardEx
Institutional ownership	Proportion of firm's equity owned by institutional investors	Thomson Reuters Ownership database
E-index	The E-index is calculated based on six provisions: staggered board; limits to shareholder byelaw amendments; supermajority requirements for mergers; supermajority requirements for charter amendments; poison pills; and golden parachute. The E-index is the sum of these provisions, where the presence of each provision equals 1 and 0 otherwise (Bebchuk et al 2009)	Investor Responsibility Research Center (IRRC)
Monitoring needs	A factor score of three proxies: free cash flow; analyst coverage; and *Institutional ownership*	Compustat, I/B/E/S, Thomson Reuters Ownership database
Information asymmetry variables		
Analyst coverage	The log value of one plus the number of analysts that issue earnings forecasts for a given firm during the fiscal year.	I/B/E/S
DISP	$\log\left(1+\frac{\text{standard deviation of analysts}'forecasts}{\text{share price (t}-1)}\right)$	I/B/E/S
ErrorF	$\log\left(1+\frac{\text{EPS forecast}-\text{EPS actual}}{\text{Median EPS}}\right)$	I/B/E/S
IA-index	A comprehensive index using the quantile rankings of *Firm size, R&D investments, Tobin's Q, Analyst coverage* and *ErrorF*. The index ranges from 5 to 25	I/B/E/S, Compustat.
CEO characteristics		

CEO age	Their age in years	Execucomp
CEO tenure	the number of years that the CEO has served in this role	Execucomp
CEO gender	A dummy variable that takes the value of 1 when the CEO is male and 0 if the CEO is female.	Execucomp
Alternative variables for corporate culture		
Innovation	Ratio of innovation-related words in the QA section of earnings calls	Li et al. (2021) data
Quality	Ratio of quality-related words in the QA section of earnings calls	Li et al. (2021) data
Teamwork	Ratio of teamwork-related words in the QA section of earnings calls	Li et al. (2021) data
Respect	Ratio of respect-related words in the QA section of earnings calls	Li et al. (2021) data
Integrity	Ratio of integrity-related words in the QA section of earnings calls	Li et al. (2021) data
Strong cultureLietal	A dummy variable that takes the value of 1 if the sum of a firms' five cultural dimensions of Li el al's (2021) study is in the top quartile across all firms in a year, and 0 otherwise.	My own calculations using the data from Li et al. (2021)

Table A4.1: Robustness test: Other ways of measuring corporate culture (CVF and Li et al. (2021) dimensions)

Variables	Dependent variable: *Equity incentives*	Dependent variable: *Cash incentives*
	(1)	(2)
Collaborate	0.023	-0.020
	(0.03)	(0.026)
Control	0.008	0.009
	(0.026)	(0.020)
Create	0.018	0.014
	(0.03)	(0.027)
Compete	0.027**	-0.025**
	(0.014)	(0.012)
Teamwork	0.014*	-0.013**
	(0.007)	(0.006)
Respect	-0.009*	0.010**
	(0.005)	(0.005)
Innovation	0.004	-0.007**
	(0.004)	(0.003)
Quality	0.005	-0.004
	(0.006)	(0.005)
All controls	YES	YES
Observations	9784	9784
R-squared	0.196	0.346
Year FE	YES	YES
Industry FE	YES	YES

This table shows further robustness test using other ways for measuring corporate culture including dominant corporate culture and Li et al.'s (2021) corporate culture dimensions measures. The dependent variable of the baseline OLS regression model is CEO compensation measured by *Equity incentives* and *Cash incentives.* The main independent variables are the four dimensions of the corporate culture based on the CFV: *Collaborate*; *Control*; *Create*; and *Compete* as well as Li et al. (2021) corporate culture dimensions: *Teamwork*, *Respect, Innovation*, and *Quality*. The same set of controls as in Table 4.5 is included. Definitions of all variables are included in Appendix Table A. All models include year and industry fixed effects, where industry fixed effects are based on Fama-French 48 industry classification. Firm continuous variables are winsorised at the 1st and 99th percentiles. Robust standard errors are in parentheses and are clustered at the firm level. ***, **, and * indicates significance at the 1%, 5%, and 10% level, respectively.

Table A4.2: Robustness test: Corporate culture and CEO compensation, controlling for R&D investments and independent directors' connectedness

Variables	Dependent variable: *Equity incentives*					Dependent variable: *Cash incentives*				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Collaborate	0.061				0.044	-0.035				-0.025
	(0.047)				(0.049)	(0.038)				(0.039)
Control		-0.027			-0.037		.013			0.019
		(0.028)			(0.029)		(.022)			(0.023)
Create			0.021		-0.011			-0.012		0.006
			(0.04)		(0.044)			(0.034)		(0.038)
Compete				0.046***	0.045***				-0.027**	-0.026*
				(0.016)	(0.017)				(0.013)	(0.014)
Independent directors' connectedness	0.007	0.007	0.007	0.008	0.008	-0.007	-.007	-0.007	-0.008	-0.008
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(.009)	(0.009)	(0.009)	(0.009)	(0.009)
R&D investments	0.353**	0.366**	0.368**	0.305*	0.287*	-.129	-0.136	-0.137	-0.099	-0.090
	(0.161)	(0.159)	(0.158)	(0.161)	(0.162)	(.136)	(0.132)	(0.130)	(0.137)	(0.139)
All controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	4811	4811	4811	4811	4811	4811	4811	4811	4811	4811
R-squared	0.196	0.195	0.195	0.198	0.199	.347	0.346	0.346	0.348	0.348
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

This table reports the results of a further robustness test to reduce omitted variables bias. I introduce *R&D investments* and *Independent directors' connectedness* as additional control variables in the baseline OLS regression model described in model (4.1). The dependent variable is CEO compensation measured by *Equity incentives* and *Cash incentives*. The main independent variables are the four dimensions of the corporate culture based on the CFV: *Collaborate*; *Control*; *Create*; and *Compete*. Other control variables include firm, governance, and CEO characteristics. Definitions of all variables are included in Appendix Table A. All models include year and industry fixed effects, where industry fixed effects are based on Fama-French 48 industry classification. Firm continuous variables are winsorised at the 1st and 99th percentiles. Robust standard errors are in parentheses and are clustered at the firm level. ***, **, and * indicates significance at the 1%, 5%, and 10% level, respectively.

Table A4.3: Endogeneity: Lag regression: Other ways of measuring corporate culture

Panel A. Alternative measure of corporate culture (dominant culture)

Variables	Dependent variable: *Equity incentives*					Dependent variable: *Cash incentives*				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Collaborate-dominant	0.008				0.005	-0.008				-0.007
	(0.010)				(0.010)	(0.008)				(0.008)
Control-dominant		-0.001			-0.004		0.004			0.006
		(0.009)			(0.009)		(0.008)			(0.008)
Create-dominant			0.000		-0.003			0.000		0.001
			(0.009)		(0.009)			(0.008)		(0.008)
Compete-dominant				0.044***	0.044***				-0.031***	-0.031***
				(0.011)	(0.011)				(0.010)	(0.010)
Observations	10505	10505	10505	10505	10505	10505	10505	10505	10505	10505
R-squared	0.195	0.195	0.195	0.199	0.199	0.359	0.359	0.359	0.361	0.361

Panel B. Regression results using Li et al. (2021) corporate culture dimensions

Variables	Dependent variable: *Equity incentives*					Dependent variable: *Cash incentives*				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Teamwork	0.017**				0.013*	-0.015**				-0.012*
	(0.008)				(0.008)	(0.006)				(0.006)
Respect		-0.009*			-0.014***		0.006			0.010**
		(0.005)			(0.005)		(0.004)			(0.005)
Innovation			0.008*		0.007			-0.006*		-0.004
			(0.004)		(0.005)			(0.003)		(0.003)
Quality				0.010*	0.007				-0.008	-0.006
				(0.006)	(0.006)				(0.005)	(0.005)
Observations	9084	9084	9084	9084	9084	9084	9084	9084	9084	9084
R-squared	0.173	0.173	0.173	0.173	0.175	0.343	0.343	0.343	0.343	0.345
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

This table shows further robustness test for the lag regression using other ways for measuring corporate culture including dominant corporate culture and Li et al.'s (2021) corporate culture dimensions measures. The dependent variable is CEO compensation measured by *Equity incentives* and *Cash incentives.* Panel A reports the results for the OLS regression model, where the independent variables are the dominant corporate culture measures based on the CVF:

Collaborate-dominant; *Control-dominant; Create-dominant*; and *Compete-dominant*. Dominant corporate culture is a dummy variable that equals one for a firm whose corporate culture score is in the top quartile across all firms in a certain year, and zero otherwise. Panel B reports the results of the baseline OLS regression model, where the independent variables are the four dimensions of the corporate culture based on Li et al. (2021): *Teamwork*, *Respect*, *Innovation*, and *Quality*. The same set of controls as in Table 4.5 is included in Panels A and C. Definitions of all variables are included in Appendix Table A. All independent variables are lagged by one year with respect to CEO incentives. All models include year and industry fixed effects, where industry fixed effects are based on Fama-French 48 industry classification. Firm continuous variables are winsorised at the 1st and 99th percentiles. Robust standard errors are in parentheses and are clustered at the firm level. ***, **, and * indicates significance at the 1%, 5%, and 10% level, respectively.

Table A4.4: Endogeneity: Corporate culture and CEO compensation (PSM matched sample)

Variables	Dependent variable: *Equity incentives*				Dependent variable: *Cash incentives*			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Collaborate-dominant	0.006				0.008			
	(0.014)				(0.013)			
Control-dominant		-0.020				0.019*		
		(0.013)				(0.011)		
Create-dominant			-0.009				0.004	
			(0.012)				(0.009)	
Compete-dominant				0.029*				-0.017*
				(0.017)				(0.012)
All controls	YES	YES	YES	YES	YES	YES	YES	YES
Observations	3129	3722	3717	2332	3129	3722	3717	2332
R-squared	0.198	0.231	0.217	0.209	0.198	0.375	0.372	0.347
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES

This table reports the results of the baseline OLS estimation of model (4.1) for the new matched sample after removing firms with more than one dominant culture in a specific year. The dependent variable is CEO compensation measured by *Equity incentives* or *Cash incentives*. The main independent variables of interest are the dominant corporate culture measures based on the CVF: *Collaborate-dominant*; *Control-dominant; Create-dominant*; and *Compete-dominant*. The control variables include firm, governance, and CEO characteristics as in Table 4.5. Definitions of all variables are included in Appendix Table A. All models include year and industry fixed effects, where industry fixed effects are based on Fama-French 48 industry classification. Firm continuous variables are winsorised at the 1st and 99th percentiles. Robust standard errors are in parentheses and are clustered at the firm level. ***, **, and * indicates significance at the 1%, 5%, and 10% level, respectively.

Table A5.1: Corporate culture, cash holdings, and precautionary savings (M/B ratio)

Variables	Dependent variable: *Cash holdings*				
	(1)	(2)	(3)	(4)	(5)
M/B	-0.027***	-0.027***	0.003	0.001	-0.035***
	(0.004)	(0.005)	(0.005)	(0.003)	(0.006)
Compete	0.005				-0.002
	(0.009)				(0.009)
Compete × *M/B*	0.014***				0.011***
	(0.002)				(0.002)
Create		0.009			0.028
		(0.023)			(0.024)
Create × *M/B*		0.044***			0.028***
		(0.008)			(0.008)
Collaborate			0.103***		0.104***
			(0.024)		(0.022)
Collaborate × *M/B*			0.001		-0.006
			(0.008)		(0.006)
Control				-0.001	0.017
				(0.019)	(0.018)
Control × *M/B*				0.005	-0.002
				(0.006)	(0.005)
All controls	YES	YES	YES	YES	YES
Observations	27071	27071	27071	27071	27071
R-squared	0.533	0.533	0.528	0.524	0.541
Year FE	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES

This table reports an additional test result of the interaction term between corporate culture and precautionary proxy denoted by *M/B* ratio. I use the baseline regression OLS model. The dependent variable is *Cash holdings* measured as the ratio of cash and short-term investments to total assets. The independent variables are the four dimensions of the corporate culture based on the CVF: *Compete, Create, Collaborate*, and *Control*. The main variable of interest is the interaction term of cultural dimensions and the precautionary proxy *M/B*. I include the same set of controls as in Table 5.4. These variables are not tabulated to conserve space. Definitions of all variables are included in Appendix Table A. All models include year and industry fixed effects, where industry fixed effects are based on Fama-French 48 industry classification. Continuous variables are winsorised at the 1st and 99th percentiles. Robust standard errors are in parentheses and are clustered at the firm level. ***, **, and * indicates significance at the 1%, 5%, and 10% level, respectively.

Table A5.2: Robustness test: Other ways of measuring corporate culture

Variables	Dependent variable: *Cash holdings*
	(1)
Compete	0.016**
	(0.008)
Create	0.089***
	(0.018)
Collaborate	0.054***
	(0.016)
Control	0.019
	(0.012)
Quality	-0.001
	(0.003)
Innovation	0.006***
	(0.002)
Teamwork	0.022***
	(0.003)
Respect	-0.016***
	(0.003)
All controls	YES
Observations	18330
R-squared	0.592
Year FE	YES
Industry FE	YES

This table shows further robustness test using other ways for measuring corporate culture including dominant corporate culture and Li et al.'s (2021) corporate culture dimensions measures. The dependent variable is *Cash holdings* measured as the ratio of cash and short-term investments to total assets. The main independent variables are the four dimensions of the corporate culture based on the CFV: *Collaborate*; *Control*; *Create*; and *Compete* as well as Li et al. (2021) corporate culture dimensions: *Teamwork*, *Respect, Innovation*, and *Quality*. I include the same set of controls as in Table 5.4. These variables are not tabulated to conserve space. Definitions of all variables are included in Appendix Table A. All models include year and industry fixed effects, where industry fixed effects are based on Fama-French 48 industry classification. Continuous variables are winsorised at the 1st and 99th percentiles. Robust standard errors are in parentheses and are clustered at the firm level. ***, **, and * indicates significance at the 1%, 5%, and 10% level, respectively.

Table A5.3: Further robustness test: controlling for independent directors' connectedness

Variables	Dependent variable: *Cash holdings*				
	(1)	(2)	(3)	(4)	(5)
Compete	0.016				0.015
	(0.011)				(0.012)
Create		0.053**			0.051**
		(0.021)			(0.023)
Collaborate			-0.024		-0.039
			(0.023)		(0.024)
Control				-0.006	0.001
				(0.012)	(0.012)
Independent directors' connectedness	-0.001	-0.002	-0.002	-0.002	-0.001
	(0.009)	(0.009)	(0.008)	(0.009)	(0.008)
All controls	YES	YES	YES	YES	YES
Observations	5209	5209	5209	5209	5209
R-squared	0.497	0.497	0.496	0.496	0.499
Year FE	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES

This table reports the results of a further robustness test introducing *Independent directors' connectedness* as an additional control variable in the baseline OLS regression model described in model (5.1). The dependent variable is *Cash holdings*, measured as the ratio of cash and short-term investments to total assets is cash holdings. The main independent variables are the four dimensions of the corporate culture based on the CVF: *Compete, Create, Collaborate*, and *Control*. Additional control variables include the firm characteristics used in Table 5.4. These variables are not tabulated to conserve space. Definitions of all variables are included in Appendix Table A. All models include year and industry fixed effects, where industry fixed effects are based on Fama-French 48 industry classification. Continuous variables are winsorised at the 1st and 99th percentiles. Robust standard errors are in parentheses and are clustered at the firm level. ***, **, and * indicates significance at the 1%, 5%, and 10% level, respectively.

Table A5.4: Endogeneity: Lag regression: Robustness test using other ways of measuring corporate culture and Cash holdings

Panel A. Alternative measure of corporate culture (dominant culture)					
Variables	Dependent variable: *Cash holdings*				
	(1)	(2)	(3)	(4)	(5)
Compete-dominant	0.032***				0.028***
	(0.007)				(0.007)
Create-dominant		0.021***			0.019***
		(0.005)			(0.005)
Collaborate-dominant			0.038***		0.037***
			(0.006)		(0.006)
Control-dominant				-0.001	-0.003
				(0.006)	(0.006)
All controls	YES	YES	YES	YES	YES
Observations	22850	22850	22850	22850	22850
R-squared	0.532	0.532	0.534	0.530	0.537
Year FE	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES
Panel B. Alternative measure of corporate culture using Li et al. (2021) dimensions					
Variables	Dependent variable: *Cash holdings*				
	(1)	(2)	(3)	(4)	(5)
Quality	0.001				-0.003
	(0.003)				(0.003)
Innovation		0.010***			0.009***
		(0.002)			(0.002)
Teamwork			0.026***		0.025***
			(0.004)		(0.004)
Respect				-0.011***	-0.017***
				(0.003)	(0.003)
All controls	YES	YES	YES	YES	YES
Observations	15901	15901	15901	15901	15901
R-squared	0.578	0.580	0.583	0.579	0.586
Year FE	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES
Panel C. Alternative measure of cash holdings (log of cash ratio)					
Variables	Dependent variable: *lnCash holdings*				
	(1)	(2)	(3)	(4)	(5)
Compete	0.289***				0.236***
	(0.046)				(0.049)
Create		0.561***			0.432***
		(0.109)			(0.111)
Collaborate			0.330***		0.228**
			(0.107)		(0.105)
Control				-0.066	-0.072
				(0.061)	(0.064)

All controls	YES	YES	YES	YES	YES
Observations	22815	22815	22815	22815	22815
R-squared	0.420	0.418	0.416	0.415	0.423
Year FE	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES

This table shows further robustness test for the lag regression using other ways for measuring corporate culture including dominant corporate culture and Li et al.'s (2021) corporate culture dimensions measures in addition to the alternative measure of cash holdings (*lnCash holdings*). I use the baseline regression OLS model (5.1). The dependent variable in Panels A and B is *Cash holdings* measured as the ratio of cash and short-term investments to total assets. Panel A reports the results for the OLS regression model, where the independent variables of interest are the dominant corporate culture measures based on the CVF: *Compete-dominant; Create-dominant; Collaborate-dominant*; and *Control-dominant*. Dominant corporate culture is a dummy variable that equals 1 for a firm whose corporate culture score is in the top quartile across all firms in a particular year, and zero otherwise Panel B reports the results of the baseline OLS regression model, where the independent variables are the four dimensions of the corporate culture based on Li et al. (2021): *Quality; Innovation; Teamwork*; and *Respect*. In Panel C, the dependent variable *logCash holdings* is the alternative measure for *cash holdings*, which is the natural logarithm of the ratio of cash and short-term investments to total assets and the independent variables are the four dimensions of the corporate culture based on the CVF: *Compete, Create, Collaborate*, and *Control*. I include the same set of controls as in Table 5.4. Definitions of all variables are included in Appendix Table A. All independent variables are lagged by one year with respect to *Cash holdings.* All models include year and industry fixed effects, where industry fixed effects are based on Fama-French 48 industry classification. Continuous variables are winsorised at the 1st and 99th percentiles. Robust standard errors are in parentheses and are clustered at the firm level. ***, **, and * indicates significance at the 1%, 5%, and 10% level, respectively.

Table A5.5: Endogeneity: Corporate culture and cash holdings (PSM matched sample)

Variables	Dependent variable: *Cash holdings*			
	(1)	(2)	(3)	(4)
Compete-dominant	0.024***			
	(0.008)			
Create-dominant		-0.006		
		(0.006)		
Collaborate-dominant			0.050***	
			(0.010)	
Control-dominant				-0.015**
				(0.007)
All controls	YES	YES	YES	YES
Observations	5321	8832	8648	9270
R-squared	0.446	0.492	0.552	0.469
Year FE	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES

This table reports the results of the baseline OLS estimation of equation (5.1) for the new matched sample after removing firms with more than one dominant culture in a specific year. The dependent variable is *Cash holdings* measured as the ratio of cash and short-term investments to total assets. The main independent variables of interest are the dominant corporate culture measures based on the CVF: *Compete-dominant; Create-dominant*; *Collaborate-dominant*; and *Control-dominant*. The control variables include firm characteristics as Table 5.4. Definitions of all variables are included in Appendix Table A. All models include year and industry fixed effects, where industry fixed effects are based on Fama-French 48 industry classification. Continuous variables are winsorised at the 1st and 99th percentiles. Robust standard errors are in parentheses and are clustered at the firm level. ***, **, and * indicates significance at the 1%, 5%, and 10% level, respectively.

Table A5.6: Endogeneity: Entropy balancing matching (Dominant corporate culture)

Panel A. Before entropy balancing

Variables	Treatment group *Compete-dominant* = 1 (N= 6767)	Control group *Compete-dominant* = 0 (N= 20304)	Treatment group *Create-dominant* = 1 (N=6767)	Control group *Create-dominant* = 0 (N=20304)	Treatment group *Collaborate-dominant* = 1 (N=6767)	Control group *Collaborate-dominant* = 0 (N=20304)	Treatment group *Control-dominant* = 1 (N=6767)	Control group *Control-dominant* = 0 (N=20304)
	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean
	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)	(4a)	(4b)
Firm size	5.968	6.152	6.374	6.017	5.814	6.203	5.919	6.169
Leverage	0.130	0.226	0.179	0.210	0.184	0.208	0.146	0.221
Capital expenditures	0.034	0.042	0.041	0.039	0.037	0.041	0.038	0.041
Net working capital	0.013	0.051	0.040	0.042	-0.033	0.066	0.061	0.035
M/B ratio	2.466	2.483	2.373	2.513	2.901	2.338	2.646	2.423
Cash flow	0.023	-0.039	0.017	-0.037	-0.102	0.002	0.007	-0.034
Cash flow volatility	0.164	0.263	0.196	0.253	0.328	0.209	0.232	0.241
Return volatility	0.112	0.093	0.090	0.101	0.161	0.077	0.088	0.101
R&D investments	0.164	0.349	0.299	0.304	0.184	0.342	0.345	0.289
Dividend policy	5.968	6.152	6.374	6.017	5.814	6.203	5.919	6.169

Panel B. After entropy balancing

Variables	Treatment group	Control group *Compete-dominant* = 0 (N= 20304)	Treatment group	Control group *Create-dominant* = 0 (N=20304)	Treatment group	Control group *Collaborate-dominant* = 0 (N=20304)	Treatment group	Control group *Control-dominant* = 0 (N=20304)

	Compete-dominant = 1 (N= 6767)		*Create-dominant* = 1 (N=6767)		*Collaborate-dominant* = 1 (N=6767)		*Control-dominant* = 1 (N=6767)	
	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean
	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)	(4a)	(4b)
Firm size	5.968	5.967	6.374	6.374	5.814	5.814	5.919	5.919
Leverage	0.130	0.130	0.179	0.179	0.184	0.184	0.146	0.146
Capital expenditures	0.034	0.034	0.041	0.041	0.037	0.038	0.038	0.038
Net working capital	0.013	0.011	0.040	0.039	-0.033	-0.033	0.061	0.061
M/B ratio	2.466	2.470	2.373	2.380	2.901	2.901	2.646	2.646
Cash flow	0.023	0.023	0.017	0.016	-0.102	-0.102	0.007	0.007
Cash flow volatility	0.164	0.165	0.196	0.196	0.328	0.328	0.232	0.232
Return volatility	0.112	0.112	0.090	0.090	0.161	0.160	0.088	0.088
R&D investments	0.164	0.164	0.299	0.299	0.184	0.184	0.345	0.345
Dividend policy	5.968	5.967	6.374	6.374	5.814	5.814	5.919	5.919

This table reports the covariate balance for entropy balancing. Panel A reports the mean for the covariates for the treatment and the control groups before balancing, while Panel B reports the same information after the balancing. The treatment variable is based on the dominant cultural dimension. The dominant corporate culture is measured as a dummy variable that takes the value of 1 if the firm's score is in the top quartile across all firms in a particular year, and zero otherwise. The same set of controls as in Table 5.4 are used as covariates. Definitions of all variables are included in Appendix Table A.

Table A6.1: Board of directors' characteristics and firm's culture

Variables	Dependent variable: *Corporate culture*
Firm size	-0.028**
	(0.013)
Leverage	-0.469***
	(0.084)
ROA	0.019
	(0.153)
Firm age	-0.004***
	(0.001)
Board size	0.009
	(0.007)
Board independence	-0.001
	(0.001)
Board busyness	0.000
	(0.001)
Constant	3.571***
	(0.271)
Observations	8434
R-squared	0.502
Year FE	YES
Industry FE	YES

This table reports the results of board characteristics on firms' culture using an OLS regression model. The dependent variable is *Corporate culture* measured as the sum of the four corporate culture dimensions scores based on the CVF: *Compete, Create, Collaborate,* and *Control*. The main independent variables of interests are *Board size, Board independence*, and *Board busyness*. The control variables include the firm characteristics as in Table 6.2. Definitions of all variables are included in Appendix Table A. All models include year and industry fixed effects, where industry fixed effects are based on Fama-French 48 industry classification. Firm variables are winsorised at the 1st and 99th percentiles. Robust standard errors are in parentheses and are clustered at the firm level. ***, **, and * indicates significance at the 1%, 5%, and 10% level, respectively.

Table A6.2: Endogeneity: Lag regression: further robustness tests

Dependent variable: *Corporate culture*

Variables	Baseline regression results	*Strong cultureCVF*	*Strong cultureLietal*	Alternative connectedness measure	Controlling for institutional ownership
	(1)	(2)	(3)	(4)	(5)
Independent directors' connectedness	0.046**	0.229*	0.517***	0.043*	0.046**
	(0.021)	(0.125)	(0.096)	(0.023)	(0.023)
All controls	YES	YES	YES	YES	YES
Observations	6174	6174	6033	6174	6174
Pseudo $R^{2/}$ R^2	0.517	0.364	0.237	0.516	0.517
Year FE	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES

This table shows further robustness test for the lag regression. For the purpose of comparison, the baseline regression result shown in Table 6.2 is reported here in column (1). Columns (2) and (3) are estimated using logit model; columns (4) and (5) are estimated using OLS regression. In columns (1), (4), and (5) the dependent variable is *Corporate culture* measured as the sum of the four corporate culture dimensions scores based on the CVF: *Compete, Create, Collaborate,* and *Control.* Columns (2) and (3) reclassify strong corporate culture to be in the top 25% based on the dimensions of the CVF and Li et al. (2021), respectively. Thus, in these two columns *Strong cultureCVF/Strong cultureLietal* is a dummy variable that equals one for a firm whose strong culture score is in the top quartile across all firms in a particular year, and zero otherwise. Column (4) uses alternative measure for *Independent directors' connectedness* where I additionally include year and industry fixed effects in the second step of constructing the connectedness measure. I include *Institutional ownership* as an additional control variable in column (5). All models include the same set of controls as in Table 6.2. Definitions of all variables are included in Appendix Table A. All the independent variables are lagged by 1 year. All models include year and industry fixed effects, where industry fixed effects are based on Fama-French 48 industry classification. Firm variables are winsorised at the 1st and 99th percentiles. Robust standard errors are in parentheses and are clustered at the firm level. ***, **, and * indicates significance at the 1%, 5%, and 10% level, respectively.

Table A6.3: Endogeneity: Entropy balancing matching

Panel A. Before entropy balancing

	Treatment group *Independent directors' connectedness (dummy)* = 1 (N= 4422)			Control group *Independent directors' connectedness (dummy)* = 0 (N= 4012)		
Variables	Mean	Variance	Skewness	Mean	Variance	Skewness
Firm size	7.696	2.497	0.432	7.634	1.811	0.312
Leverage	0.209	0.029	0.669	0.220	0.031	0.731
ROA	0.146	0.007	0.330	0.146	0.007	0.536
Firm age	30.690	341.900	0.497	28.560	266.400	0.633
Board size	9.120	4.190	0.417	9.040	4.359	0.605
Board independence	0.796	1.256	-1.397	0.750	1.749	-1.010
Board busyness	0.091	1.160	1.378	0.064	0.091	1.651

Panel B. After entropy balancing

	Treatment group *Independent directors' connectedness (dummy)* = 1 (N= 4422)			Control group *Independent directors' connectedness (dummy)* = 0 (N= 4012)		
Variables	Mean	Variance	Skewness	Mean	Variance	Skewness
Firm size	7.696	2.497	0.432	7.696	2.497	0.432
Leverage	0.209	0.029	0.669	0.209	0.029	0.669
ROA	0.146	0.007	0.330	0.146	0.007	0.330
Firm age	30.690	341.900	0.497	30.690	341.900	0.498
Board size	9.120	4.190	0.417	9.120	4.190	0.417
Board independence	0.796	1.256	-1.397	0.796	1.256	-1.397
Board busyness	0.091	1.160	1.378	0.091	1.160	1.378

This table reports the covariate balance for entropy balancing. Panel A reports the mean, variance, and skewness for the covariates for the treatment and the control groups before balancing, while Panel B reports the same information after the balancing. The treatment variable is based on independent directors with large connections. *Independent directors' connectedness (dummy) is* an indicator variable that equals 1 if the firm's independent directors' connectedness measure is higher than the industry mean and 0 otherwise. The same set of controls as in Table 6.2 are used as covariates. Definitions of all variables are included in Appendix Table A.

Table A6.4: Corporate culture and Independent directors' connectedness

Variables	Dependent variable: *Independent directors' connectedness*
	(1)
Corporate culture	0.087***
	(0.032)
Firm size	-0.023
	(0.014)
Leverage	-0.159*
	(0.087)
ROA	-0.167
	(0.183)
Firm age	0.002
	(0.001)
Board size	-0.008
	(0.009)
Board independence	0.015***
	(0.002)
Board busyness	0.009***
	(0.001)
Constant	-1.353***
	(0.392)
Observations	8434
R-squared	0.168
Year FE	YES
Industry FE	YES

This table reports the results of firms' culture on independent directors' connectedness using an OLS regression model. The dependent variable is the *Independent directors' connectedness,* which is the residual obtained from a regression of the natural logarithm of aggregate networks on the natural logarithm of firm size, board size, firm age, number of analysts and institutional ownership. The main independent variable is *Corporate culture* measured as the sum of the four corporate culture dimensions scores based on the CVF: *Compete, Create, Collaborate,* and *Control*. The control variables include the firm and board characteristics. Definitions of all variables are included in Appendix Table A. All models include year and industry fixed effects, where industry fixed effects are based on Fama-French 48 industry classification. Firm variables are winsorised at the 1st and 99th percentiles. Robust standard errors are in parentheses and are clustered at the firm level. ***, **, and * indicates significance at the 1%, 5%, and 10% level, respectively.